World Health Organization

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A European perspective

Lorenzo Rocco, University of Padua, Italy
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Abstract
The aim of the research reported here was to examine the causal impact of social capital on health in 14 European countries. Using data from the European Social Survey for 14 European countries, supplemented by regional-level data, the authors studied whether individual and/or community-level social capital positively affects health. The authors controlled for other relevant factors that are also expected to affect health, and addressed – via an instrumental variable approach – the challenge of assessing causality in the relationship between social capital and health. The large variance of the error term due to measurement errors calls for strong instruments to obtain reliable estimates in a finite sample. The dataset is rich enough in information to allow the finding of a seemingly strong causal relationship between social capital and individual health. Community social capital (defined at regional level) appears not to affect health once individual-level social capital is controlled for. Taken at face value, the findings suggest that policy interventions should be targeted at improving primarily individual social capital. In doing so they would achieve a double effect: on the one hand they would directly improve individual health; on the other they would contribute to community social capital, which reinforces the beneficial role of individual social capital.

Keywords
SOCIOECONOMIC FACTORS – SOCIAL SUPPORT – ECONOMIC DEVELOPMENT – SOCIAL CHANGE – DATA COLLECTION

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Contents

Abbreviations III

Foreword IV

1. Introduction 1

2. What is social capital and why might it be good for health? 2

3. Data 4

4. The model 6

5. Results 10

6. Conclusions 13

References 14

Abbreviations

ESS	European Social Survey
EU	European Union
GDP	gross domestic product
NUTS	European Nomenclature of Units for Territorial Statistics
OLS	ordinary least squares
SHARE	Survey of Health, Ageing and Retirement in Europe

Foreword

The WHO Regional Office for Europe, in cooperation with its 53 Member States, is developing a new European policy for health – Health 2020. The main rationale for this policy stems from various factors, including the fact that within the WHO European Region, despite overall improvement in life expectancy, the distribution of health within and among countries is characterized by an increase in health inequities. All countries are challenged by major demographic, social, economic and environmental changes that impact population health. These changes bring both opportunities and challenges for the health of Europeans. Hence, Health 2020 sets out to critically re-examine current governance mechanisms for health, health policy, public health structures and health care delivery.

The Health 2020 vision is for a WHO European Region "where all people are enabled and supported in achieving their full potential and well-being and in which countries, individually and jointly, work towards reducing inequities in health within the Region and beyond". Assets for health and well-being should be taken into account as an important element in an innovative approach to translate this vision into action.

Assets-based approaches identify the protective and promoting factors that affect health and wellbeing. In the international literature one of these protective and promoting factors is identified as "social capital". Health 2020 acknowledges that assets-based research and programmes are relatively new to professionals working in the health sector. Nevertheless, they offer the potential to enhance both quality of life and longevity by focusing on the salutogenic resources that promote the self-esteem, resilience and coping skills of individuals and communities.

A review of the relevance of salutogenic assets for health and wellbeing has been carried out recently.[1] In that review the authors point out that asset-based approaches to health and well-being offer a new, positive lens for viewing the conditions required by individuals and communities to maximize their health potential. Such approaches focus on the well-known concepts of resilience and social capital. It is almost intuitive that social capital is linked to individual and community health. Since the term social refers to processes between people that establish networks, norms and social trust, and that facilitate coordination and cooperation for mutual benefit, one can infer that in a given population where the level of social capital is high, the level and distribution of health should be better than in a setting characterized by low social capital.

The authors utilize data from the European Social Survey of 14 countries supplemented by other data sources. Their analysis confirms the relationship between social capital and community and individual health. The authors contribute to fill important gaps for theoretical and empirical measurement of social capital and the causal impact of social capital on health. They argue that policy interventions should be targeted at improving individual social capital. Improved individual social capital would have a double impact. Firstly it would bring about improved conditions for individual health and community social capital would be increased as a consequence. In turn this would reinforce the health-promoting role of individual social capital.

Models such as the one developed in this publication need further research and improvement. Nevertheless, this work clearly shows that social capital cannot be overlooked by policy-makers when considering the best ways to improve conditions for protecting and promoting the health of individuals and communities. Theoretical and methodological developments of just this sort need to accompany the process of implementation of Health 2020. Measuring, monitoring and promoting people's resources and capacity to create health and health equity in European countries and in local communities are the founding stones for an assets-based approach.

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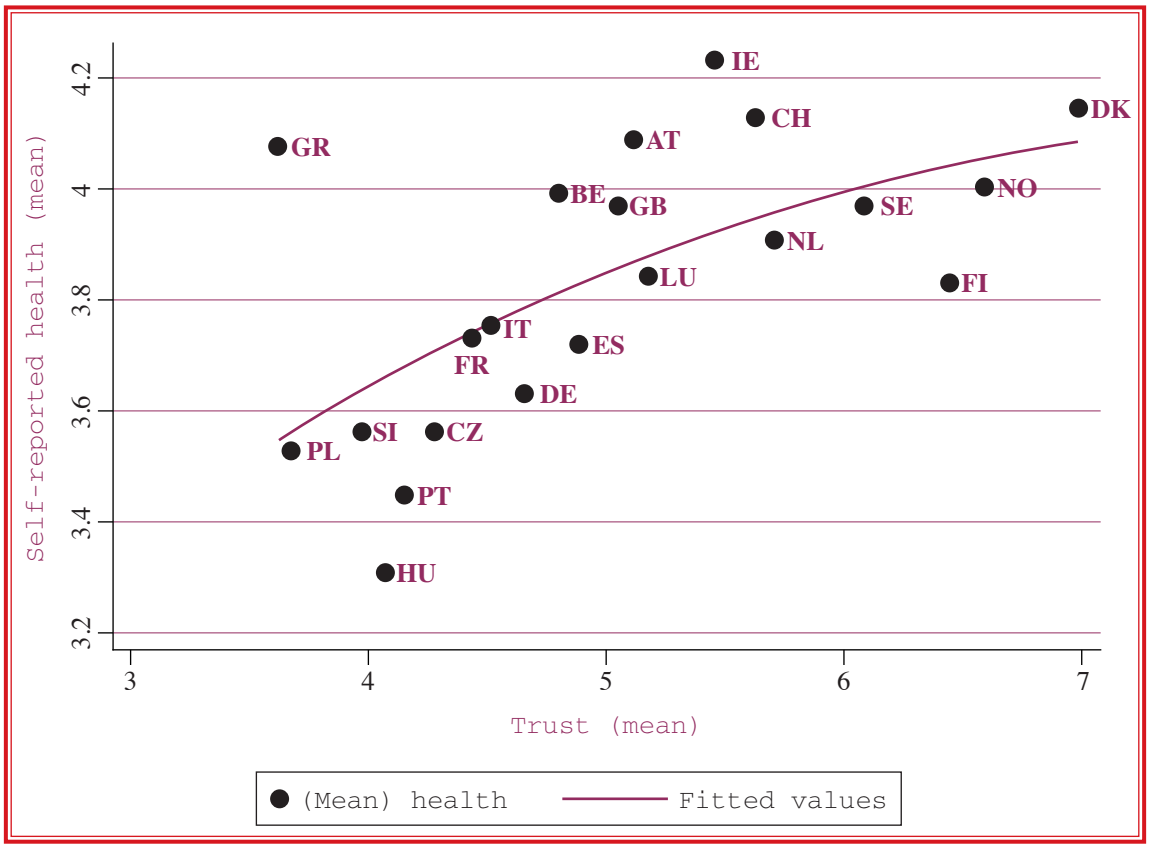
[1] Ziglio E et al. *Maximizing health potential for 2020: the asset model for health and development*. Copenhagen, WHO Regional Office for Europe (in press).

1. Introduction

Health economists and public health scientists have expended increasing effort in recent years to document what appears to be a rather close link between social capital and health. Islam et al. (2006) offer an excellent survey, and Scheffler, Brown & Rice (2007); Folland (2007) and D'Hombres et al. (2010) offer more recent contributions. Fig. 1, based on data from the 21 European countries covered by the European Social Survey (ESS), confirms this close relationship. In Fig. 1, social capital is measured for each country as a weighted mean of individuals' self-reported rate of trust. The question's exact wording is: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?"

Fig. 1. Health and trust in 21 European countries, 2002



Note: AT = Austria; BE = Belgium; CH = Switzerland; CZ = the Czech Republic; DE = Germany; DK= Denmark; ES = Spain; FI = Finland; FR = France; GB = the United Kingdom; GR = Greece; HU =Hungary; IE = Ireland; IT = Italy; LU = Luxembourg; NL = the Netherlands; NO = Norway; PL = Poland;PT = Portugal; SE = Sweden; SI = Slovenia.
Source: ESS (2002) and authors' calculations.

The positive relationship is evident and the correlation rather strong (0.51). The crucial question is whether this relationship reflects a causal impact from social capital to health, the reverse causal impact or the influence of other factors simultaneously affecting social capital and health. A further, more specific question relates to the relevant dimension of social capital that may be responsible for this link: is it the social capital at the individual level or the community level that matters for people's individual level of health, or is there some degree of interaction between the two types of social capital?

Only a sparse set of previous studies has undertaken explicit efforts to tackle the econometric challenges of assessing causality in the relationship between social capital and health. For instance, Folland (2007) in the case of the United States of America and D'Hombres et al. (2010) for a set of eastern European countries could not reject the hypothesis of a causal impact of social capital on health after a careful analysis. The existing evidence is decidedly mixed regarding the relative importance of individual- versus community-level social capital: while, for example, Poortinga (2006) found no independent impact of community social capital when individual social capital was simultaneously included in the estimated equation, Iversen (2007) suggests that both levels matter for individual health.

The present paper attempts to answer both questions for a set of 14 European countries, using data from the ESS in 2002 and 2004. Anticipating the results, first, the authors corroborate the hypothesis of a positive causal impact running from social capital to health; second, they suggest that community social capital has no independent effect once they control for individual social capital. To the best of the authors' knowledge, the present paper is the first to take into account the empirical challenges originating from the fact that both health and social capital are measured imperfectly.

The paper is organized as follows. Section 2 defines social capital and discusses research into the topic, including the link between social capital and trust. It also notes some of the mechanisms by which social capital might benefit health. Section 3 describes the data and provides summary statistics. Section 4 introduces the model of social capital and health that the authors estimate and extensively discusses the instruments used in the analysis, their relevance and exogeneity. Section 5 presents estimates corresponding to four quasi-nested specifications of the general model, and Section 6 discusses the results and concludes.

2. What is social capital and why might it be good for health?

Several definitions of social capital have been proposed in the sociological literature. Bourdieu (1986) defines it as the capital of social connections, mutual acquaintance and social recognition. Coleman (1988) refers to social capital as all those features of the social structure that might facilitate actions of individuals within the social structure itself. For instance, parental care may be seen as a social norm that facilitates children's subsequent activity and success in society; social relationships per se are a form of social capital as they establish obligations, expectations and trustworthiness. Putnam, Leonardi & Nanenetti (1993:167) define social capital as those "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions". The World Bank (2011) has adopted a definition of social capital very close to that of Putnam and colleagues: "Social capital is not just the sum of the institutions which underpin a society – it is the glue that holds them together". Although all definitions refer directly or indirectly to social connections or social networks as elements of social capital, the Putnam definition points to the role of social capital as a catalyst of coordination/cooperation, an essential device to achieve better (social and/or economic) outcomes. Coordination entails a range of potential benefits: it may help reduce transaction costs, overcome difficulties due to incomplete or asymmetric information and establish efficient transactions in the presence of incomplete contracts (Alesina & La Ferrara, 2002). In this sense the emphasis on trust as an indicator of social capital appears appropriate, as trust favours (even one-shot) cooperation, without the need of creating long-standing personalized relationships and processes of reputation building. Moreover, trust is a determinant of social connections, as a minimum amount of trust is required to initiate a social interaction (Ghosh & Ray, 1996; Kranton, 1996).

The authors of this paper embrace the perspective of Putnam and colleagues as they focus on the individual origin and source of social capital. As Glaeser, Laibson & Sacerdote (2002) point out, only if social capital is

an individual concept can one hope to rationalize it, discussing its accumulation and its production by applying the economic toolbox. Conversely, a concept mainly defined as a communitarian phenomenon, as is the case in the post-Coleman literature, would be hardly manageable.

At least three mechanisms could account for a positive role of social capital in determining individual health.

1. *The first is improved access to health relevant information*. The more extensive an individual's social interaction (for example, via frequent contact with friends and relatives, participation in social events and meetings, and membership in formal and informal organizations) and the more involved someone is in continuous social interaction, the more likely and less costly he/she can access information on how to cure or prevent diseases, what the best remedies are, and where the best hospital or the most qualified physician is. Improved access to information is particularly important in the health care setting, where asymmetric information between health suppliers and consumers represents a pervasive market failure.

2. *Informal health care and support can be provided in case of illness*. Even in developed countries, where formal health care is ubiquitous, there still exists a substantial demand for informal care and assistance, housing services and babysitting in case of temporary illness. A recent report (Buckner & Yeandle, 2007) valued the cost of informal care in the United Kingdom at £87 billion – almost the same as the National Health Service budget as a whole. At times, even financial support is required to cover occasional out-of-pocket expenditures on health care. The market or the public health system is often unable to provide this kind of support, either due to the short duration of the illness periods, which makes a formal organization difficult, or to the possibly prohibitive costs of provision. Therefore, informal and tacit mechanisms arise as a substitute. This could take the form of reciprocal assistance between neighbours or friends, acting as risk-sharing devices to supplement formal health insurance. In less developed countries, these agreements are even more widespread, given that the formal care system is far less developed than in rich countries. Reciprocal support and assistance are possible only in the context of reciprocal trust, as there is no enforceable contract guaranteeing obligations. Repeated interactions facilitate such forms of cooperation: in developing countries repetition is further ensured by the fact that households or kin groups, that is, long-lasting social institutions that stand beyond individuals, are the true subjects of the reciprocal obligations. By contrast, in developed countries obligations are taken by individuals (who may change residence often) and do not usually transfer to the heirs, making cooperation much more dependent on reciprocal trust. Informal assistance can be understood as the well-known prisoner's dilemma, a fundamental problem in game theory that demonstrates why two people might not cooperate even if doing so is in both their best interests. As game theory indicates, cooperative equilibrium is achievable only if each player trusts that his/her partner is also cooperative. If only one player is trusting, the predictable outcome is that the trusting player assists his/her partner but does not receive reciprocal assistance. This outcome would hardly be positive to a trusting player's health.

3. *In the political economy mechanism, well-organized, connected groups are more effective in lobbying*. At a more aggregate level, social capital may also serve to coordinate people's efforts to lobby public authorities to obtain potentially health-promoting public goods, for example, health infrastructure, traffic regulations, sport facilities and green space areas. The level of aggregation cannot be too high, as different communities within a larger region can have opposite views on the proper location for and cost of these facilities. Moreover, these investments are essentially non-excludable public goods that will benefit both citizens who did and did not invest in the lobbying efforts. Hence, such coordination is more likely realized at village or borough level rather than at, say, regional level.[2]

[2] Due to only very aggregate information about the respondents' place of residence in the data available, the authors were constrained to define "community" as the region of residence at the level of aggregation given in the survey, which contains information on the region of residence and is based on the European Nomenclature of Units for Territorial Statistics (NUTS) classification system (European Commission, 2011a). This meant that what this report calls "communities" corresponds to local units classed by the system in most cases as NUTS2 (and in some cases NUTS3), arguably a rather high level of agregation that may prevent testing for this specific mechanism.

3. Data

The authors used the first and second round of the ESS, a repeated, cross-country survey that covers 21 European countries (ESS, 2002 and 2004). It provides information about individual social behaviour and attitudes, such as political opinions, political participation, exposure to media and news, social relationships, and trust of other people and institutions. ESS is particularly valuable because it provides detailed information about respondents' socioeconomic characteristics and parental background. Health has not been a major focus of the survey: respondents are asked only to self-report their current health status and whether they are hampered in daily activities by illness or disability. Nevertheless, despite the generality and potential bias in those questions, the advantages are that they have been widely used in many surveys and, more importantly, self-reports have been shown to be a good predictor of mortality at the individual level (Ferraro & Farmer, 1999).

The sample included more than 80 000 respondents, equally shared between the two rounds. In each round ESS defines a representative sample for each covered country, so about 2000 residents in each country provide information in each round.

ESS data also contains information on the region of residence, based on NUTS (European Commission, 2011a), a geocode standard for referencing the subdivisions of countries for statistical purposes. The standard is developed and regulated by the European Union (EU). For each EU member country, a hierarchy of three NUTS levels is established; the subdivisions in some levels do not necessarily correspond to administrative divisions in a country. NUTS1 defines major socioeconomic regions; NUTS2 captures basic regions for the application of regional policies; NUTS3 relates to small regions for specific diagnoses (European Commission, 2011a). The information on the region of residents is at the NUTS2 level in most cases and NUTS3 in others. This feature allowed the authors to complement the ESS micro data with additional regional level data from the EU regional database (European Commission, 2011b). In particular the authors added regional indicators of development (gross domestic product (GDP) per capita and GDP growth and employment), health care supply (number of beds in hospitals and number of health personnel per 100 000 residents), as well as population density, length of road network and number of beds in hotels and residences. Not all of the regional-level information is available for all ESS countries. Hence, the dataset resulting from the merging of ESS and regional-level data had to be limited to 14: Austria, Belgium, the Czech Republic, Germany, Finland, France, Greece, Hungary, Italy, the Netherlands, Poland, Portugal, Spain and Sweden. The regional level data the authors used came from the same years as the ESS micro data.

The variables of primary interest are health on the one hand and individual and community social capital on the other. In the ESS, respondents are asked to rate their current health on a five-step ladder ranging from very bad (1) to very good (5). This report's health indicator (*goodhealth*) is a binary variable that takes 1 (good health) if respondents judged their health as fair, good or very good and 0 if they judged it as very bad or bad.

Individual social capital is captured by an indicator extensively used in the empirical social capital literature since Putnam, Leonardi & Nanenetti (1993) proposed it, that is, the individual degree of trust. As mentioned above, the question posed in the ESS (very similar to that in many other surveys covering social aspects) is: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" Respondents rate their trust on a ladder ranging from 0 to 10.

The authors used the individual answers to this question as their measure of individual social capital (*trust*). The community-level social capital associated with individual *i* is measured as the mean trust of the residents in the same region as individual *i*. Average measures of individual social capital are frequently used in the literature (Islam et al., 2006). However, the definition of what is the relevant scope of "community" is a matter of some debate. For purposes of this report, mainly driven by data constraints, the authors defined community as the region of residence at NUTS2 level. Unfortunately, the ESS does not provide more refined information about respondents' residence. As mentioned, it is possible that the relevant level of aggregation is lower, such as village or borough.

Simple summary statistics of the variables included in the model are reported in Table 1.

Table 1. Descriptive statistics of the variables used in the regression analysis

Variable	Description	Mean	Standard Deviation	Minimum	Maximum
Goodhealth	Good health	0.92	0.27	0	1
Trust	Trust	4.91	2.41	0	10
Trust * mean trust	Interaction of trust and mean trust	24.52	13.92	0	67.18
Mean trust	Average trust of people other than i living in i's region	4.85	0.88	1.42	6.85
Mean trust ^ 2	Squared mean trust	24.26	8.70	2.01	46.95
Z4	Population density at regional level	443.43	830.80	3.3	6231.8
Z5	Roadway network length	194.56	360.31	-2.3	1903
Z1	Birthplace of respondent's father	0.91	0.29	0	1
Z2	Birthplace of respondent's mother	0.91	0.29	0	1
Z3	Victim of a burglary/assault in the last 5 years	0.21	0.40	0	1
Z6	Percentage of people without Internet access at regional level	0.39	0.16	0	0.90
Z7	Percentage of residents with citizenship at regional level	0.97	0.03	0.81	1
Z3*Z7	Interaction of Z3 and Z7	0.20	0.39	0	1
Z3*Z4	Interaction of Z3 and Z4	99.84	475.81	0	6231.8
Z3*Z6	Interaction of Z3 and Z6	0.08	0.17	0	0.90
Sqrt(Z5)	Square root of Z5	9.72	19.81	0.72	622.32
Sqrt(Z5)*ln(Z5)	Square root of Z5 * natural log of Z5	-53.37	246.07	-8007.38	0.47
Sqrt(Z4/1000)	Square root of Z4/1000	14.13	34.89	0.16	303.03
(Z4/1000)^3	Cubed Z4/1000	3.37	20.12	3.59E-08	242.014
Z6^2	Squared Z6	0.18	0.14	1.91E-09	0.81
Z7^3	Cubed Z7	0.92	0.08	0.53	1
Sqrt(Z6)	Square root of Z6	17.96	583.01	1.11	22857.24
Mcrime	Percentage of residents that reported having been victims of burglary/ assault in last 5 years	0.21	0.09	0	0.6
Fatheredu	Respondent's father's education (level)	1.79	1.60	0	6
Motheredu	Respondent's mother's education (level)	1.56	1.39	0	6
Father_employed	Respondent's father employed (dependent) when respondent was 14	0.66	0.47	0	1
Mother_employed	Respondent's mother employed (dependent) when respondent was 14	0.38	0.49	0	1
Father_selfemployed	Respondent's father self-employed when respondent was 14	0.23	0.42	0	1
Mother_selfemployed	Respondent's mother self-employed when respondent was 14	0.11	0.31	0	1
Fatherdied	Respondent's father died before respondent was 14	0.06	0.24	0	1
Motherdied	Respondent's mother died before respondent was 14	0.02	0.14	0	1
Male	Gender (male = 1)	0.48	0.50	0	1
Age	Age in years	47.71	17.70	14	99
Age2	Squared age	2589.70	1777.70	196	9801
Brncntr	Respondent born in the country of residence	0.94	0.24	0	1
Urban	Urban residence	0.65	0.48	0	1
Married	Marital status	0.55	0.50	0	1
Eduyrs	Respondent's education in years	11.69	4.12	0	40
HHincome	Respondent's household income	5.86	2.31	1	12
HHmembers	Number of household members	2.69	1.37	1	13
Religious	Self-reported rate of religiosity	4.72	3.03	0	10
Bed	Number of bed places in the region hospitals per 100 000 inhabitants	628.65	241.09	154.6	1822.6
Hp	Number of heath personnel at regional level per 100 000 inhabitants	346.71	107.40	154.8	830.3
Gdp	GDP per capita at regional level	21.64	7.12	7.57	53.38
Gro	Growth rate at regional level	2.00	2.02	-2.3	15
Emp	Employment in thousands at regional level	978.36	689.84	27.69	5345.4
Essround	ESS round	1.53	0.50	1	2
Religion dummies	Roman Catholic, Protestant, Eastern Orthodox, other Christian denomination, Islam, Eastern religions, other non-Christian religion (reference: nonreligious)				
Occupation dummies	One digit ISCO codes 1–9 (reference: unemployed)				
Country dummies	Austria (reference), Belgium, Czech Republic, Germany, Finland, France, Greece, Hungary, Italy, the Netherlands, Poland, Portugal, Spain, Sweden				

Note. The sample size is 31 914. "HH" means household; ISCO stands for the International Standard Classification of Occupations.
Sources: ESS (2002–2004) and European Commission (2011b).

4. The model

The first objective of this research was to test whether individual and community social capital – proxied by trust and average trust in the relevant NUTS2 region – affects individual health. The second objective was to test whether the impact of individual social capital is strengthened or weakened by community social capital. For instance, it is plausible to expect that an individual endowed with a sufficiently high level of trust and living in a community rich in social capital could easily develop an intense and wide social network. By contrast, the same individual located in a community lacking social capital might find it difficult to develop social links as his or her potential partners are rather diffident.

To examine both questions, the authors estimated the following regression model:

$$H^*_{irc} = \alpha_0 + \alpha_1 S^*_{irc} + \alpha_2 S^*_{irc} \overline{S}^*_{rc} + \alpha_3 \overline{S}^*_{rc} + X_{irc}\alpha_4 + R_{rc}\alpha_5 + u_c + \varepsilon_{irc} \quad (1)$$

where H^*_{irc} is an objective indicator of the health of an individual i, living in region r of country c, and S^*_{irc} is an objective measure of micro/individual social capital. The objective indicator of community social capital is $\overline{S}^*_{rc}$, defined in region r of country c. The authors allow for an effect of S^*_{irc} varying with $\overline{S}^*_{rc}$ by introducing the product of the two variables. In addition to community social capital, the authors controlled for individual and region-specific characteristics, X_{irc} and R_{rc}, respectively. Finally, the error term is composed of country fixed effects u_c and an individual specific error component ε_{irc}. The authors allowed $E(S^*_{irc}\varepsilon_{irc})$ to be nonzero while they assumed that ε_{irc} is uncorrelated with all other variables and in particular with objective community social capital. Reverse causality and the possibility that some unobservable individual characteristics are omitted from the model justify the assumption $E(S^*_{irc}\varepsilon_{irc}) \neq 0$. Instead, objective community social capital is claimed to be exogenous because it seems unlikely that individual health might have a feedback on community social capital. Moreover, this assumption is supported by the fact that a series of regional indicators (R_{rc}) and country fixed effects are included in the model in order to limit the possibility of misspecification.

Unfortunately, the variables H^*_{irc}, S^*_{irc} and $\overline{S}^*_{rc}$ are unobservable, and only self-reported measures of health and social capital are available. Specifically, the authors observed self-reported health H_{irc} and self-reported social capital S_{irc}. The authors assumed that respondents' self-reported variables are noisy measures of the true indicators H^*_{irc} and S^*_{irc}, and we defined them as follows

$$H_{irc} = H^*_{irc} + \eta_{irc} \quad (2)$$

$$S_{irc} = S^*_{irc} + \lambda \overline{S}_{rc} + \mu_{irc} \quad (3)$$

where η_{irc} and μ_{irc} are zero–mean noises such that $E(H^*_{irc}\eta_{irc}) = 0$, $E\left(S^*_{irc}\mu_{irc}\right) = 0$ and $E\left(\overline{S}_{rc}\mu_{irc}\right) = 0$. A central feature of this model is that the authors allow for the measurement error in reporting individual social capital to be correlated with *reported* community social capital. Finally, the observed measure of community social capital is the sample average of reported individual social capital in the region r of country c, and the authors assumed the following relationship with the objective (and unobserved) community social capital:

$$\overline{S}_{rc} = \overline{S}^*_{rc} + \theta_{rc} \quad (4)$$

with the usual assumption that $E\left(\overline{S}^*_{rc}\theta_{rc}\right) = 0$. Looking at equations (3) and (4), it is important to emphasize that the authors did not assume that objective community social capital is simply the sum (or the mean) of everybody's objective individual social capital, because, as suggested by the World Bank definition of social

capital, community social capital should be seen as more than just the sum. Anyway, equations (3) and (4) imply a relationship between objective individual and community social capital. Taking the sample mean at regional level of equation (3) results in $1-(\lambda)\bar{S}_{rc} = \frac{1}{N_{rc}}\sum_i S^*_{irc} + \frac{1}{N_{rc}}\sum_i \mu_{irc}$, so

$$\bar{S}^*_{rc} = \frac{\sum_i S^*_{irc} + \sum_i \mu_{irc}}{N_{rc}\ 1-(\lambda)} - \theta_{rc} \tag{5}$$

That is, objective community social capital is a linear transformation of average individual objective social capital within the relevant NUTS2 region.

By substituting (2), (3) and (4) in (1) the authors obtain an expression relating observed self-reported individual health, reported individual social capital and an indicator of community social capital:

$$\begin{aligned} H_{irc} = \alpha_0 + \alpha_1 S_{irc} + \alpha_2 S_{irc}\bar{S}_{rc} + (\alpha_3 - \alpha_1\lambda)\bar{S}_{rc} - \alpha_2\lambda\bar{S}^2_{rc} + X_{irc}\alpha_4 + R_{rc}\alpha_5 + u_c + \\ +\varepsilon_{irc} + \eta_{irc} - \alpha_1\mu_{irc} + \alpha_2\theta_{rc}(\lambda\bar{S}_{rc} - S_{irc}) - \alpha_2\mu_{irc}\bar{S}_{rc} + \alpha_2\mu_{irc}\theta_{rc} - \alpha_3\theta_{rc} \end{aligned} \tag{6}$$

which can be rewritten as

$$H_{irc} = \gamma_0 + \gamma_1 S_{irc} + \gamma_2 S_{irc}\bar{S}_{rc} + \gamma_3\bar{S}_{rc} + \gamma_4\bar{S}^2_{rc} + X_{irc}\gamma_5 + R_{rc}\gamma_6 + u_c + \tau_{irc} \tag{7}$$

where

$$\tau_{irc} = \varepsilon_{irc} + \eta_{irc} - \alpha_1\mu_{irc} + \alpha_2\theta_{rc}(\lambda\bar{S}_{rc} - S_{irc}) - \alpha_2\mu_{irc}\bar{S}_{rc} + \alpha_2\mu_{irc}\theta_{rc} - \alpha_3\theta_{rc} \tag{8}$$

First, note that model (1) is identified, as parameters α_3 and λ can be obtained from the reduced form estimates of (7) thanks to the relationships

$$\lambda = -\frac{\gamma_4}{\gamma_2} \quad \text{and} \quad \alpha_3 = \frac{\gamma_2\gamma_3 - \gamma_1\gamma_4}{\gamma_2} \tag{9}$$

Next, note that $E(S_{irc}\tau_{irc})$ and $E(\bar{S}_{rc}\tau_{irc})$ are all nonzero by construction. Therefore, although in model (1) the authors assumed that (objective) community social capital was exogenous, and there were good theoretical reasons to claim so, this is no longer the case when acknowledging that only a proxy of community social capital is actually observed. In other words the empirical version of model (1), the one that can be estimated in practice, introduces further complications. Precisely, the endogeneity of $\bar{S}_{rc}$ depends on the joint role of (a) measurement error in S_{irc} and (b) the presence of the interaction $S^*_{irc}\bar{S}^*_{rc}$. Thus, in the final model all social capital variables (four!) are endogenous. Hence, ordinary least squares (OLS) estimates of (5) would be biased and inconsistent.

In addition, $\sigma^2_\tau = Var(\tau_{irc})$ can be expected to be large, as it is a combination of three error terms. Not only that, it also depends on both S_{irc} and $\bar{S}_{rc}$, so homoscedasticity cannot be assumed. Finally, the presence of the regional-level error term θ_{rc} and of $\bar{S}_{rc}$ generates spatial correlation among people living in the same region.

With OLS not being a defensible option, the authors rely on instrumental variable estimators with standard errors robust to both heteroscedasticy and spatial correlation. As usual, the choice of proper instruments is not easy, but in this setting it is even more difficult because of the large variance of τ_{irc} resulting from measurement errors in self-reported social capital and health. A large variance of the error term has two negative effects on the reliability of instrumental-variable estimates.

First, it is well known that instrumental variables are unbiased only asymptotically: in finite samples, even if rather large, instrumental-variable estimates are biased, and the bias increases with the standard error of τ_{irc}, which in this case has just been shown to be large. Of course, the bias is zero if instruments and the error term have exactly zero correlation, but this is the case only asymptotically. Second, the variance of the instrumental-variable estimate increases with the variance of τ_{irc}. Both problems can be alleviated by adopting strong instruments, that is, ones that are highly correlated with the endogenous variables, as both instrumental-variable bias and instrumental-variable variance decrease with the correlation between instruments and instrumented variables (Wooldridge, 2002: equations 5.37 and 5.39). Fortunately, the dataset is rather rich, offering several variables suitable for use as instruments for SC_{irc}.

Instrumental variables

Overall, there are four variables to instrument: (a) individual social capital; (b) community social capital; (c) the interaction of (a) and (b); (d) squared community social capital. Fortunately, once proper instruments have been developed for individual and community social capital, it is easy to produce additional instruments for the transformed variables by applying appropriate operators.

Since community social capital is computed as the average of individual social capital reported by the residents of a region, each instrument suitable for individual social capital is potentially relevant also for community social capital.

The set of instruments is as follows:

1. whether the birth countries of respondent's father and mother (*Z1* and *Z2*, respectively) are the same as the respondent's country of residence;
2. whether the respondent or a member of his or her household has been the victim of a burglary or an assault in the past five years (*Z3*);
3. population density at regional level (*Z4*);
4. length of road network at regional level (*Z5*);
5. the percentage of residents without Internet connection living in respondent's region (*Z6*); and
6. the percentage of residents with the status of citizen in respondent's region (*Z7*).

Instruments *Z1*, *Z2* and *Z3* are defined at the individual level, the remaining four at the regional level.

All instruments must satisfy two requirements: they must be relevant, that is, correlated with the endogenous variables, and they must be exogenous, that is, they must affect individual health only through the instrumented variables, without independent and autonomous role. The relevance of each instrument is discussed first and its exogeneity afterwards.

As for *Z1*, *Z2* and *Z7*, a now extensive body of literature points out that ethnic/national minorities in a country tend to remain less socially integrated (Alesina & La Ferrara, 2002; La Porta et al., 1999; Easterly & Levine, 1997). Social marginalization experienced early in an individual's life might also shape subsequent social behaviour and the ability to create and manage social ties.

Having recently been a victim of a burglary or an assault (*Z3*) is certainly related with the degree of trust towards other people. This experience is likely to induce a widespread feeling of fear and distrust of people outside a relatively narrow circle of close friends and relatives. Results suggest that the expected negative correlation is very strong.

Next *Z4*, *Z5* and *Z6* are correlated with the costs of social interaction. In more sparsely populated regions with a less developed road network, the cost of social interaction, that is, the cost of meeting others, is higher. When Internet connection is widespread, opportunities to create relationships are larger and social interaction is cheaper. There exists a reciprocal relationship between trust and social interaction: while social interaction is certainly easier in a climate of reciprocal trust, people learn to trust or distrust another after a substantial amount of repeated social interactions. Therefore, *Z4*, *Z5* and *Z6* are indirectly related with people's trust, by facilitating contacts and meetings among people.

Exogeneity (that is, the excludability condition of the proposed instruments) requires a more extensive and careful discussion.

The birthplace or birthplaces of the respondent's father and mother, *Z1* and *Z2*, could have an independent effect on the respondent's health status, as the parents' birthplace/birthplaces are likely to be related to parents' education, income and working conditions, which are shown to be important inputs in the health production function (Rosenzweig & Shultz, 1982). To capture this effect of *Z1* and *Z2*, the authors have included in the set X_{irc} rather detailed information on parental background, including father's and mother's education, employment status when respondent was 14 – distinguishing between employed, self-employed and unemployed – and a couple of dummies indicating whether the father or mother was dead when the respondent was 14. The authors also controlled for the potential influence of the coincidence between the respondent's birth country and his/her current residence, in order to capture possible impediments or discrimination in accessing education and health care services. Moreover, cultural aspects – such as the respondent's religion, generally transmitted by parents – are controlled for. Indeed, the authors are fairly sure that parents' birthplace has no effect per se on respondent's health except from the impact on opportunities of social relationship and interaction (in other words parent's birthplace can reasonably be assumed to influence health only through social capital, once parental background is controlled for).

Having been a victim of crime (or being close to someone who was) in the recent past is certainly not an individual decision or under individual control. Nevertheless, one cannot claim that being such victim is a truly random event, that is, a completely exogenous accident, as people are able to modify the probability of these events by avoiding risky neighbourhoods, installing security devices in their homes, etc. Moreover, it is likely that the risk of burglary is influenced by people's age, gender (the elderly and women being easier targets) and income and with the level of crime in their place of residence. Hence, *Z3* is likely to be correlated with age, gender, household income and crime intensity in the region of residence. These variables all impact individual health: age and gender for obvious reasons, income by determining the opportunities of investment in health, and criminal victimization by reducing people's mobility. Therefore, the authors need to include them among individual and regional controls to be allowed to claim that *Z3* has no independent effect on health.

One might be concerned that having been a victim of crime has a direct impact on health. A more suitable instrument would have been whether a household member, excluding the respondent, was a crime victim. Limitations in the data prevent an exploration of this potentially relevant distinction. However, small events of thefts in victims' houses that are unlikely to harm people's physical health directly and permanently are considered. Some studies point to the emotional negative consequences of rapes and violence (Krug et al., 2002), but this type of crime is not considered here.

The remaining four instruments, *Z4*, *Z5*, *Z6* and *Z7*, defined at regional level, could affect individual health only through their correlation with the economic development of the region of residence. For instance, in Europe more densely populated regions with better transport infrastructures are at the same time richer as well as more extensively equipped with health care resources. Therefore, the authors controlled for regional GDP per capita, nominal GDP growth rate, employment and variables of health supply, such as the number of hospital beds and number of health personnel.

Overall, all these instruments could have an impact on individual health that is not mediated exclusively through social capital. Such impact, however, would not be an autonomous, independent one, but would instead be due to the instruments' correlation with other variables (parental background, income, regional development, etc.). Therefore, having controlled for the latter, the authors believe that the exogeneity requirement is met. In the following estimates, the Sargan or the Hansen J test, which does not reject the hypothesis of exogeneity, is reported.

5. Results

The authors proceed by estimating progressively more general models, by applying progressively less stringent restrictions to the model (7). The report will show that only the most general specification produces results that are interpretable. Constrained models appear to be misspecified. The authors report the results from constraint models, as they have been largely used in the previous literature (for example, Poortinga, 2006). By applying the restriction the authors discuss below, constrained specifications of model (7) are not proper nested models, as the set of endogenous variables to be instrumented depends on the restriction imposed. Therefore, the set of instruments and their functional form must vary accordingly, in order to maximize their correlation with the instrumented variables (that is, their relevance).

In model 1, to consider the simplest model, the authors assume first that $\alpha_3 = \alpha_2 = \lambda = 0$. Indeed, the authors estimate

$$H_{irc} = \gamma_0 + \gamma_1 S_{irc} + X_{irc}\gamma_5 + R_{rc}\gamma_6 + u_c + \tau'_{irc} \tag{10}$$

with

$$\tau'_{irc} = +\varepsilon_{irc} - \eta_{irc} - \alpha_1 \mu_{irc} \tag{11}$$

In this case homoscedasticity could be retained. The only variable to instrument is SC_{irc}. The set of excluded instruments is $I1=\{Z1,...,Z7\}$. Table 2 reports probit estimates (marginal effects) of equation (8), with and without region dummies (columns 1 and 2), without accounting for endogeneity of individual social capital. It appears that regional controls R_{rc} are sufficient to capture regional heterogeneity as estimates of the social capital coefficient are very close in columns 1 and 2. In column 3, OLS linear probability estimators of equation (8) are reported and their size is comparable to the probit estimates. Therefore, the linear probability model can be safely adopted. Finally, column 4 reports instrumental-variable linear probability estimates. The magnitude of SC_{irc} is more than ten times greater than in column 3. Table 2 also reports the p-value associated to the Anderson canonical correlation LR test, which tests the strength of the instruments, the p-value of the Hansen overidentification test, which tests the exogeneity of the instruments, and the F test that all excluded instruments *I1* are jointly zero. While the Hansen test does not reject the hypothesis of exogeneity of the instruments, both the Anderson and F tests prove the strength of the instruments. Overall, these results suggest that OLS are largely biased due to measurement errors and reverse causality. Looking at column 4, increasing *trust* by one would increase the probability of being in good health by about 9%. This is an order of magnitude that is not dissimilar from what other studies have found using OLS or multilevel modelling.

Next, in model 2, the authors assume that $\alpha_2 = \lambda = 0$. The model to estimate is then

$$H_{irc} = \gamma_0 + \gamma_1 S_{irc} + \gamma_3 \bar{S}_{rc} + X_{irc}\gamma_5 + R_{rc}\gamma_6 + u_c + \tau''_{irc} \tag{12}$$

with $\tau''_{irc} = +\varepsilon_{irc} - \eta_{irc} - \alpha_1 \mu_{irc} - \alpha_3 \theta_{rc}$ and $\gamma_3 = \alpha_3$.

Table 2. Regression results for model 1

Method	Probit (ME)		Probit (ME)		OLS		Instrumental variable	
Dependent variable	Goodhealth		Goodhealth		Goodhealth		Goodhealth	
Trust	0.0049	*(10.84)***	0.0051	*(10.71)***	0.0077	*(11.73)***	0.0905	*(5.05)***
Male	0.0033	*(1.48)*	0.0029	*(1.23)*	0.0044	*(1.41)*	-0.0020	*(0.49)*
Age	-0.0046	*(11.88)***	-0.0048	*(11.91)***	-0.0038	*(7.34)***	-0.0025	*(3.57)***
Age2	0.0000	*(8.51)***	0.0000	*(8.56)***	0.0000	*(2.39)**	-0.0000	*(0.13)*
Brncntr	0.0031	*(0.63)*	0.0034	*(0.67)*	0.0055	*(0.87)*	-0.0049	*(0.60)*
Urban	0.0066	*(2.68)***	0.0054	*(2.15)**	0.0090	*(2.74)***	0.0186	*(4.11)***
Married	0.0159	*(6.07)***	0.0167	*(6.11)***	0.0303	*(8.42)***	0.0237	*(5.11)***
Eduyrs	0.0030	*(8.14)***	0.0032	*(8.15)***	0.0055	*(11.05)***	0.0006	*(0.48)*
HHincome	0.0036	*(5.29)***	0.0038	*(5.45)***	0.0048	*(5.46)***	-0.0000	*(0.03)*
HHmembers	0.0015	*(1.38)*	0.0016	*(1.45)*	0.0021	*(1.54)*	0.0010	*(0.61)*
Religious	-0.0003	*(0.60)*	-0.0004	*(0.78)*	-0.0009	*(1.40)*	-0.0043	*(3.99)***
Fatheredu	-0.0007	*(0.54)*	-0.0007	*(0.57)*	-0.0011	*(0.74)*	-0.0068	*(3.11)***
Motheredu	0.0032	*(2.15)**	0.0037	*(2.32)**	0.0019	*(1.12)*	-0.0012	*(0.52)*
Father_employed	0.0104	*(2.12)**	0.0114	*(2.22)**	0.0160	*(2.24)**	-0.0100	*(0.96)*
Mother_employed	-0.0040	*(1.49)*	-0.0041	*(1.48)*	-0.0077	*(2.12)**	-0.0042	*(0.95)*
Father_selfemp	0.0185	*(3.92)***	0.0197	*(3.97)***	0.0320	*(4.14)***	0.0035	*(0.31)*
Mother_selfemp	-0.0075	*(1.84)**	-0.0075	*(1.80)**	-0.0124	*(2.32)**	-0.0088	*(1.33)*
Fatherdied	0.0086	*(1.58)*	0.0085	*(1.49)*	0.0080	*(0.88)*	0.0007	*(0.06)*
Motherdied	0.0038	*(0.60)*	0.0040	*(0.59)*	0.0070	*(0.67)*	0.0092	*(0.72)*
Essround	-0.0008	*(0.35)*	-0.0020	*(0.71)*	-0.0018	*(0.47)*	0.0046	*(0.96)*
Bed			-0.0000	*(0.36)*	-0.0000	*(1.00)*	-0.0001	*(2.77)***
Hp			-0.0000	*(0.78)*	-0.0000	*(0.54)*	0.0000	*(0.40)*
Gdp			0.0008	*(2.34)**	0.0011	*(2.62)***	-0.0001	*(0.25)*
Gro			0.0002	*(0.20)*	-0.0001	*(0.09)*	-0.0014	*(1.08)*
Emp			-0.0000	*(1.24)*	-0.0000	*(1.49)*	-0.0000	*(3.43)***
Mcrime			-0.0312	*(1.58)*	-0.0363	*(1.39)*	0.0662	*(1.71)**
Religion dummies	Yes		Yes		Yes		Yes	
Occupation dummies	Yes		Yes		Yes		Yes	
Region dummies	Yes		No		No		No	
Country dummies	Yes		Yes		Yes		Yes	
Constant					0.8928	*(39.23)***	0.6297	*(9.95)***
Observations	31914		31914		31914		31914	
Anderson LR (p)							0.00	
Sargan (p)							0.25	
F trust							9.16	
R-squared					0.11			

Note. Absolute values of z statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

The assumption of spherical errors (that is, that errors should be uncorrelated and homoscedastic) cannot be retained as there might be a special correlation within each region. This specification controls for the possibly independent effects of community social capital. By construction, community social capital is endogenous as well as SC_{irc}: the authors instrument them by the set *I1* as in model 1. Results are reported in Table 3, first and second columns. The former reports OLS estimates of (10) as a benchmark, and the latter presents instrumental-variable estimates. In both cases the authors opt for a linear probability model, as they do here. While individual social capital is largely significant and positive, community social capital is not significant. However, instruments, although likely to be exogenous, seem to be poorly correlated with community social

capital, a fact that might bias the authors' estimate. This concern pushes them to adopt the procedure described in the following models 3 and 4 to improve the fit.

In model 3, the authors consider restriction $\lambda = 0$ The model to estimate is

$$H_{irc} = \gamma_0 + \gamma_1 S_{irc} + \gamma_2 S_{irc}\overline{S}_{rc} + \gamma_3 \overline{S}_{rc} + X_{irc}\gamma_5 + R_{rc}\gamma_6 + u_c + \tau_{irc} \tag{13}$$

with the most general error term. In this case both individual and community social capital are endogenous and need to be instrumented. The error term is heteroscedastic and spatially correlated. Instruments are functionally transformed to maximize the correlation with the endogenous variables and maximize their strength. Precisely, the set of instruments is

$$I3 = I1 \cup \{Z3/Z4, Z3/Z6, Z3/Z7, \sqrt{Z5}, \sqrt{Z5}\ln(Z5), \sqrt{Z4/1000}, (Z4/1000)^3, Z6^2, Z7^3\},$$

which is obtained by a multiple fractional polynomial fit of each endogenous variable with included and excluded instruments.[3] The relevance and Hansen tests are clearly passed by *I3*. Note the improvement in the F test corresponding to $\overline{S}_{rc}$ with respect to model 2. Results are reported in columns 3 and 4 of Table 3. In the former OLS results are reported as the benchmark, and in the latter instrumental-variable results are reported. Now community social capital seems to have a significantly negative independent effect on individual health. The marginal effect of individual social capital, given by $\gamma_1 + \gamma_2 \overline{SC}_{rc}$, is not significantly different from zero. However, it is positive when computed at the mean of $\overline{S}_{rc}$. Misspecification of the model due to the assumption λ=0 is likely to be responsible for these results, shown below.

Table 3. Regression results for models 2-4

Model	Model 2				Model 3				Model 4	
Method	OLS		Instrumental variable		OLS		Instrumental variable		Instrumental variable	
Dependent variable	Goodhealth		Goodhealth		Goodhealth		Goodhealth		Goodhealth	
Trust	0.0078	*(11.82)***	0.0936	*(4.43)***	0.0177	*(3.64)***	-0.0972	*(1.05)*	-0.6889	*(2.83)***
Mean trust	-0.0086	*(1.73)**	-0.0152	*(0.35)*	0.0004	*(0.05)*	-0.2335	*(2.76)***	0.6231	*(2.14)**
Trust*mean trust					-0.0021	*(2.25)**	0.0343	*(1.93)**	0.1480	*(3.10)***
Mean trust ^ 2									-0.1395	*(2.85)***
Observations	31914		31914		31914		31914		31914	
R-squared	0.11				0.11					
Anderson LR (p)			0.00				0.00		0.57	
Sargan/Hansen J (p)			0.60				0.15		0.66	
F trust			8.45				7.23		7.41	
F trust*mean trust							8.74		8.46	
F mean trust			2.24				6.36		6.00	
F mean trust^2									5.65	

Note. Absolute values of t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

In model 4, the authors estimate equation (5) without restrictions. Instrumental-variable estimates are reported in the last column in Table 3. There are now four endogenous variables $\{SC_{irc}, SC_{irc}\overline{SC}_{rc}, \overline{SC}_{rc}, \overline{SC}^2_{rc}\}$. The set of instruments to adopt is $I4 = I3 \cup \{\sqrt{Z6}\}$, again obtained by multiple fractional polynomial fit. The Hansen J

[3] The authors use the fractional polynomial to improve the fit of the first stage regression and to make their instruments as strong as possible. This is important in light of the fact that the model indicates that the regression error term is likely to have a large variance. Adopting a fractional polynomial method means that the authors are allowing for a potential nonlinear functional form of the relationship between the endogenous variable and its instrument.

test is passed, and F tests for each of the endogenous variables are satisfactory. However, *I4* performs badly in the Anderson canonical correlation test: yet, this should not be interpreted as an indication that the excluded instruments are not relevant, as they have proved to be rather strong in each specification and as the F tests indicate that singularly each endogenous variable is well correlated with *I4*. The negative result is likely due to the large degree of collinearity between $\overline{SC}_{rc}$ and $\overline{SC}^2_{rc}$. Estimates show that the marginal effect of individual social capital $\gamma_1 + \gamma_2 \overline{SC}_{rc}$ is significant and positive for individuals living in communities with sufficiently high social capital (higher than 4.655, to be compared with an average value of 4.846). Moreover, by using equation (7), the authors obtain that *α3* is not significantly different from zero while λ is highly significant ($\alpha 3$=-0.0263 (s.e. 0.0597), λ=0.9428 (s.e. 0.1343)); that is, community social capital plays no autonomous role in determining individual health, but the bias in reporting individual social capital does depend on community social capital.

6. Conclusions

Overall, the authors found that individual social capital seems to be a significant, true determinant of individual health only if trusting individuals live in regions with sufficiently high community social capital. In particular, in regions with average community social capital, the marginal effect of individual social capital on health is 0.028; that is, increasing individual trust by one unit (on a scale of 0 to 10) will increase the probability of being in good health by 2.8%. Compared to the OLS and probit estimates, the instrumental-variable estimates are much larger: this is because the authors controlled for error-in-variable issues and reverse causality. There is no evidence that community social capital plays an autonomous role (α_3=0), but instead it contributes to the effect of individual social capital. In other words, social capital is effective if diffused at community level. Namely, trusting others has a positive impact on health only if trust is reciprocal: trusting while not being trusted will lead to the worst outcome for the player in a prisoner-dilemma-like setting, as noted in the introduction.

Finally, acknowledging that community social capital alters the reporting of individual social capital proved to be crucial in producing reliable and sensible results. Actually, this effect is highly significant and large enough to determine the apparently negative independent impact of community social capital that was obtained in models 2 and 3, while otherwise community social capital plays no autonomous role.

This paper builds on and complements previous literature that explores the relationship between social capital and health in that it (this paper) explicitly accounts for measurement error in self-reported variables. With few exceptions (for example, Folland, 2007; D'Hombres et al., 2010), even the endogeneity of social capital has been overlooked thus far in the widely used multilevel analysis. By contrast, the authors here emphasized the choice of adequate instrumental variables to break down the circular relationship between social capital and health in order to identify the causal impact of social capital on health. Overall, the authors have determined that individual social capital increases the probability of being in good health if the community has sufficiently high social capital. However, community social capital does not affect health directly.

The latter result should be taken with caution. It is not hard to imagine that the "relevant" communities should be smaller than those the authors considered, as cooperation is usually easier among a limited number of agents. Other limitations of the present analysis are related to the fact that in spite of the many individual and regional controls included in the regression, the potential influence of some unobservable variables could not be taken into account (for example, risk aversion, time preferences and predisposition to relating with other people). However, a proper account of unobserved heterogeneity can be achieved only by using panel data: unfortunately, most existing datasets that pay attention to social issues tend to be designed as repeated cross- sections (with the notable exception of the Survey of Health, Ageing and Retirement in Europe (SHARE) dataset).

As in previous research, the authors conclude that social capital cannot be overlooked by policy-makers when considering the most effective ways of improving health conditions. The novelty of this study in terms of policy implications is the discovery that interventions attempting to improve health by building social capital should be targeted at improving primarily individual social capital, because in so doing they would achieve a double effect: on the one hand, they would directly improve individual health; on the other, they would contribute to community social capital, which reinforces the beneficial role of individual social capital. Exploiting such reinforcing mechanism could improve the (cost–)effectiveness of policies: an intervention that succeeds in improving the social capital of a large number of individuals in one community would produce a larger health benefit than one that targets the same number of individuals located in a number of different communities.

Further research should be devoted to model theoretically and formally the role of social capital in influencing individual health. Thus far, the empirical literature has proceeded without guidance from a clear theoretical framework. In addition, more empirical work is needed to test ways of promoting social capital. In principle, policies to promote social capital may be pursued in two ways: by providing financial and/or in-kind support to allow social capital to develop more easily and by generating "enthusiasm among communities and their leaders to develop social capital" (Scheffler & Brown, 2008). In practice, as others noted earlier, there are hardly any examples in the literature analysing interventions that intentionally seek to improve social capital (Kawachi et al., 2000). A notable exception, if in a developing country context, is a recent, encouraging study by Pronyk et al. (2008) that demonstrates the positive effects of an intervention in rural South Africa: it combined group-based microfinance with participatory gender and training relative to HIV in order to promote changes in solidarity, reciprocity and social group membership as a means of reducing women's vulnerability to intimate partner violence and HIV.

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The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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