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DOES SOCIAL CAPITAL DETERMINE HEALTH? EVIDENCE FROM EIGHT TRANSITION COUNTRIES

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SUMMARY

There is growing interest in the role of social relationships in explaining patterns of health. We contribute to this debate by investigating the impact of social capital on self-reported health for eight countries from the Commonwealth of Independent States. We rely on three indicators of social capital at the individual level (trust, participation in local organisations, social isolation) and employ alternative procedures to estimate consistently the impact of social capital on health. The three social capital indicators are choice variables and are hence, by definition, endogenously determined. We attempt to circumvent the endogeneity problems by using instrumental variable estimates. Our results show that the individual degree of trust is positively and significantly correlated with health, this being true with least squares estimators as well as when relying on instrumental variable estimators with (and without) community fixed effects. Similarly, social isolation is negatively and significantly associated with health, irrespective of the procedure of estimation. On the other hand, the effect of being a member of a Putnamesque organisation is more ambiguous and usually not significantly related to health. Copyright © 2009 John Wiley & Sons, Ltd.

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1. INTRODUCTION

There is growing interest in the role of social relationships in explaining patterns of health. This paper contributes to this young but fast growing field by looking at the role of social capital in determining health in eight countries that are part of the Commonwealth of Independent States (CIS).[1] Given these countries' poor adult health status, driven by excessive rates of non-communicable diseases and reflected in historically low and recently stagnating or even declining life expectancy (McMichael *et al.*, 2004), there is good reason to consider ways of improving health that go beyond the traditional boundaries of health promotion and care.

The term 'social capital' is often traced back to the work of Bourdieu (1977) who introduced the term in the 1970s, later differentiating it from cultural, economic, and symbolic capital. The concept was

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[1]For a collection of papers on the importance of social capital for a large set of development outcomes, see the World Bank's Social Capital website at http://go.worldbank.org/F4WH97I000 (last accessed 01/11/2008).

subsequently developed by Coleman (1990), who was the first to test it empirically. He identified several forms of social capital, including levels of trust within a community, 'appropriable' social organizations (such as sources of help when disaster strikes), norms and sanctions, and information channels. While Bourdieu and Coleman saw social capital as being neutral, with effects depending on the uses to which it was put, Putnam (1993, 2000) viewed the existence of functioning social networks as important determinants of a range of positive phenomena. He noted how societal developments in contemporary America were weakening these networks, with adverse consequences for society. Early empirical research on the role of social capital has focused on issues such as education (Coleman, 1986), functioning of government institutions (Putnam *et al*., 1993), and crime levels (Sampson *et al*., 1997).

Social capital is a relatively new field of research in the transition countries of eastern Europe and central Asia[2] but has already attracted particular attention in several countries (Wallace, 1998; Rose, 2000; Raiser *et al*., 2001; Rojas and Carlson, 2005), because of the specificities of post-Soviet society. Rose (1995) compared Soviet society to an hourglass: a dense network of state organisations at the top, assuming almost complete responsibility for health and relegating individuals to a passive, subsidiary role. In contrast, clearly separated at the bottom, lay an equally dense set of informal networks, in which individuals developed links with friends and relatives to insulate themselves against the party structures. Social networks were not used to strengthen the democratic structures within society but instead to exploit the state for private advantage (Ledeneva, 1998), with widespread use of *blat*, or connections (Davis, 1988), to obtain care that was ostensibly free and universally accessible. For individuals deprived of such informal support, the collapse of the state apparatus has been associated with an increased vulnerability and this might, in part, contribute to the mortality crisis observed following the collapse of communism (Kennedy *et al*., 1998).

The relationship between social networks and health has been documented since 1901, when Emile Durkheim identified a relationship between suicide rates and the level of social integration in a society (Durkheim, 1970). More recent research, building explicitly on the concepts of social capital developed by, among others, Putnam, found that US states with low levels of social capital had higher mortality rates and worse health status (Kawachi *et al*., 1997).

Much of this research has been undertaken in North America or, less often, in western Europe (Islam *et al*., 2006), in keeping with the relative paucity of work on social capital *per se* in transition countries. Comparatively few studies have looked at the link between social capital and health in this region. Exceptions include Rose (2000), who – using Russian data – identified a significant independent contribution by social capital (measured by involvement or exclusion from formal and informal networks; friends to rely on when ill; control over one's own life; and trust) to health that was in addition to the contribution of human capital factors such as age, subjective social status, gender, and income. Similarly, Carlson (1998) highlights the fairly close association between indicators of social capital at the individual level and self-perceived health in eastern Europe. Reitan (2003) has focused on establishing the relationship between electoral turnout and health (measured by life expectancy) at regional level in Russia.[3] However, none of these studies in the former Soviet region explicitly tries to tackle the problem of endogeneity, so that there is very little reason to conclude a causal impact of social capital on health from the existing work. The present paper contributes to the debate from an empirical perspective, by examining whether social capital has impacted upon health in eight countries of the CIS, using the 2001 Living Conditions, Lifestyles and Health (LLH) survey. In particular, we undertake efforts to deal with some of the econometric problems involved in establishing causality in the relationship.

[2]For a very comprehensive literature review on social capital in transition countries see Mihaylova (2004).

[3]Kennedy *et al*. (1998) also examine regional Russian data and conclude that there is a fairly robust association between different indicators of social capital (i.e. mistrust in government, crime, quality of work relations, civic engagement in politics) and mortality rates.

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In examining this question, we focus on the micro-dimension of social capital. Drawing on Coleman's conceptualisation, we see more intense social relationships facilitating individuals' access to social support and health care, as well as the development of informal insurance arrangements. Informal networks providing a degree of mutual insurance often develop in countries where the informal economy is widespread (Murgai *et al.*, 2002). Although there has been little research on this phenomenon in this region compared with other parts of the world, such arrangements have been identified in Russia where they provide a degree of protection from the consequences of fluctuations in income (Skoufias, 2003). They are based on reciprocity and flourish in environments where people trust each other. In cases of temporary sickness these social arrangements provide insurance services to individuals otherwise excluded from formal mechanisms. Moreover, intensive social interactions offer a privileged channel for information transmission and sharing of past experiences on health facilities, doctors, drugs, and diseases, thus reducing the cost of health information. Informal networks are thus likely to facilitate transfer of health information or to constrain deviant health behaviours.

We rely on three indicators for social capital – individual degree of trust, participation in local organisations, and social isolation – and employ alternative procedures to estimate consistently the impact of social capital on health. Membership in organisations, social isolation, and trustworthy behaviour are choice variables, implying that social capital indicators are by definition endogenously determined and depend on individual specificities. As mentioned above, we tackle this endogeneity problem using instrumental variable estimates. The wealth of the data set allows us to distinguish the social capital impact from other community effects (such as health-care supply) that are simultaneously correlated with health and measures of social capital. Our results show that the individual degree of trust is positively and significantly correlated with health, both with least squares estimators and when we rely on instrumental variable estimators with (or without) community fixed effects. Similarly, social isolation is negatively and significantly associated with health, irrespective of the procedure of estimation. On the other hand, the effect of being a member of a Putnamesque organization on self-reported health is more puzzling and usually not significantly related to health.

The paper is structured as follows: the following section presents the data and empirical methodology, the third section discusses the empirical results and the last section concludes.

2. DATA AND EMPIRICAL STRATEGY

The data used in this paper are drawn from the 2001 Living Conditions, LLH survey. This cross-national dataset covers a sample of eight former Soviet countries: Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, and Ukraine.[4]

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

$$H_{ijk} = \beta_0 + C_{jk}\beta_1 + D_k\beta_2 + X_{ijk}\beta_3 + \mathrm{SC}_{ijk}\gamma + \varepsilon_{ijk}$$

where the subscript i stands for the individual, the subscript j for the community, and k for the country; C_{jk} is a vector of explanatory variables at community level, X_{ijk} is vector of explanatory variables at individual level, SC_{ijk} are three social capital indicators defined at the individual level, ε_{ijk} is the disturbance term, and

[4]The national sample size in the LLH was usually around 2000, but ca. 4000 in the Russian Federation and 2500 in Ukraine. Samples were selected using multi-stage random sampling with stratification by region and rural/urban settlement type. Within each primary sampling unit (about 50–200 per country), households were selected by random sampling from a household list (Armenia) or by standardised random route procedures (other countries). One person was chosen from each selected household (nearest coming or last birthday). The questionnaire collects 125 questions covering demographic and socio-economic characteristics, living conditions, lifestyle (including smoking), use of health services, health status, and health beliefs. Interviews were carried out in all countries throughout fall 2001. Quality control procedures included re-interviews to assess the work of both the interviewers and the interviewers' supervisors. Response rates varied between 71 and 88% among countries. For more details on the survey, see www.llh.at (accessed 1 April 2007).

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H_{ijk} is a health indicator taking the value one, if individuals self-report being in very good or good health, and zero otherwise. For any individual *i*, community is defined as the set of individuals living in the same settlement (city, town, or village) of *j*. Inevitably, the number of respondents in each settlement varies, with the largest numbers in national capitals and the smallest in villages. Our sample contains 366 settlements in total, with the number of respondents varying between 11 and 474 respondents.[5]

The three social capital indicators we employ are very commonly used in the literature. Our first social capital indicator captures how much individuals trust in other people. Formally, *trust* is a dichotomous variable taking the value one, if individuals state that they greatly or quite trust a majority of people, and zero otherwise. Informal mechanisms of insurance heavily rely on mutual trust. A sense of fairness and respect, conditions favouring cooperative and trusting relationships, partly depend on specific economic and social characteristics of the community such as the degree of income inequality, or social cohesion.

Next, we use an indicator of individual participation in local organisations denoted by *membership*. We focus on '*Putnamesque*' networks involving 'horizontal egalitarian relationship' rather than on networks based on 'vertical hierarchical relationships'. The variable *membership* takes the value one, if individuals are members of one of the following organisations: church, sport, art, music, neighbourhood, youth, women, charitable organisations, or any other voluntary organisation, while it takes the value zero otherwise.[6] As pointed out by, among others, Szreter and Woolcock (2004), social relationships between individuals sharing the same social identity are more likely to be associated with well-being and informal insurance arrangements while relationships between individuals situated at different levels of the social scale are more likely to be correlated with reciprocal respect but less likely to involve reciprocal trust.[7]

Finally, we use an indicator for social isolation. This variable takes the value one if the individual feels alone, and zero otherwise.[8] Numerous authors (e.g. Pevalin and Rose, 2002) have shown that social isolation is associated with psychological stress, which in turn has negative consequences for psychological and physical health (depression, heart disease, etc.) (Kuper *et al*., 2002). In addition, as mentioned before, informal networks such as friendship, neighbour- and work-related ties may provide psychological as well as financial support in the event of negative health shocks.

Standard OLS estimates of the coefficients associated with SC_{ijk} yield unbiased results if $E(SC_{ijk}\varepsilon_{ijk}) = 0$ holds. Unfortunately, as reviewed extensively by Durlauf and Fafchamps (2005), there are three main reasons why the orthogonality condition could fail:

First, it is usually difficult to distinguish the social capital effect from other local effects potentially influencing health. Social capital may vary between locations, conditional on social and economic characteristics of the community. The local opportunity structures, ranging from health infrastructures to the level of social organisation, are likely to be positively correlated with each other. This implies that we have to elicit carefully the specific impact of social capital, after taking into account local features, as well as individual and household characteristics related to individual health. To that end, we include in the health equation a set of individual, household, and community control variables.[9] The individual

[5]Ideally we would like to identify and use communities of similar size, such as US villages or boroughs. Unfortunately data are not detailed enough and they codify and include only the country and the settlement of residence of respondents, so that no alternative definition of community can be adopted here. Therefore, we are potentially subject to the Modifiable Area Unit Problem (Nakaya, 2000).

[6]In other words, the variable *membership* takes on the value zero if individuals are not involved in any organisations or if they are members of political or professional associations. In line with some of the social capital literature (e.g. Knack and Keefer, 1997) we distinguish between Putnamesque and Olsonian organisations. The former, such as educational, sport and art clubs, religious and charitable organizations, and youth groups, allow their members to pursue common goals without imposing negative externalities on the rest of the society. The latter, including political parties and movements, trade unions, professional associations, and various interest groups, tend to engage in collective action that may reconfigure redistribution systems in their favour at the expense of the rest of the society. Therefore, in contrast to Putnamesque groups, which are thought to play a positive role in society, the impact of Olsonian groups may be distinctly negative (Fidrmuc and Gërxhani, 2005).

[7]See Szreter and Woolcock (2004) for more information about the distinction between 'bonding' versus 'bridging' social capital.

[8]Given how the indicator is constructed, we expect that the coefficient associated with the social support dummy to be negative.

[9]See the Appendix table for a precise definition of the variables used in the analysis.

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variables comprise age, number of years the individual has been living in the community, dummy variables for the level of education, employment status, gender, and membership of a minority population group. The household variables are: the size of the household, the number of individuals working within the same household, the number of children younger than 16, and a self-evaluation of the material and economic conditions of the household and of the water quality to which the household has access. Self-evaluation of material circumstances was used instead of self-reported income. The latter was not included in the survey as our previous work in this region has found that the former better captures the economic situation of a household given the variable, but often extensive, informal economy (Balabanova and McKee, 2002). In addition, we include two variables, defined at the household level, to control for health supply: the distance from the nearest hospital and the distance from the nearest doctor. Finally, we also include as community variables the size of the place where the individual lives, the surfacing of the road leading to this place (asphalt or not) and dummy variables for the administrative classification of the place (capital of the state, regional capital, other city, small town, and village). Moreover, to be assured that our results (based on probit or linear probability models) are not driven by unobservable community effects, we compare the results with those resulting from the use of community fixed effects and community random effects. Should the coefficients associated with social capital indicators turn out not to differ significantly when using each approach, this will indicate that social capital variables are not capturing the impact of other local effects.

Second, trust, membership of organisations, and social support are individual choices, which depend on individual specific and unobservable preferences. Hence, they are by definition endogenously determined. Unobservable individual effects such as time preferences, personal interests, and individuals' exogenous shocks are correlated both with self-reported health and with self-reported social capital indicators i.e. $E(\mathrm{SC}_{ijk}\varepsilon_{ijk}) = 0$.

Third, there is concern about possible reverse causality since health could have an impact on social participation and individual behaviours. Individuals in poor health might be more socially isolated or forced to decline membership if they are hampered in daily activities. Their perception of others and thus their degree of trust may also be a function of health.

To address the last two problems, we turn to instrumental variable estimates, as was recently done by Folland (2007). The validity of the instrumental variable results will depend on the admissibility of the exclusion restrictions. In other words, we need to identify variables that satisfy the two necessary conditions for instrument validity – i.e. they must be both strongly correlated with social capital ('relevance' condition) and orthogonal to the disturbance term of the health equation ('orthogonality' condition). As described below, we rely on community-based instruments.

Alesina and La Ferrara (2000, 2002) point out that more egalitarian societies tend to have a higher level of social capital. Their results indicate, for instance, that in the US racial fractionalization and income inequalities have a negative impact on membership and trust – two of the social capital indicators we also employ in our analysis. One interpretation of this finding is that individuals distrust those that are different from themselves, and contacts with 'different' individuals (in terms of the level of income, education, or religious beliefs) are more likely in a heterogeneous society. Alesina and La Ferrara refer to this interpretation as 'aversion to heterogeneity'. Drawing on this perspective, we define the heterogeneity of the communities in terms of the variation in religious beliefs,[10] in the level of education and in the individual economic situation and use these three indicators as instruments for social capital. More specifically, we rely on Herfindhal indexes to measure the degree of heterogeneity of each community. Intuitively, a Herfindahl index represents the probability that two randomly selected

[10]Alesina and La Ferrara (2002) find that religious beliefs *per se* do not affect trust in the US. However, they do not control for religious heterogeneity, as it is likely to be highly correlated with ethnic and racial heterogeneity in the US, which is instead included in their regression.

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persons in a community are part of the same group. Hence, the variable used to measure the diversity within each community is simply equal to one minus the Herfindahl index.

In addition, we also use the average level of social capital within the community as an instrumental variable. The idea is that the more people trust others and the more they feel that others also trust them, the more likely that cooperative and reciprocal behaviours will arise, reinforcing the trust in others. From a different perspective, all the residents in a given community experience similar social interactions. Despite idiosyncratic feelings and perceptions, the judgements of an individual and that of the community in which they live must be related.

Similarly, the possibility of being a member of some organization depends on the supply of such organizations. Average membership indicates the presence of networks at the community level. In addition, being socially isolated is more likely in a community where many residents report being socially isolated, as this reveals a lack of social networks and cohesion. Note that in order to avoid spurious correlations between the dependant variable and the instruments, these instrumental variables are calculated for each individual as the mean *over all other individuals* in the community.

Given such reciprocity-based argument and Alesina and La Ferrara's findings, we are confident about the 'relevance' of these instruments.[11]

Satisfying the 'orthogonality' condition is more challenging. In particular, there is a need to consider the possibility that, contrary to our hypothesis, income inequality and community social capital might have independent and autonomous effects on individual health, not mediated through individual social capital.

First, consider income inequality.[12] On the one hand, Subramanian and Kawachi (2004), who reviewed the multilevel studies on income inequality and individual health, show that studies conducted outside the US fail to identify a relative income effect once individual and household characteristics are controlled for (see for instance Shibuya *et al*., 2002; Osler *et al*., 2002; Blakely *et al*., 2003).[13] On the other hand, in the US, results are mixed. While Deaton and Paxson (2001), Fiscella and Franks (2000), and Mellor and Milyo (2002) find no statistically significant association between individual health and income inequality within a reference group, Soobader and LeClere (1999) and Subramanian *et al*. (2001) conclude the opposite. However, in these last studies, indicators of health supply or other country specificities are not controlled for. As stressed by Subramanian and Kawachi (2004), community level inequality is likely to be correlated with community indicators of health policy (public spending in health). Such a correlation, rather than one with income inequality autonomously, could explain the significant association between community level inequality and individual health once individual's characteristics are taken into account.

Interestingly, Kawachi *et al*. (1997) and Kawachi and Kennedy (1997) identify a positive correlation between state-level mortality rates (an aggregate health indicator) and income inequality. However, these authors suggest that this association is due to the detrimental effect of income inequality on social

[11]One may argue that our instruments are more relevant for communities of relatively small size, which in that case means that we run the risk of estimating a local average treatment effect. Although plausible, this concern is not supported by our first-stage estimates that show instead a strong correlation between the instruments and the endogenous variables.

[12]The health and income inequality hypothesis (HIIH) has received widespread attention among public health scientists, summarised in several recent reviews (see for instance Wagstaff and van Doorslaer, 2000; Deaton, 2003; Lynch *et al*., 2004; Subramanian and Kawachi, 2004 and Wilkinson and Pickett, 2006). The HIIH has been introduced to explain health differences among developed countries, which display very similar levels of GPD per capita but relatively large differences in life expectancy and other health indicators. The HIIH applies universally, irrespective of individual income level: it follows that the most affluent should enjoy a better health in more egalitarian than in more unequal societies and the poorest should be better off in equally poor communities. Unfortunately only dubious psychological arguments justify this conclusion.

[13]One exception is Subramanian *et al*. (2003), who finds a significant association between income inequality and individual health after controlling for household income. However, income inequality is measured rather *ad hoc* through four dummies taking the value one if the community Gini coefficient is respectively less than 0.4, between 0.4 and 0.45, between 0.45 and 0.5, and above 0.5. Moreover these dummies are the only control variables at the community level, so that their interpretation can be questioned.

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capital and social cohesion. Explicitly, Kawachi *et al.* (1997) state, 'The small path coefficient from income inequality to mortality suggests that the former is an instrument variable (p. 1945)'.

Although, due to limitation of space, we have reported only a limited selection of the extensive literature, we agree with Deaton (2003) who, after surveying this literature, states:

> My conclusion is that there is no direct link to ill health from income inequality per se; all else equal, individuals are no more likely to be sick or to die if they live in places or in periods where income inequality is higher. The raw correlations that exist in (some of the) data are most likely the result of factors other than income inequality, some of which are intimately linked to broader notions of inequality or unfairness. (p. 115)

Consider now the orthogonality of community social capital instruments. There might be concerns about the existence of an independent effect of the community average level of social capital, even after including individual social capital in the health equation. Social capital is a multifaceted phenomenon and there is debate about whether it is an individual attribute or a community characteristic. Anderson *et al.* (2004), based on a public-good experiment, argue that social capital is both an individual and a community attribute. Glaeser *et al.* (2002) criticizes the post-Coleman (1990) view that social capital is a community attribute, as this makes it difficult to understand how social capital is produced and accumulated. Nowadays there seems to be a consensus that social capital has both an individual and a community dimension. Recognizing that social capital has multiple dimensions does not, however, imply that each dimension plays an autonomous role in shaping individual health. There are several studies that do report a positive effect of aggregate social capital on individual health (see for instance, Scheffler *et al.*, 2007; Islam *et al.*, 2006; Kawachi *et al.*, 1999),[14] but they do not *simultaneously* include individual social capital. Thus, the effect of community level social capital can be due to its positive correlation with individual social capital. (The reciprocity arguments that support the relevance of our instruments apply here.) Conversely, when social capital at both the individual and aggregate level is accounted for in the health equation, Subramanian *et al.* (2002) and Poortinga (2006) show that the positive effect of social capital on individual health lies at the individual level and not at the community level.[15] These two studies suggest that social capital indicators defined at the community level are not significantly correlated with individual health once we control for individual social capital. In addition, Lindström *et al.* (2004) find that 'self-reported health status is mainly affected by individual factors and that the small [community] differences in self-reported health […] are explained by individual factors (p. 139)'.[16]

Taken together this evidence tends to suggest that community social capital does not have an independent effect on self-reported health once we control for social capital at the individual level.[17] This does not negate the role of community social capital. Indeed, we acknowledge that social capital is located both at the individual and community level but we assume that the former channels the effects of the latter, which therefore affects health only indirectly. Current studies, although not conclusive,

[14]For an excellent overview of studies on the effect of individual and area level of social capital on health outcomes, see Islam *et al.* (2006).

[15]Subramanian *et al.* (2001) carry out the empirical study in the US while Poortinga (2006) uses the 2002–2003 European Social Survey and covers 22 European countries. Aggregated social capital indicators are defined at the state level in the former case and at the national level in the latter case. Similarly, using the US Benchmark Survey, Helliwell and Putnam (2004) find no community level effect of trust and membership, while individual effects are strongly significant. Finally, Kim and Kawachi (2006) find that in the US aggregate social capital interacts with individual level social capital, so that it would affect health only in tandem with individual social capital, without having an independent effect.

[16]Lindström *et al.* (2004) examine the effect of social capital and neighbourhood on self-reported health in Malmö, Sweden with a multilevel model.

[17]Note however that both individual and community level social capital affect individual self-reported health in the model proposed in Iversen (2007). However few controls at community level are included in addition to social capital indicators, so that the latter could also capture other sources of variability across communities.

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tend to support the claim we are making in this paper; however, further research should be carried out to precisely assess to what extent social capital at each level matters for individual health.[18]

Under the condition that the community-based instruments can be excluded from the health equation, it is still possible that there may be variables that are simultaneously correlated with the individual level of social capital and self-reported health. In order to avoid the risk of omitting them in all specifications we include many covariates that could possibly be correlated with both social capital and health – in particular health-care infrastructures.

In addition, we also report instrumental variable estimates with community fixed effects. It is still possible to identify the impact of social capital on health after the inclusion of community fixed effects because the three instruments corresponding to the community average level of social capital are calculated for each individual as the mean over all other individuals in the community. It implies that the three instruments vary between individuals living in the same community. However, the instrumental variable estimator with the inclusion of community fixed effects is statistically costly: the identification of the coefficients associated with social capital relies on much lower variation in the instruments.

Finally, as mentioned earlier, we test the validity of our set of instruments with a classical over-identification test: we cannot reject the orthogonality of the set of instruments with a conventional type-I error of 5%. In fact, the *p*-value associated with the *J statistic* is equal to 0.215.[19]

Lastly, note that our set of *community*-based instruments is orthogonal to *individual* unobservable characteristics (responsible for the endogeneity bias) and that the *individual* level of health will not have an effect on these community-based instruments (reverse causality bias) once we control for the availability of health-care infrastructures and the other community level variables mentioned above.

3. EMPIRICAL PART

3.1. Summary statistics

Table I reports relevant summary statistics separately for each of the eight countries. The first variable measures the percentage of individuals that report being in good or quite good health. There are substantial cross-country differences in self-reported health. The prevalence of good (or quite good) self-rated health is the highest in Kazakhstan and Kyrgyzstan (respectively 72.54 and 82.54%) and the lowest in Ukraine (46.10%).

Cross-country variations in the individual and household characteristics could in part explain the heterogeneity in health across countries. On one hand, respondents in Kazakhstan and Kyrgyzstan are younger, consume less alcohol, have a lower Body Mass Index (weight divided by height squared) than those in Ukraine. The self-reported financial situation is also more favourable in Kazakhstan and Kyrgyzstan (and also in Belarus) than in the other countries.

On the other hand, the proportion of individuals with tertiary education in Kazakhstan and Kyrgyzstan is low compared with what is observed, for instance, in Georgia.

In addition, variations in access to health facilities may impact on variations in health. Indeed, for instance in Kyrgyzstan, 92% of individuals report having access to water of good or quite good quality while this figure only reaches 39% in Ukraine. However, there is no obvious relationship between the prevalence of good (or quite good) self-rated health and the distance to the nearest hospital (or to the nearest doctor) or the surfacing of the road leading to the place. This reflects the limited value of

[18]Unfortunately, the point is difficult to solve, as it is rooted in the definition itself of social capital and in the problematic issue of its correct measurement. The debate on how to define social capital is likely to continue for a while.

[19]Although this test is the one that is used in the literature, we recognize that the power of this test is limited because it is based upon the null of 'orthogonality'.

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Table I. Summary statistics by country

	FULL-SAMPLE	Armenia	Belarus	Georgia	Kazak.	Kyrgyz.	Moldova	Russia	Ukraine
Number of observations	11 187	1892	1812	1684	1825	1787	1782	3614	2052
Health									
Self reported good health (%)[a]	64.63	57.24	58.27	66.68	72.54	82.54	55.55	61.53	46.39
Individual and household characteristics									
Age: mean	43.28	45.95	46.15	47.04	41.51	39.98	46.75	45.80	49.08
Graduated from tertiary education (%)	29.24	20.90	16.99	33.84	20.82	18.63	15.09	21.00	20.02
Household size: mean	3.19	3.05	2.77	4.21	3.51	3.59	2.94	2.66	2.78
Financial situation (%)[b]	60.01	43.31	71.45	40.72	75.54	79.41	59.35	63.89	46.10
Work status (1 = working)	54.43	26.20	66.77	58.91	52.94	41.75	48.27	64.45	51.54
Health infrastructures and local characteristics									
Distance to the nearest hospital (in km)	5.63	1.90	4.33	4.51	9.75	3.19	8.86	5.37	2.44
Distance to the nearest doctor (in km)	1.65	2.55	1.57	1.94	1.91	1.61	1.36	1.55	1.91
Access to water of quality[c]	0.63	0.80	0.59	0.77	0.63	0.92	0.75	0.52	0.39
Road leading to the place is asphalt	94.95	87.43	98.03	86.40	100.00	87.5	94.40	95.90	99.90
Social capital (%)									
Trust	47.94	45.24	51.49	37.23	57.53	71.90	29.34	57.19	48.97
Membership	5.55	3.11	7.17	10.68	5.75	6.93	9.87	6.77	5.65
Social Isolation	23.53	35.26	23.93	12.27	23.24	23.83	27.27	24.15	22.36
Community heterogeneity (1-*Herfinhdhal index*)									
Education	0.27	0.71	0.68	0.61	0.68	0.65	0.71	0.71	0.67
Economic situation	0.55	0.61	0.49	0.52	0.52	0.58	0.57	0.56	0.61
Religious beliefs	0.31	0.17	0.29	0.10	0.51	0.46	0.15	0.41	0.40

Source: Living Conditions, Lifestyle and Health data set (2001); Life expectancy at birth is from WHO Health for All Database, version January 2006.
[a]Percentage of individuals that reports to be in good, or quite good health.
[b]Percentage of individuals that reports to be in very good, good or on average financial situation.
[c]Percentage of individuals that reports that the quality of the water in their water pope is good or quite good.

geographical access to health care as a determinant of health, as it takes no account of the complex nature of access to care or the quality of care provided in the nearest facility (Andersen, 1995).

The summary statistics show that around 48% of individuals report trusting others while only 5.5% of individuals are member of a Putnamesque organization and almost 24% feel isolated. We observe important country differences: only 3.1% of individuals are members of an organization in Armenia while this figure reaches 10% in Georgia. Similarly, 12 and 35% of individuals report feeling isolated in Georgia and Armenia, respectively. However, no clear cross-country pattern emerges from these statistics in terms of the individual endowment of social capital.

3.2. Empirical results

Table II presents estimates of the health Equation (1). Column 1 reports the probit estimate while the last four columns present the linear specifications. In columns 2 and 3, respectively, we present the least squares and community-fixed effects estimates. Column 4 displays the community-random effects estimate. In column 5, we account for the nested structure of the data (individuals within communities within countries) by a multilevel random-intercept model with country- and community-specific intercepts.[20] For the probit estimate, we report the marginal effects at the average values of the independent variables in the sample.

[20]The results of a more general multilevel random intercepts and slopes model would be difficult to interpret in our context.

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Table II. Self-reported health and social-capital, probit and least-squares estimates

		Linear model			
	Probit	Least squares	Community fixed effects	Random community effects	Linear random-intercept model
Social capital measures					
Trust	0.079	0.068	0.069	0.067	0.0677
	(8.07)**	(8.05)**	(7.48)**	(7.79)**	(7.836)**
Member	0.003	0.002	−0.009	−0.003	−0.002
	(0.15)	(0.14)	(0.46)	(0.14)	(−0.151)
Social Isolation	−0.115	−0.106	−0.106	−0.106	−0.106
	(9.90)**	(10.09)**	(9.90)**	(10.55)**	(−10.56)**
Joint signif. of SC variables [*p*-value]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Individual variables					
Age	−0.009	−0.008	−0.008	−0.008	−0.008
	(21.51)**	(22.75)**	(23.49)*	(23.08)**	(−23.11)**
Sex dummy	−0.113	−0.099	−0.093	−0.096	−0.099
	(11.56)**	(11.59)**	(10.75)*	(11.29)**	(−11.31)**
Primary education	−0.090	−0.090	−0.077	−0.083	−0.0847
	(5.35)**	(5.95)**	(4.98)**	(5.82)**	(−5.909)**
Tertiary education	0.051	0.044	0.045	0.045	0.0453
	(4.63)**	(4.70)**	(4.64)**	(4.67)**	(4.719)**
Work status (1 = employed)	0.027	0.029	0.030	0.029	0.0291
	(2.36)*	(2.88)**	(2.87)**	(2.88)**	(2.879)**
Minority status	−0.010	−0.007	−0.002	−0.006	−0.00548
	(0.85)	(0.65)	(0.21)	(0.51)	(−0.501)
Household variables					
1-*Household conditions*					
Economic	0.141	0.132	0.128	0.131	0.131
	(13.24)**	(13.42)**	(12.54)*	(13.83)**	(13.86)**
Material	0.092	0.069	0.071	0.070	0.0697
	(6.44)**	(6.42)**	(6.36)**	(5.80)**	(5.773)**
Household size	−0.000	0.001	−0.001	0.000	0.000505
	(0.14)	(0.34)	(0.30)	(0.02)	(0.188)
Number of working members	0.017	0.015	0.017	0.016	0.0155
	(2.67)**	(2.83)**	(3.01)**	(2.94)**	(2.789)**
2-*Health care facilities*					
Distance from the doctor	0.004	0.004	0.002	0.003	0.00358
	(1.92)	(2.10)*	(0.56)	(1.56)	(1.632)
Distance from the hospital	−0.001	−0.001	−0.001	−0.001	−0.000870
	(1.37)	(1.30)	(0.56)	(1.12)	(−1.138)
Water quality	0.072	0.062	0.055	0.061	0.0621
	(6.75)**	(6.63)**	(5.26)**	(6.37)**	(6.530)**
Population size	0.000	0.000	0.000	0.000	8.28e–10
	(0.32)	(0.34)	(.)	(0.22)	(0.0920)
Road	−0.049	−0.037	−0.064	−0.041	−0.0441
	(2.14)*	(2.00)*	(1.79)	(1.72)	(−1.881)
Dummies for admin. Class of the Place					
Village dummy	−0.002	−0.001	0.000	0.000	0.000479
	(0.11)	(0.09)	(.)	(0.01)	(0.0288)
Capital dummy	−0.034	−0.028	0.000	−0.029	−0.0229
	(1.92)	(1.87)	(.)	(0.95)	(−0.775)
Country dummies	YES	YES	YES	YES	NO
R-squared	0.15	0.18	0.17	0.18	
Observations	11187	11187	11187	11187	11187

Source: Living Conditions, Lifestyle and Health data set (2001).
Columns 1–4: Absolute value of the heteroskedastic robust *t*-statistic below coefficients. *Significant at 5%; **significant at 1%. Column 5: Linear random-intercept model with country and community random intercepts. The variance of both community and country level random component is 0.0037 with a standard error equal to 0.9864; the variance of residual component is 0.1820 (0.0029). Therefore only 1.95% of the unexplained variation is due to community and country level factors each. Moreover, as the estimated variance at both community and country level is much lower that the corresponding standard error, the model specification does not require the inclusion of further community and country level controls. A logit multilevel specification (not reported here) gives similar results.

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Before discussing the impact of social capital, we briefly discuss the effect of individual, household, and community variables on self-reported health. As the estimates coming from probit and linear specifications are almost identical, we only base the discussion below on the results displayed in column 1 of Table II. Regarding individual characteristics we find that, as expected, age is negatively correlated with health, while being female decreases the probability of reporting good or very good health by 16%.[21] However, this needs to be interpreted in the light of evidence that, especially in this region, higher levels of reported poor health among women reflect the greater number of female survivors, with healthy life expectancy among men and women almost the same (Andreev *et al*., 2003). Education is positively correlated with self-reported health: individuals having attained a tertiary education are 5.1% more likely to report good health compared with the excluded category, i.e. the individuals graduated from secondary school.[22] Moreover, the wealth indicators, such as the two dummies related to self-reported economic and material conditions of the household, are strongly correlated with health. The employment status of the individuals and the number of individuals working within the same household are also positively and significantly correlated with health. Working increases the probability of being in good health by 2.7%.

The estimated impact of the availability of health facilities appears to be more mixed and perhaps puzzling. On one hand – and as expected – access to good quality water is positively and very significantly associated with self-reported health. On the other hand, the coefficients associated with the distance from the household dwelling to the nearest doctor and to the nearest hospital are not significantly different from zero. In light of the very limited effectiveness of care provided in many post-Soviet health facilities this may, however, not be so surprising (McKee, 2007).

Finally note that the community characteristics – size of the place and the two dummies for the administrative classification of the place of residence are jointly significantly different from zero.

Our main interest being the impact of social capital on self-reported health, we now turn to the analysis of the coefficients on trust, membership, and social isolation, focusing on the four estimates displayed in Table II. In line with our hypothesis, the coefficients associated with trust and social isolation are both strongly different from zero, with the expected sign. Individuals trusting people are 6.7–7.9% more likely to report good health. The coefficient associated with trust is almost identical, irrespective of the estimation procedure. Trusting relationships are likely to facilitate the transfer of health-related information and to reduce psychological stress. Similarly, socially isolated individuals are about 10.5% less likely to consider themselves in good health, a result that holds whether we use the community random effects estimator, the community fixed effects estimator or the random intercept model with country and community random intercepts. The social isolation effect reaches 11.5% in the pooling estimates. Socially isolated people may be less able to 'insure' health against negative income shocks when insurance markets are imperfect and tend to have less access to network information or moral support.

Finally, the coefficient associated with membership is positive but not significantly different from zero in all estimates. However, several problems in the construction of the membership variable could explain the absence of a significant effect of membership on health. First, the membership variable takes the value one if individuals are a member of one or several 'Putnamesque' organizations, and zero otherwise. In other words, our indicator cannot capture the potentially differentiated effects of being member of one or several organizations. We have therefore tried to re-estimate the health equation

[21]Note that we have also considered the possibility of a non-linear relationship between age and self-reported health, as found in Glaeser *et al*. (2002). Results are not reported but it emerges that including the square of age as an additional covariate does not affect the magnitude and significance of the coefficients associated with the other explanatory variables. Furthermore, the square of age is not significantly related to self-reported health.

[22]Similarly, we observe that the individuals with less than a secondary school degree are 9% more likely to be in a bad self-reported health compared with the excluded category.

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using, as alternative measure for membership, a counting variable reporting the number of 'Putnamesque' organisations in which the individual is involved. Second, our indicator for membership takes the value zero even if individuals are (i) part of 'Olsonian' organizations (professional organisation, political parties, etc.) or (ii) not involved in any type of organizations. We made this distinction as it is well known that 'Olsonian' organisations may generate negative externalities on individuals not involved in such organizations.[23] It is hence possible that the positive effect of being member of 'Putnamesque' organizations is compensated by the negative effects of not being involved in 'Olsonian' organizations (if the individuals are not simultaneously involved in both types of organizations). We have therefore also tested the sensitivity of our results, using as an alternative measure of membership a dummy variable equal to one if the individual belongs to an organization, irrespective of its nature, and zero otherwise. Space does not permit results to be reported (available upon request) but it turns out that the coefficient associated with membership is not significantly different from zero, whatever membership indicator we rely on.

In summary, our findings confirm the evidence of a positive effect of social capital on self-reported health. The coefficients associated with trust and social isolation are positive and negative, respectively, and both are significantly different from zero. In addition, even if membership is not significantly correlated with self-reported health, the joint test of the significance of the three indicators of social capital strongly rejects the null hypothesis with a p-value < 0.0001, irrespective of the procedure of estimation.[24]

Nevertheless, we must take care before interpreting these associations as causal given the three statistical problems, discussed in the previous section, which could bias the results. We therefore turn now to instrumental variable estimates. For the remainder of the paper, we will rely on linear specifications since the results presented above show that probit and linear specifications give very similar results.

Table III presents instrumental variable results. We focus the presentation in the upper part of Table III on the coefficients associated with trust, membership, and social support. To allow comparison to the above-discussed results, we repeat the pooling estimate in column 1, while column 2 presents the instrumental variable estimate and the column 3 reports the instrumental variable estimate with community fixed effects.[25]

Recall that we use as instruments (i) three measures of community heterogeneity in terms of the religious beliefs, the level of education and the economic situation and (ii) the average level of social capital within the community (for the three social capital indicators).

The lower part of Table III reports diagnostic tests of the validity of our instrumental variable estimators. The Hansen test of over-identifying restrictions does not lead one to reject the orthogonality of our instrument set with respect to the disturbance term with p-values greater than 0.21. We also report the Anderson test in order to check the second condition, which must be satisfied by any set of admissible instrumental variables, namely the 'strength' of their correlation with the endogenous variables. The weakness of the set of instruments is rejected with a p-value lower than 0.001.[26] Note also that the F-statistics, testing the hypothesis that the coefficient on the excluded instruments are all zero in

[23]See Knack and Keefer (1997) and Fidrmuc and Gërxhani (2005).

[24]Note that we have also estimated an ordered probit given that the self-reported health can take four values ('good', 'quite good', 'rather bad', and 'bad'). Results are not reported but are available upon request. The conclusions are not different from those obtained with the probit or linear probability model. Trusting behaviours increase the probability to self-report being in good and quite good health and decrease the probability of reporting being in rather bad or bad health. Similarly, social isolation increases the probability of self-reporting to be in rather bad or bad health.

[25]Note that we have also estimated country-specific estimates in pooling as well as in instrumental variable with community fixed effects. Results are consistent with the full-sample based in Table III, at least qualitatively, as the signs as well as broad magnitudes are comparable. However, it is beyond the scope of this paper to interpret country differences in the impact of social capital.

[26]The 'weak instruments' problem (Stock *et al.*, 2002) has recently received growing interest. Several studies have pointed out that weak instruments can lead to severe bias in instrumental variable estimation and that the Hansen test of overidentifying restrictions tends to over-reject.

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Table III. Self-reported health and social-capital, instrumental variable estimates

	Least squares	GMM estimates	GMM estimates Community fixed effects
Trust	0.068	0.079	0.075
	(8.05)**	(2.85)**	(6.98)**
Membership	0.002	0.251	−0.008
	(0.14)	(2.21)*	(0.39)
Social isolation	−0.106	−0.228	−0.113
	(10.09)**	(2.03)**	(9.14)**
Joint significance of SC variables [*p*-value]	[0.00]	[0.00]	[0.00]
Observations	11187	11187	11187
Instrumental variables diagnostics			
Test of overidentifying restrictions: *J* statistic [*p*-value]	—	0.215	—
Anderson canon: [*p*-value]	—	[0.00]	[0.00]
Anderson-Rubin test, joint significance coefficient *F* [*p*-value]	—	90.97 [0.00]	3.07 [0.00]

Source: Living conditions, Lifestyle and Health data set (2001).
Note: Additional covariates include individual variables (age, educational dummies, work status), household variables (household size, number of working household members, dummies defining the material and economic conditions, and proxies for health care facilities, i.e. distance to the nearest doctor and hospital, two dummies for the quality of the water and the type of road leading from the household dwelling to the community), and community variables (population size, two dummies for the classification of the place of residence (village and capital). Instruments (columns 2 and 3): The external instruments are composed of 3 Herfindhal indices measuring the level of heterogeneity within each community (in terms of education, income and religious beliefs) and 3 indicators measuring the community level of social capital. The variables are calculated for each individual as the mean over all other individuals in the community. GMM estimators have been used. The results are consistent in the presence of arbitrary heteroskedasticity. Absolute value of the *t*-statistic below coefficients. *Significant at 5%; **significant at 1%.

each first-stage estimate are well above the threshold of 10 indicated by Staiger and Stock (1997) as the rule of thumb criterion of instrument weakness.

Taken together with the non-rejection of the test of over-identification, this suggests that our set of instruments is reasonable.

When we address the endogeneity of the three social capital indicators, the coefficients associated with trust and social isolation have a positive and negative sign, respectively, and are statistically different from zero. The quantitative impact of trust is almost equal, irrespective of the procedure of estimation: the coefficient associated with trust equals 0.068 in the pooling estimates, 0.075 in the instrumental variable approach, and 0.080 in the instrumental variable approach with community fixed effects. Social isolation is also negatively and significantly associated with health, whatever the procedure of estimation. Note however that the magnitude of the coefficient associated with this indicator varies substantially: individuals suffering from social isolation are 11.1% (instrumental variable estimator with community-fixed effects) to 23.6% (instrumental variable estimator) less likely to report good health. In addition, when we rely on the instrumental variable estimator, we observe that being a member of a 'Putnamesque' organization significantly increases the probability of reporting being in a good or very good health. However, we remain cautious about the generalisability of this finding, given its lack of robustness across the various specifications. Indeed, the coefficient associated with membership is not significantly different from zero when we control for all community-level unobserved heterogeneity (instrumental variable estimator with community fixed effects). Finally, once again, the joint test of the significance of the three indicators for social capital strongly rejects the null hypothesis with a p-value < 0.0001.

In summary, these instrumental variable results confirm those presented in Table II. Social capital is positively related to self-reported health. Yet, as we now control for the potential reverse causality and the endogeneity bias, we are more confident that this positive association is due to a causal effect of social capital on health. Assuming that our instruments are valid, as indicated by the analyses discussed above, our results suggest that the individual level of social capital has a causal and positive impact on self-reported health. However, we are unable to identify the precise channels by which social capital

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improves health in the given context, whether through enhanced psychological or financial support in case of need or through better information availability or otherwise.

4. CONCLUSION

In this paper we have investigated the impact of social capital on individual self-reported health for a sample of countries from the Commonwealth of Independent States. We rely on three indicators of social capital – individual degree of trust, participation in local organisations, social isolation – and employ alternative procedures to estimate consistently the impact of social capital on health. To the best of our knowledge this paper is the first to assess the impact of social capital on health of individuals in transition countries in ways that explicitly try to overcome the main empirical concerns involved in assessing the relationship.

Our empirical results suggest that trust is positively and significantly correlated with health, whether pooled or when we rely on instrumental variable estimators with community specific effects. Similarly, social isolation is negatively and significantly associated with health, irrespective of the procedure of estimation. On the other hand, the effect on self-reported health of being a member of a Putnamesque organization is less clear. However, the coefficient associated with membership, while not being significantly related to health in most specifications of the model, does turn positive when we employ an instrumental variable estimator. These findings are consistent with a very recent study at an ecological level suggesting that a high level of membership of organisations exerted a protective effect in the face of mass privatisation in these countries during the 1990s (Stuckler *et al*. in press). Overall, these findings indicate that improvements in social capital offer the potential to improve health quite considerably in this region.

This inevitably begs the question of how this might be achieved. Here, the present analysis is but the first step in the diagnosis and there is still much to do to produce a policy prescription. First, this study was inevitably dependent on the questions that had been asked in the surveys. There are three types of social capital, defined by those who are linked together (Gitall and Vidall, 1998; Pritchett and Woolcock, 2002). Bonding social capital refers to the intensity of interaction between individuals who see themselves as being in recognisable social groups. Bridging social capital describes linkages between individuals in groups who know that they are not alike, but who have similar levels of power. Linking capital refers to relations between individuals who occupy recognisably different social groups and who have different levels of power. It is argued that a balanced combination of these types of social capital is most likely to be beneficial to health. Unfortunately, although this study does capture horizontal egalitarian relationships, it does not offer insights into the other forms, despite attempts to differentiate the effect of being a member of 'Putnamesque' and 'Olsonian' organisations. However, this distinction is always difficult to make in large-scale surveys. Second, within any of these three types, the intensity of relationships can be either positive or negative for health, depending, for example, on whether such relationships are used for mutually beneficial outcomes or in pursuit of exclusion of others or nepotism and corruption. Again, understanding which is dominant requires detailed qualitative research. Third, as Szreter and Woolcock (2004) have noted, social capital is not a solution to all problems. However, it is a useful concept that focuses our attention on issues that have previously been given insufficient attention.

Some more general conclusions are, however, possible. To understand the gap between the existing situation and where, as a health policy maker, one would wish to be, it is perhaps easiest to draw on a historical example. Szreter (2004) has studied what factors were important in building social capital and, as a consequence, improving health in Britain during the industrial revolution, a period of economic disruption with many parallels with the post-Soviet transition. He identifies three important developments. The first is a rejection of policies that concentrate wealth in the hands of a few,

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instead promoting what is termed 'co-production', in which the state, small and medium enterprises, and bodies representing residents and workers collaborate in pursuit of the common goal of sustainable economic growth. The second is a mechanism by which civic society can articulate its concerns and the political structures can respond to them. The third, which underpins the first two, is political participation. Clearly, all of these developments involve actions far beyond the health sector and, unfortunately, it seems that many political developments in this region are actually moving societies in the opposite direction.

However, notwithstanding this rather pessimistic interpretation of developments at the macro-level, there is also evidence that much can be achieved more locally, programmes designed to increase social interaction. Thus, a programme in three neighbourhoods in Portland, Oregon, involving measures to promote community participation in urban renewal, achieved improvements in mental health (Semenza *et al*., 2007). Another before and after study of a traffic calming scheme, which led to greater pedestrian activity, was associated with better physical health (Morrison *et al*., 2004). A recent systematic review found some evidence of gains in mental health linked to interventions giving employees' greater control in organisations (Egan *et al*., 2007). Oakley (1991) identified six dimensions in promoting social capital in communities. These are: *animation*, assisting local people to stimulate their own critical awareness, to examine and explain issues in their own words, and to realise what they can do to bring about change; *structuring*, defined as development of internal cohesion and solidarity among people; *facilitation*, assisting people to undertake specific actions including the acquisition of particular technical and managerial skills, gaining access to available resources or translating their own ideas into feasible projects; *intermediary*, serving as a go-between in relation to other external services; *linking*, helping to develop links between people in similar contexts and facing similar problems; and finally, *withdrawal*, as external intervention becomes progressively redundant.

While the evidence of effectiveness of interventions elsewhere is limited, evidence from this region is, unfortunately, so far almost non-existent and there are many reasons for caution in transplanting policies from elsewhere. Anyone now in middle age will have lived through a period where state policies might have been designed to break down trust. The Soviet security services had extensive networks of informers and, while the worst excesses of the Stalinist era ended in 1953 (Applebaum, 2003), many families will have had direct experience of disappearances and executions, often as a consequence of an ill-considered comment to a neighbour. Clearly, future policies must take account of this reality. Nonetheless, there is potential to experiment with these local initiatives in many places building on, for example, the World Health Organisation's Healthy Cities project, in which a number of cities in this region participate.

This brief analysis suggests that change will be difficult. However, it also indicates clearly that, even if there is insufficient evidence to identify the costs and benefits associated with specific interventions that might improve social capital in the countries concerned, policies that, directly or indirectly, increase the currently low levels of social capital in this region (when compared with the western European countries for instance (Fidrmuc and Gërxhani, 2005)) may be worth considering. The extremely unfavourable adult health status in the CIS countries highlights the urgency of exploring ways of improving health that go beyond the traditionally accepted boundaries of the health-care system.

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APPENDIX

A definition of the variables is given in the following table

Self reported good health	Indicator taking on the value one if the individual self- reports to be in very good or good health, zero otherwise
Individual level of social capital	
Trust	Indicator taking on the value one if the individual agrees or quite agrees with the opinion that a majority of people can be trusted, zero otherwise
Membership	Indicator taking on the value one, if the individual is member of one of the following organisations: church, sport, art, music, neighbourhood, youth, women, charitable organisations or any other voluntary organisation, zero otherwise
Social isolation	Indicator taking on the value one if the individual feels alone, and zero otherwise
Individual characteristics	
Age	Age of the individual
Age2	Age squared of the individual
Sex	Indicator taking on the value one if the individual is a female, zero otherwise
Primary education	Indicator taking on the value one if the individual has completed the primary education, zero otherwise
Tertiary education	Indicator taking on the value one if the individual has (i) completed or (ii) attained but not completed the tertiary education, zero otherwise
Work status	Indicator taking on the value one if the individual is working at the time of the interview, zero otherwise
Migration	Indicator taking on the value one if the individual has not always been living in the community, zero otherwise
Minority	Indicator taking on the value one if the individual self-reports to belong to a minority group (the group being defined with respect to the nationality), zero otherwise
Household characteristics	
1-*Household conditions*	
Economic	Indicator taking on the value one if the individual reports to be in a very good, good or average economic situation, zero otherwise

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Material	Indicator taking on the value one if the individual reports to have enough money to purchase long lasting consumer goods as well as expensive goods such as car or flat, zero otherwise
Household size	Size of the household
Number of working member	Number of individuals working within a common household
2-*Health care facilities*	
Distance from the Doctor	Distance from the nearest hospital, in kilometres
Distance from the Hospital	Distance from the nearest doctor, in kilometres
Water quality	Indicator taking on the value one if the quality of the water in the household water pope is good or quite good, zero otherwise
Community characteristics	
Population size	Population size of the community
Road	Indicator taking on the value one if the surface leading to the community is in asphalt, zero otherwise
Village dummy	Indicator taking on the value one if the community is classified as a village, zero otherwise
Capital dummy	Indicator taking on the value one if the community is classified as a regional or state capital, zero otherwise
Instruments	
Heterogeneity of the community, three indicators	Heterogeneity with respect to the educational level, economic situation, religious beliefs. Indicators ranged between 0 and 1 (no heterogeneity)
Community level of social capital, three indicators	For each individual, mean *level of social capital over all other individuals* in the community

Source: Living conditions, Lifestyle and Health data set (2001).

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