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An exploratory analysis of the relationship between social interactions, income and health in Italy

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Abstract

This paper carries out an exploratory investigation into the effect of various types of social interaction on health in Italy. After controlling for household income, education, work status and a number of socio-demographic variables, we find that the frequency of meetings with friends is significantly and positively associated with self-perceived health. The frequency of visits with relatives has a significant, but weaker effect. Membership in voluntary organizations is a significant and weakly negative predictor of good health. Other relevant explanatory variables are education and work status.

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1. Introduction

In the last two decades, a growing body of research on social capital has emerged in public health[1]. Empirical studies have found compelling evidence of a strong association between social trust, some types of networks, and connectiveness – often grouped together under the umbrella term of social capital – and health in a variety of developed and developing countries (Kawachi *et al.* 1997, 1999, Carlson 1998, Rose 2000, Subramanian *et al.* 2002, Kennelly *et al.* 2003, Kim *et al.* 2006, Poortinga 2006, Folland 2007, Engstrom *et al.* 2008). Recently, the topic has attracted the attention of economists. The effect of social capital on health and risky behaviours such as drinking and smoking has been checked in a number of economic studies after controlling for income and other wealth-related variables (Carlson 1998, Frijters *et al.* 2005, De Silva *et al.* 2007, Folland 2007, Chuang *et al.* 2008, Petrou *et al.* 2008, Fujisawa *et al.* 2009, Brown *et al.* 2010, D'Hombres *et al.* 2010, Giordano *et al.* 2010).

Social interactions can influence health in a number of ways. More intense social relationships may facilitate individuals' access to social support and health care, as well as the development of informal insurance arrangements (D'Hombres *et al.* 2010). They can promote a more rapid diffusion of health information, increase the likelihood that healthy norms of behaviour are adopted (e.g., physical activity and usage of preventive services), and exert social control over deviant health-related behaviours (Kawachi *et al.* 1999, Phelps 2000, Melchior *et al.* 2003, Brown *et al.* 2006, Folland 2007). Cohesive networks may exert the so-called "buffering effect", balancing the adverse consequences of stress and anxiety through the provision of affective support and by acting as a source of self-esteem and mutual respect (Kawachi *et al.* 1997, Eberly *et al.* 2004, Greiner *et al.* 2004, De Silva *et al.* 2007). At the macro level, a cohesive community may be able to carry out collective actions for the improvement of health services and amenities (Kawachi *et al.* 1997, De Silva *et al.* 2007).

Our work contributes to the debate by carrying out the first exploratory assessment of the socio-economic determinants of self-reported health in Italy from an economic perspective. We are particularly interested in assessing the role of the structural components of social capital, as given by participation in formal and informal networks. Raw data is taken from the 1993-2000 sections of both the Multipurpose Survey on Households (MSH) conducted by the Italian Institute of Statistics (Istat) and the Survey on Household Income and Wealth (SHIW) carried out by the Bank of Italy. The final sample is an original dataset obtained by merging information from these two sources through statistical matching, a technique allowing for the integration of data from different files not containing the same units (Rodgers 1984, Rässler 2002, D'Orazio *et al.* 2006).

Based on logistic regressions, our preliminary results show a significant and positive association between self-reported health and the frequency of meeting with friends. The frequency of visiting relatives is significantly correlated with good health, but the size of its effect seems to be negligible. Other significant explanatory variables are education, employment (both as self-employed and as an employee), and newspaper reading. Membership in voluntary organizations is significantly and negatively associated with good health.

At this stage of the research, the analysis still has some limitations. First, meeting with friends and relatives, as well as membership in voluntary organizations, may be endogenously determined. Thus, addressing the problem of endogeneity is an overriding task for a more in-depth assessment of the relationship between social interactions and health. Second, the role of ecological variables should be subjected to a thorough evaluation. Italy is in fact experiencing a process of decentralization of social policies (the so-called "devolution"), which has led to a gradual cutback of the public sector and to the creation of a number of local markets for health services. The process has resulted in a marked and growing differentiation between regions, which requires further investigation about the role played in the determination of health by "regional" variables such as the

[1] Materials on social capital and health are retrievable on *Social Capital Gateway*, a website edited by the corresponding author of this article at the address www.socialcapitalgateway.org.

level of public spending, the presence of social enterprises providing health services, and the quality of public health infrastructures. The reminder of the paper is organized as follows: section 2 describes the data and methodology. Section 3 presents and comments on our results. A discussion of the implications for further studies closes the paper.

2. Data and methodology

Raw data is drawn from the 1993-2000 sections of the Multipurpose Survey on Households (MSH) conducted by Istat. This survey investigates a wide range of social behaviours and perceptions on a sample of 24,000 households, roughly corresponding to 50,000 individuals. However, it does not collect information on household income. In order to overcome this limit, we combined the MSH with the SHIW by imputing the income variables of individuals taken from the SHIW to similar individuals from the MSH through a statistical matching procedure[2]. Both of the samples are representative of the Italian population at the national and regional level. As in Fiorillo (2008), let *A* be the MSH dataset (the so-called "base file") collecting information on X_A variables for each of n_A records, and let *B* be the SHIW dataset (the "supplemental file") comprising X_B variables for each of n_B records. Let $X=(X_1,...,X_P)$ be the vector of variables measured in both the files, i.e. for each of the units n_A and n_B included in the two datasets. The remaining variables in each of the files will be referred to as $Y=(Y_1,...,Y_Q)$ in file *A* and as $Z=(Z_1,...,Z_R)$ in file *B*. The statistical matching procedure is aimed at creating a file *C* collecting all the variables *X*, *Y*, and *Z* for each of n_A records of the base file. For each unit in file *A* we identify a similar unit in file *B* as a function of the *X* "common" variables. Then, we impute the household income variable collected in the supplemental file *B* (the SHIW) to the matching records in the base file *A*, in order to obtain an original dataset *C* including all the variables of interest for the analysis. The inherent assumption in this procedure is that the random vector *Y* given *X* is independent of the random vector *Z* given *X*. The conditional independence assumption implies that *Y*'s relationship to *Z* can be totally inferred from *Y*'s relationship to *X* and *Z*'s relationship to *X*. Thus, the distributions of *X*, *Y*, and *Z* of the new file *C* must be identical to the distributions of *X*, *Y*, and *Z* empirically observed in the original files *A* and *B*. As a consequence, the best test to evaluate the quality of the statistical matching relies on the marginal distributions of the variables. As stated by Rässler (2002, 23), "A statistical match is said to be successful if the marginal and joint empirical distributions of *Z* and *Y* as they are observed in the donor samples are nearly the same in the statistically matched file". It should be clear, however, that "the statistical matching procedure does not generate new information about the conditional relationship of the *Y-Z* pair, but only reflects the assumptions used in creating the matched file" (Kadane 1978, 166).

The common variables $X=(X_1,...,X_P)$ shared by the original datasets are identified according to the following criteria: 1) they must have been classified and measured in the same (or very similar) way in both of the surveys. 2) They must have been observed for all the individuals included in the samples. 3) They can be assumed as possible determinants of health and social interaction in the base file. Based on hints from previous studies, we chose the following variables: gender, age, education, family size, number of children, region of residence, work status, sector of activity, and homeownership. The statistical matching was then performed through a regression imputation with random residuals. More in particular, the regression parameters of *Z* (i.e. the household income) on *X* were estimated on the SHIW. Then, a random residual was added to the regression prediction to obtain the imputed value of *z* for each $a=1,...,n_A$ record in file *A*. Finally, the quality of the procedure was controlled by comparing, for each of the considered years, the

[2] The SHIW covers 7,768 households composed of 19,551 individuals and 13,009 income-earners and contains detailed information on the income and wealth of family members as well as socio-demographic characteristics of the household.

conditional distribution of the household income given X in the new and the original files. The marginal distributions are not found to be statistically different[3].

Our final dataset C is a pooled cross section sample of 216,994 observations collected in the years 1993, 1995, 1998, and 2000. In this file, the level of household income "drawn" from the Survey on Household Income and Wealth carried out by the Bank of Italy is imputed to the n_A statistical records included in the Istat Survey on Households.

Our dependent variable is self-reported health, as measured through the question, "In general, would you say that your health is very good, good, fair, poor, or very poor?" In contrast to most of the previous studies on the topic, we preferred not to dichotomize the variable in order to keep as much information as possible. Among independent variables, we focus on the "structural" component of social capital. The health economics literature commonly distinguishes between the structural and the cognitive dimensions social capital. Basically, the former dimension refers to social networks that connect agents. The latter refers to the dispositional characters of agents that affect their propensity to trust others and adopt cooperative behaviours (Uphoff 1999, Sabatini 2009a, 2009b). Following Sabatini (2009a), we measure the structural dimension of social capital through indicators of social interaction. In particular, we account for the following variables:

- the frequency of meetings with friends, a categorical variable measured on a 5-point scale ranging from 1 if the interviewee usually meets friends everyday to 5 if never.
- The frequency of meetings with relatives, as measured on the same scale[4].
- Membership in organizations, distinguished between passive membership (if the individual participated in meetings of an organization in the 12 months prior to the interview), and active membership (if the individual did unpaid work for an organization in the 12 months prior to the interview). The organizations we accounted for are volunteer, charitable, ecological and cultural associations, political parties, and trade unions.
- Religious participation, as measured through a binary variable which is equal to 1 if the interviewee goes to a church or other place of worship one or more times a week.

We controlled for gender, marital status, age, family size, presence and age of children, education, work status, homeownership, the home's characteristics (whether it is "civil" or "luxury"), newspaper reading, and the subjective perception about a number of problems possibly affecting the community, such as traffic, parking, pollution, dirtiness, micro-criminality, and the inefficiency of the public transportation system. Finally, following empirical studies in health economics (Carlson 1998, Frijters *et al.* 2005, Poortinga 2006, De Silva *et al.* 2007, Folland 2006, 2007, Yip *et al.* 2007, Chuang *et al.* 2008, Mansyur *et al.* 2008, Petrou *et al.* 2008, Fujisawa *et al.* 2009, Brown *et al.* 2010, D'Hombres *et al.* 2010, Giordano *et al.* 2010), we controlled for a measure of income, given by the natural logarithm of the imputed household income (sum of labour income, capital income and pensions) obtained through the statistical matching procedure. Since income is a likely source of common bias, its inclusion in the set of independent variables adds to the analysis by allowing a better evaluation of the role of social capital and the other demographic and socio-economic characteristics of agents.

All the variables are described in detail in Table A1 in the Appendix. Summary statistics are reported in Table 1 below. They show that, on average, respondents are female, married, with children, have a low education level, are employed as an employee, are homeowners, and they rate their health as good. In terms of the key independent variables, 47% of individuals meet friends and relatives one or more times per week. 22% of respondents are passive members of voluntary organizations. 12% are active members. 34% of the sample attends churches or other places of worship one or more times a week.

[3] Distributions are available upon request to the authors.

[4] Categories of the two variables measuring the frequency of meetings with friends and relatives were grouped as follows: 1 = everyday; 2 = one or more times a week; 3 = a few times per month; 4 = a few times per year. The reference category is *never*.

Our empirical model of perceived health can be represented by the following estimation equation:

$$H_{it}^{*} = \alpha + SI_{it}^{'}\beta + \lambda Y_{it} + Z_{it}^{'}\delta + \varepsilon_{it} \quad (1)$$

where H is self-reported health for individual i at time t; SI are the social interaction variables defined at the individual level; Y is the annual household income; the Z vector consists of the other variables that are known to influence self-perceived health and ε is a random-error term.

We do not observe H^{*} in the data. Rather, we observe H as an ordinal variable, measured on a scale from 1 (very poor perceived health) to 5 (very good perceived health). Thus, the structure of (1) makes it suitable for estimation as an ordered logit model:

$$\Pr(H_{it} = J\text{-}1) = F(\mu_j - \alpha - SI_{it}^{'}\beta - \lambda Y_{it} - Z_{it}^{'}\delta) - F(\mu_{j\text{-}1} - \alpha - SI_{it}^{'}\beta - \lambda Y_{it} - Z_{it}^{'}\delta) \quad (2)$$

where j takes a value from 1 to 5, μ_j is defined such as $H=J\text{-}1$ when $\mu_{j\text{-}1} < H^{*} \leq \mu_j$ and $F(.)$ is the logistic distribution.

Table 1. Descriptive statistics

	Obs.	Mean	St. dev.
Dependent variable			
Self-perceived health	213792	4.06	1.06
Frequency of meetings with friends			
Everyday	215564	0.24	0.43
Once or more times per week	215564	0.47	0.50
A few times per month	215564	0.15	0.35
A few times per year	215564	0.07	0.25
Frequency of meetings with relatives			
Everyday	219994	0.13	0.34
Once or more times per week	219994	0.16	0.37
A few times per month	219994	0.04	0.20
A few times per year	219994	0.04	0.20
Associational and religious participation			
Passive membership	212012	0.22	0.41
Active membership	211542	0.12	0.33
Church attendance	212603	0.34	0.47
Demographic and socio-economic characteristics			
Female	216994	0.52	0.50
Married	216994	0.58	0.49
Age21-40	216994	0.17	0.38
Age31-40	216994	0.18	0.38
Age41-50	216994	0.16	0.37
Age51-65	216994	0.21	0.41
Age > 65	216994	0.17	0.38
Household size	216994	3.26	1.31
Children 0-5	216994	0.13	0.39
Children 6-12	216994	0.20	0.48

Table 1. Descriptive statistics (continuation)			
Children 13-17	216994	0.23	0.50
Elementary	216994	0.25	0.43
Junior high school	216994	0.32	0.47
High school (diploma)	216994	0.30	0.46
Bachelor's degree and beyond	216994	0.06	0.25
Household income (ln)	216994	10.64	0.46
Self-employed	216994	0.11	0.32
Unemployed	216994	0.06	0.24
Student	216383	0.10	0.30
Retired	216994	0.20	0.40
Newspaper reader	212787	0.25	0.43
Homeowner	216994	0.72	0.45
Civil house	214251	0.61	0.49
Perception of community problems			
Micro-criminality	216555	0.03	0.17
No parking problems	215259	0.39	0.49
No traffic problems	214895	0.23	0.42
No pollution	215059	0.30	0.46
No dirtiness problems	215378	0.27	0.44
No public transport problems	214359	0.37	0.48

3. Results

Table 2 reports the results of our estimates. The frequency of meetings with friends is found to be strongly and positively correlated with perceived health. Meeting friends everyday raises the probability of reporting very good health by 10% (see Table 3 reporting the marginal effects). The size of the positive effect exerted by relationships with friends eases as the frequency of meetings decreases. Meeting with friends a few times per year is associated with a 2,5 point higher probability of reporting very good health. More intense social relationships may unfold a positive effect on health through four channels. First, they facilitate the acquisition of health information, since friends may share past experiences and provide information on health facilities, doctors, drugs, and diseases (D'Hombres *et al.* 2010). Second, they promote the development of informal insurance arrangements. Melchior *et al.* (2003) report that individuals with adequate social relations receive advice as well as material and financial aid from others and thus may benefit from better (medical and non-medical) care. Notably, mutual assistance mechanisms generally play a particularly relevant role in areas where the informal economy is widespread and the institutions are weak, such as the Italian Mezzogiorno. Third, they exert social control over deviant health-related behaviour. Kawachi et *al.* (1999) suggest that innovative behaviours (e.g., use of preventive services) diffuse much more rapidly in communities that are cohesive and in which members know and trust one another. According to Folland (2007), "sympathetic relationships might serve as coaching, urging healthful practices" (e.g. physical activity). Fourth, cohesive social networks may buffer the adverse effects of stress, thereby reducing the need for harmful habits such as smoking and drinking. Social relationships of poor quality may lead to feelings of insecurity and low self-esteem, resulting in higher levels of stress, causing depression and anxiety (Kawachi *et al.* 1999, De Silva *et al.* 2007).

Education is another relevant predictor of perceived health. Having a high-school degree increases the probability of very good perceived health by 16%. This probability rises to 18% when bachelor's degree and beyond is achieved. The explanation of this result seems to be straightforward: education helps individuals to acquire and properly select high quality information on risky behaviours, preventive services, medical care methods, and access to facilities.

The effect of household income per se is significant, but its size seems to be comparatively negligible. Work status is found to be a stronger predictor of perceived health. Being unemployed or retired increases the individuals' probability of rating their own health as very poor by 4%. By contrast, self-employed workers exhibit a 2.7 point higher probability of reporting very good health.

The presence of micro-criminality in the area of residence seems to be a significant explanatory variable. Individuals who have been subject to pickpocketing exhibit a 1.8 percentage point higher probability of reporting very bad health. Feelings of fear and insecurity raise stress and anxiety, which may in turn cause a number of psychosomatic pathologies. This result supports the claims of previous epidemiological studies stressing the importance of living in a safe area. This strand of the literature points out how people feeling insecure about their neighbourhood may be more inclined to participate in unhealthy behaviours such as smoking. Patterson *et al.* (2004) found that when a geographical area was aggregately rated as a cohesive, safe, and a good place to live, individuals reported a lower tendency to smoke. Greiner *et al*. (2004) found that community rating (i.e. whether the community was rated as a good place to live) was associated with individual smoking.

An interesting result, which to our knowledge has no precedent in the literature, is the significant and positive association between the habit of reading newspapers and good perceived health. The probability of reporting very good health is 3.6 percentage points higher for individuals who read newspapers daily. Since newspapers are a channel of information about health-related behaviours, daily readers are likely to be more aware of the risks associated with smoking and

Table 2. Ordered logit estimations

	Model I		Model II		Model III	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Frequency of meetings with friends						
Everyday	0.395***	(0.026)	0.394***	(0.026)	0.410***	(0.025)
Once or more times per week	0.355***	(0.024)	0.355***	(0.025)	0.367***	(0.025)
A few times per month	0.205***	(0.031)	0.204***	(0.031)	0.211***	(0.030)
A few times per year	0.099***	(0.028)	0.099***	(0.028)	0.104***	(0.027)
Frequency of meetings with relatives						
Everyday			0.086***	(0.015)	0.087***	(0.015)
Once or more times per week			0.081***	(0.012)	0.081***	(0.012)
A few times per month			0.059***	(0.019)	0.062***	(0.019)
A few times per year			0.077***	(0.019)	0.078***	(0.018)
Associational and religious participation						
Passive membership					-0.069***	(0.011)
Active membership					-0.063***	(0.012)
Church attendance	0.009	(0.012)	0.009	(0.012)	0.016	(0.012)
Demographic and socio-economic characteristics						
Female	-0.014	(0.010)	-0.015	(0.010)	-0.024**	(0.011)
Married	0.191***	(0.019)	0.187***	(0.019)	0.185***	(0.019)
Age21-40	-0.064***	(0.023)	-0.062***	(0.023)	-0.055**	(0.023)
Age31-40	-0.190***	(0.028)	-0.189***	(0.027)	-0.176***	(0.028)
Age41-50	-0.286***	(0.029)	-0.283***	(0.029)	-0.264***	(0.028)
Age51-65	-0.594***	(0.039)	-0.585***	(0.038)	-0.569***	(0.038)
Age > 65	-1.308***	(0.043)	-1.295***	(0.042)	-1.285***	(0.041)
Household size	0.157***	(0.009)	0.160***	(0.009)	0.159***	(0.009)
Children 0-5	0.128***	(0.019)	0.121***	(0.019)	0.121***	(0.019)
Children 6-12	-0.039***	(0.015)	-0.044***	(0.014)	-0.043***	(0.014)
Children 13-17	0.172***	(0.014)	0.170***	(0.014)	0.173***	(0.014)
Elementary	0.385***	(0.027)	0.387***	(0.027)	0.388***	(0.027)
Junior high school	0.557***	(0.031)	0.558***	(0.031)	0.566***	(0.031)
High school (diploma)	0.619***	(0.031)	0.620***	(0.031)	0.637***	(0.032)
Bachelor's degree and beyond	0.716***	(0.033)	0.716***	(0.033)	0.764***	(0.034)
Household income (ln)	0.070***	(0.022)	0.070***	(0.022)	0.073***	(0.022)
Self-employed	0.115***	(0.016)	0.115***	(0.016)	0.111***	(0.016)
Unemployed	-0.180***	(0.025)	-0.179***	(0.024)	-0.183***	(0.024)
Student	-0.069**	(0.029)	-0.069**	(0.029)	-0.064**	(0.029)
Retired	-0.184***	(0.019)	-0.183***	(0.019)	-0.187***	(0.019)
Newspaper reader	0.142***	(0.011)	0.143***	(0.011)	0.147***	(0.011)
Homeowner	-0.092***	(0.017)	-0.092***	(0.017)	-0.092***	(0.017)
Civil house	0.021**	(0.009)	0.016*	(0.009)	0.015	(0.010)
Perception of community problems						
Micro-criminality	-0.079***	(0.029)	-0.079***	(0.029)	-0.077***	(0.028)
No parking problems	0.019	(0.012)	0.019	(0.012)	0.020	(0.012)
No traffic problems	0.054***	(0.017)	0.053***	(0.017)	0.052***	(0.017)
No pollution	0.036*	(0.019)	0.036*	(0.019)	0.036*	(0.020)

Table 2 (continuation)						
No dirtiness problems	0.004	(0.016)	0.004	(0.016)	0.005	(0.015)
No public transportation problems	0.029***	(0.011)	0.029***	(0.011)	0.029	(0.012)
Regional dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
No. of observations	202155		202155		200611	
Pseudo R-squared	0.068		0.068		0.069	
Log-likelihood	-243462.24		-243418.4		-241533.46	

Notes: The dependent variable *Self-perceived health* takes on discrete values (1 = very poor, 5 = very good). The model is estimated with an ordered logit. See the Appendix for a detailed description of regressors. Regional and years dummies are omitted for space reasons. Standard errors are corrected for heteroskedasticity and clustering of errors at the regional level. The estimated cut points are not reported. The symbols ***, **, * denote that the coefficient is statistically different from zero at 1, 5 and 10 percent.

drinking, or the positive effects of a balanced diet, physical activity, and the use of preventive services.

Household characteristics matter as well. As expected, perceived health is found to decrease with age. Marital status and the household size are instead significantly and positively associated with very good health. Being married raises the likelihood of reporting good health by 4.5%. A one-member increase in the household size is associated with a 3.9 percentage point higher probability of good perceived health. This result is coherent with the commonly accepted thesis that social isolation is a powerful factor of health deterioration (Kawachi *et al.* 1997, Kawachi *et al.* 1999, Folland 2007, D'Hombres *et al.* 2010).

Religious participation is not a significant predictor of health. This finding does not support previous claims by Brown *et al.* (2010). Drawing on longitudinal data from different sources, the authors find that, in the U.S., religious groups may improve community health through the spreading of moral norms thereby containing unhealthy lifestyles. At the community level, religion may also be a factor promoting collective action leading to better health services and amenities. As reported by Uslaner (1999) in a comprehensive review of the literature, religious values and involvement with institutions of faith may promote participation in other arenas, such as voting (Rosenstone *et al.* 2003) and volunteering (Wuthnow 1994). However, this seems not to be the case for Italy. Putnam (1993) argues that religion is an alternative to social capital and cohesion in Italy: "The Catholic Church there is hierarchical; it dissuades people from becoming involved in their communities" (1993, 107).

Adding the frequency of visits to relatives to the model does not change our results (see Column II in Table 3). The habit of visiting relatives is significantly and positively associated with perceived health, but the size of its effect does not change with the frequency of the visits. As reported in Table 3, meeting with relatives everyday increases the probability of reporting very good health by 2.1%. This probability is just 0.2 percentage points lower for individuals meeting with relatives a few times per year.

This finding may be interpreted as a sign that, in Italy, the intensity of family ties does not necessarily reflect their quality. Tight family relationships can be perceived as "bonding" and take the form of not very spontaneous behaviours, which may not be the expression of a wholehearted care for relatives. By contrast, less oppressive relationships may be associated with more affectionate behaviours (such as gift-giving, baby-sitting, and assistance in case of illness) and higher levels of subjective satisfaction with family life (Sabatini 2008, 2009a). Thus, seeing (or being visited by) relatives everyday instead of few times per month or per year, does not add a significant value in term of health improvement.

An interesting result is provided by the inclusion in the model of membership in voluntary organizations (Column III in Table 3).

Table 3. Marginal effects (d*y* / d*x*)

	Very poor health	Poor health	Fair health	Good health	Very good health
Frequency of meetings with friends					
Everyday	-0.007	-0.015	-0.047	-0.030	0.101
One or more times per week	-0.007	-0.014	-0.044	-0.023	0.090
A few times per month	-0.004	-0.008	-0.025	-0.015	0.052
A few times per year	-0.002	-0.004	-0.012	-0.007	0.025
Frequency of meetings with relatives					
Everyday	-0.001	-0.003	-0.010	-0.006	0.021
One or more times per week	-0.001	-0.003	-0.009	-0.005	0.020
A few times per month	-0.001	-0.002	-0.007	-0.004	0.015
A few times per year	-0.001	-0.003	-0.009	-0.005	0.019
Associational and religious participation					
Passive membership	0.001	0.002	0.008	0.004	-0.017
Active membership	0.001	0.002	0.007	0.003	-0.015
Church attendance	-0.000	-0.001	-0.002	-0.001	0.004
Demographic and socio-economic characteristics					
Female	0.000	0.001	0.003	0.001	-0.006
Married	-0.004	-0.007	-0.022	-0.011	0.045
Age21-40	0.001	0.002	0.006	0.003	-0.013
Age31-40	0.003	0.007	0.021	0.009	-0.043
Age41-50	0.005	0.011	0.033	0.013	-0.063
Age51-65	0.013	0.026	0.072	0.022	-0.135
Age > 65	0.041	0.074	0.160	0.002	-0.279
Household size	-0.003	-0.006	-0.019	-0.009	0.039
Children 0-5	-0.002	-0.004	-0.014	-0.007	0.029
Children 6-12	0.001	0.001	0.005	0.002	-0.010
Children 13-17	-0.003	-0.007	-0.021	-0.010	0.042
Elementary	-0.007	-0.014	-0.045	-0.028	0.096
Junior high school	-0.010	-0.021	-0.066	-0.041	0.139
High school (diploma)	-0.011	-0.023	-0.073	-0.048	0.157
Bachelor's degree and beyond	-0.011	-0.023	-0.078	-0.070	0.184
Household income (ln)	-0.001	-0.003	-0.009	-0.004	0.018
Self-employed	-0.002	-0.004	-0.013	-0.007	0.027
Unemployed	0.004	0.007	0.022	0.009	-0.044
Student	0.001	0.003	0.007	0.003	-0.015
Retired	0.004	0.008	0.023	0.010	-0.045
Newspaper reader	-0.002	-0.005	-0.017	-0.009	0.036
Homeowner	0.001	0.003	0.011	0.005	-0.022
Civil house	0.000	-0.001	-0.001	-0.000	0.003
Perception of community problems					
Micro-criminality	0.001	0.003	0.009	0.004	-0.018
No parking problems	- 0.000	-0.001	-0.002	-0.001	0.005
No traffic problems	-0.001	-0.002	-0.006	-0.003	0.012

Table 3 (continuation)					
No pollution	-0.000	-0.001	-0.004	-0.002	0.009
No dirtiness problems	-0.000	-0.000	-0.001	-0.000	0.001
No public transportation problems	-0.000	-0.001	-0.003	-0.001	0.007

Both passive and active membership show a significant and slightly negative association with very good health. This finding adds to a rather conflicting evidence on the possible role of the social capital of voluntary associations. At the macro level, the density of organizations and, more in general, the presence of a vibrant civil society, are commonly supposed to be related to a better ability to carry out collective actions which, in principle, may contribute to the improvement of public health (Putnam 1993, Kawachi *et al.* 1999). However, at the micro level, previous studies have found just weak associations between membership in organizations and health. Drawing on cross-country data from the World Values Survey (WVS), Carlson (1998, 2004) finds that associational activity is not related to individual health, neither is it important in explaining the health differences between areas. In a recent study based on the Living Conditions, Lifestyles and Health (LLH) survey, D'Hombres *et al.* (2010) find membership in Putnamesque associations not to be a significant predictor of self-perceived health in a sample of eight former Soviet Union countries. On the other hand, Giordano and Lindstrom. (2010) use two waves of the British Household Panel to find that membership in community groups and local voluntary associations is a predictor of self-rated health, even after adjusting for other well-known health determinants. Similar results are obtained by Ferlander *et al.* (2009) drawing on a representative sample of the Moscow population. Overall, our results support the claim that different dimensions of social capital are diversely correlated to self-perceived health. As pointed out by previous literature, strong ties with relatives (often labelled as "bonding social capital") seem to exert just a marginal effect on individual well-being (see for example Sabatini 2008). This finding suggests the need to look for alternative indicators of family social capital capturing the quality of relationships, instead of accounting solely for their intensity (Fiorillo and Sabatini 2011). Informal ties given by relationships with friends (often called "bridging social capital") exhibit a much stronger correlation with good health. On the other hand, weak ties connecting members of voluntary organizations seem to be irrelevant for individual health. The slightly negative association we find in our study may be connected to endogeneity problems in the sense of reverse causation: bad health conditions are in fact likely to hamper participation in associational activities.

4. Concluding remarks

This paper has carried out a first exploratory analysis of the socio-economic determinants of self-reported health in Italy from an economic perspective. Preliminary results show that our dependent variable is strongly and positively associated with interactions with friends. The size of this positive relationship eases as the frequency of meetings decreases. Visits to relatives are significantly correlated with good health too, but the size of the correlation is smaller. Other significant explanatory variables are education, work status, and newspaper reading. Religious participation is not a predictor of health. The effect of income per se is significant, but its size seems to be comparatively negligible. Membership in organizations exhibits a significant and weakly negative correlation with self-rated health.

At this stage of the research, the analysis still has some limitations, which may inform further developments of this work. First, it is difficult to distinguish the effect of social interaction from other local effects potentially influencing health. Meeting with friends and relatives, as well as membership in organisations, are the result of individual choices, which depend on individual specific and unobservable preferences. Hence, they are by definition endogenously determined. Moreover, the possibility of a reverse causality must be taken into account: individuals in poor

health may be more socially isolated or forced to decline various forms of social participation if they are hampered in daily activities (D'Hombres *et al*. 2010). Thus, addressing the problem of endogeneity is an overriding task for a more in-depth assessment of the relationship between social interactions and health.

Second, the role of "ecological variables" should be subjected to a thorough evaluation. As outlined in the introduction, Italy is in fact experiencing a process of decentralization of health policies, which has led to a gradual cutback of the public sector and to the creation of a number of regional markets for health services. This process has resulted in marked and growing differentiation and inequalities between regions. Thus, further investigation is required into the role of local variables measured at the macro level, such as the level of income inequality, the regional distribution of human and social capital, local public spending for social policies and healthcare, and the presence of social enterprises providing health and assistance services. An assessment of which combination of informal assistance mechanisms, public policies, and intervention by social enterprises provides the best health outcomes could lead to the design of new policies orienting the "devolution process" towards a reduction in inequalities across regions.

Third, the transmission mechanism connecting social interactions to health must be subjected to a more in-depth evaluation. Most effects are supposed to work through the containment of risky attitudes. Thus, accounting for the relationship between social interaction variables, health, and smoking and drinking behaviours would significantly improve the explanatory power of the analysis. Importantly, fulfilling this task would lead to a first assessment of the so-called "buffering effect" from an economic perspective.

Last but not least, the role of associational membership, which was already controversial in the previous literature, seems to require further investigation and interpretation. Our analysis does not distinguish between different types of organizations. A further step for improving our understanding could be made by accounting for differences in the nature and scope of associations, e.g. distinguishing between Putnamesque and Olsonian organizations.

Despite these limitations, our study contributes to the literature in three substantive ways, First, to our knowledge this is the first empirical investigation into the socio-economic determinants of health in Italy. Second, we try to do justice to the multidimensionality of the concept of social capital by taking into account different types of social interaction and pointing out how diverse is their correlation with individual health. The reliability of the analysis also benefits from the uniqueness and comprehensiveness of our dataset, which tries to overcome a structural deficiency in Italian data by merging information on agents' behaviours and perceptions with data on household income through the statistical matching procedure. Third, the preliminary results reported in the paper provide some guidelines for the continuation of researches on the Italian case study. In particular, we emphasize the need to account for measures of the quality of relationships instead of focusing solely on their quantity. These measures are sometimes collected in national social surveys (see for example the U.S. General Social Survey). The chronic lack of suitable panel data poses the need to address endogeneity problems in the frame of cross-sectional analyses. This raises severe methodological problems: while the use of instrumental variables estimation is gaining relevance in the empirical literature on public health, selection of credible instruments is a topic of heated debate in the field[5]. Another possibly suitable way to empirically assess the relationship between social capital and health is structural equation modelling. This latter technique has been recently proven to be helpful in handling categorical variables (see Kupek 2006, 2009 for a thorough and propositional review of the literature).

[5] See for example Bond et al. (2007), French and Popovici (2011), and Hall (2011) for a review on the use of instrumental variables in public health studies.

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Appendix

Table A1. Detailed description of variables

Dependent variable	
Self-perceived health	Individual assessment of health; 1 = very poor, 5 = very good
Frequency of meetings with friends	
Everyday	Frequency of meeting friends, 1 = everyday
Once or more a week	Frequency of meeting friends, 1 = one or more times a week
Few times a month	Frequency of meeting friends, 1 = few times a month
Few times a year	Frequency of meeting friends, 1 = few times a year. **Reference group: never.**
Frequency of meetings with relatives	
Everyday	Frequency of meeting relatives, 1 = everyday
One or more a week	Frequency of meeting relatives, 1 = one or more times a week
Few times a month	Frequency of meeting relatives, 1 = few times a month

Table A1. Detailed description of variables (continuation)

Few times a year	Frequency of meeting relatives, 1 = few times a year. **Reference group: never.**
Associational and religious participation	
Passive membership	Participation in meetings of formal organizations, 1 = volunteer service, ecological, cultural, political party and unions
Active membership	Unpaid activity for formal organizations, 1 = volunteer service, other, political party and unions
Church attendance	Whether the respondent goes to church once or more a week, 1 = yes
Demographic and socio-economic characteristics	
Age21-40	Age of the respondent, 1 = age between 21 and 30. **Reference group: age14-20.**
Age31-40	Age of the respondent, 1 = age between 31 and 40
Age41-50	Age of the respondent, 1 = age between 41 and 50
Age51-65	Age of the respondent, 1 = age between 51 and 65

Age>65	Age of the respondent, 1 = age above 65
Household size	Number of people who live in family
Children0_5	Age of children, 1 = children aged between 0 and 5 years. **Reference group: no children.**
Children6_12	Age of children, 1 = children aged between 6 and 12 years
Children13_17	Age of children, 1 = children is aged between 13 and 17 years
Elementary	Education of the respondent, 1 = completed elementary school (5 years)
Junior high school	Education of the respondent, 1 = completed junior high school (8 years)
High school (diploma)	Education of the respondent, 1 = completed high school (13 years)
Bachelor's degree	Education of the respondent, 1 = university degree and/or doctorate (18 years and more)
Household income (ln)	Natural logarithm of imputed household income (sum of labour income, capital income and pensions)
Self-employed	Employment status of the respondent, 1 = self-employed. **Reference group: employed**
Unemployed	Employment status of the respondent, 1 = unemployed
Student	Employment status of the respondent, 1 = student
Retired	Employment status of the respondent, 1 = retired
Newspapers	Whether the respondent reads newspapers every-day a week; 1 = yes
Homeowner	Whether the respondent owns home outright, yes = 1
Civil house	Whether the respondent lives in a civil house, yes = 1
Perception of community problems	
Micro-criminality	Whether the respondent has suffered pickpockets, yes = 1
No parking problems	Whether the respondent declares that there is not difficulty in parking in the area where he lives, yes = 1
No traffic problems	Whether the respondent declares that there is not traffic in the area where he lives, yes =1
No pollution	Whether the respondent declares that there is not pollution in the area where he lives, yes =1
No dirtiness problems	Whether the respondent declares that there is not fifth in the area where he lives, yes =1
No public transport	Whether the respondent declares that there is not a problem connecting with public transport