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Abstract

Background: Previous research has identified the role of social capital in explaining variations in health in the countries of the former Soviet Union. We explore whether the benefits of social capital vary among these countries and why.

Methods: We estimate the impact of micro social capital (trust, membership and social isolation) on individual health in each of eight former Soviet republics using instrumental variables to overcome methodological hazards such as endogeneity and reverse causality. We examine interactions with institutional variables (voice and accountability; effectiveness of the legal system; informal economy) and social protection variables (employment protection; old age and disability benefits; sickness and health benefits).

Results: Most social capital indicators, in most countries, are associated with better health but the magnitude and significance of the impact differ between countries. Some of this variation can be explained by interacting social capital indicators with measures of institutional quality, with membership of organisations bringing greater benefit for health in countries where civil liberties are stronger, whereas social isolation has more adverse consequences where there is a large informal economy. A lesser amount is explained by the interaction of social capital indicators with selected measures of social protection.

Conclusion: When considering interventions to improve social capital as a means of improving population health, it seems advisable to take into account the influence of macro contextual variables, in order not to over- or understate the likely impact of the intervention.

What this paper adds

What is already known on this subject?

Social capital, assessed by levels of trust, membership of organisations, and social connections, has been linked to better health in studies from many parts of the world. However, it is known to be low in the countries of the former Soviet Union, with recent research showing that this is a factor in the high levels of poor self-reported health in this region. There are, however, differences in the association between the various measures of social capital and health in different countries in the region.

What does this study add?

We have shown how some of the observed variation in the relationship between components of social capital and health can be explained by measures of institutional quality. Membership of organisations brings greater benefit for health in countries where civil liberties are stronger, whereas social isolation has more adverse consequences where there is a large informal economy.

Introduction

It is now clear that, despite its superficial trappings of superpower status, the Soviet Union was a deeply dysfunctional society and, from the 1960s onwards, failed to achieve either economic growth or improvements in population health.[1] It was also one where social interaction was characterised by distrust and isolation. The communist regime maintained a pervasive control over the lives of its citizens and the centrally planned economy discouraged individual initiative. Political opposition was banned, as were most forms of criticism. Social interaction was channelled through formal organizations, such as the party, trade unions and other associations controlled by the regime and spontaneous interaction was implicitly and explicitly discouraged. Personal relationships were typically limited to a narrow circle of relatives and friends and it was difficult to trust outsiders who might pass information to the authorities, leading to long periods of incarceration or worse. [2] Survival frequently required the use of imaginative circumvention of official restrictions, bringing the rule of law into disrepute.

The legacy of this situation was a low level of what has been termed social capital. [3] [4] The term "social capital" was introduced in 1977 by Bourdieu [5] and subsequently operationalised and tested empirically by Coleman.[6] It comprises a combination of trust, social support, norms, and information channels and has been linked to progress in areas ranging from economic growth to the functioning of institutions. [7] [8]

The importance of the elements comprising social capital became apparent in the transition to a market economy. Many of the formal support systems, often linked to places of employment, were no longer available. Economic restructuring preceded the creation of new social institutions and many people were unsure where to turn to for help when faced with personal crises such as job losses. .[3] [9] The scale of the problem can be seen in Table 1, which shows levels of trust, participation in local voluntary organizations, and confidence in key institutions (the army, press, labour unions, police and parliament) using data from the third round of the World Values Survey (WVS), undertaken mainly between 1999 and 2000 (see notes in Table 1).

[Table 1 ABOUT HERE]

The mean degree of participation in local voluntary organizations is only 14% in this region, far below the 54% seen in high-income countries. Although the average level

of trust is at 25%, comparable to other low- and middle-income countries, it is also below the 36% observed in high-income countries. Confidence in institutions (except the army and press) is also lower than elsewhere in the world, reflecting a yet incomplete transition.

This could have adverse consequences for health. Social capital has been invoked as a determinant of health [6 8 10 11], acting through a variety of mechanisms [12]. First, at the micro-level, social capital favours cooperation and interaction among individuals, which in turn enables them to assist and care for those falling ill and to provide economic support to those facing shocks, such as sudden unemployment, death of a breadwinner or adverse climatic conditions. Second, intense cooperation and social interactions facilitate the flow of health-related information. Third, positive interactions with other people can have positive consequences on psychological well-being. However, it cannot be assumed that benefits will flow, and much may depend on the characteristics of social capital in different settings, in particular the extent to which relationships bond members of existing groups or bridge divisions with others.[13]

The empirical evidence tends to support the idea that social capital may matter for health in transition countries, mostly based on ecological evidence[14-16] but with some individual level analyses.[17], including a recent study in which we pooled data from eight former Soviet countries.[18] Using instrumental variables to overcome certain methodological problems discussed below while simultaneously controlling for many individual, household community and country effects, we found that those who trusted a majority of people were 7% more likely to report being in good health that those not trusting others. On the other hand individuals who felt isolated were 11% less likely to be in good health than those who were not. However, there was no clear association between health and membership of what are referred to as Putnamesque organisations, characterised as being based on horizontal, egalitarian relations and exemplified by sports clubs or religious and charitable organizations [7]. These contrast with Olsonian ones, such as political parties, trade unions, and professional associations that tend to reconfigure redistribution systems in their favour at the expense of the rest of the society and which were dominant in Soviet society. Our findings were consistent with previous research from elsewhere. [10]

Earlier work did not, however, explore whether the effects of social capital on health varied between countries. In this paper, we move two steps further, taking advantage of the availability of consistent survey data from eight countries, by first documenting how the impact of social capital on health differs between countries and second, by attempting to explain any differential impacts. This draws on the work of Bobak et al who assessed the impact of factors such as corruption on individual health in transition countries using multi-level analysis. They found that corruption is damaging to health even after controlling for individual socioeconomic factors.[19]

A better understanding of the contextual factors that promote or reduce the potential health benefits of social capital should help policymakers to explore ways in which improved social capital can improve health in a specific country. Our results suggest that diversity in areas such as civil liberties and political voice may influence the meaning of conventional measures of social capital and hence their impact on health.

Data and Methods

Living conditions, Lifestyles and Health (LLH) surveys

The individual level data are from the Living conditions, Lifestyles and Health (LLH) surveys, conducted in eight former Soviet countries - Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, and Ukraine. National samples number around 2000, except for Russia (4000) and Ukraine (2500). 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). Out of each household one person was chosen, whose birthday was closest to the date of the interview. Interviews were carried out in all countries throughout autumn 2001. Response rates varied between 71% and 88% among countries. Further details have been reported elsewhere.[20]

Empirical methodology

Health production function:

The determinants of individual health can be represented by the following equation:

$$H_{ijk} = \beta_0 + C_{jk}\beta_1 + X_{ijk}\beta_2 + SC_{ijk}\gamma + \varepsilon_{ijk} \quad (1)$$

where *i* stands for the individual, *j* for the community in which the individual lives and *k* refers to the country of residence; H_{ijk} is a measure of health equal to 1 if individuals self-report to be in good health, and 0 otherwise, C_{jk} is a vector of explanatory variables at community level, X_{ijk} is vector of explanatory variables at individual level, SC_{ijk} are the social capital indicators (at individual level), and ε_{ijk} is the disturbance term. For any individual *i*, community is defined as the set of individuals living in the same town or village although in Armenia only we use the region as our data do not provide information about the precise place of residence.

The set of covariates X_{ijk} include age, level of education, employment status and gender of the respondent. We also control for household characteristics related to the size and the number of working household members and the material and economic conditions of the household. Additionally, we control for access to health care facilities through the inclusion of two variables measuring, respectively, distance of the respondent's residence to the nearest hospital and to the nearest doctor and an indicator of material circumstances derived from the water quality to which the household has access. The variables are defined in a web appendix. Finally, in order to capture all unobserved community heterogeneity, we include community fixed effects.

Three social capital indicators at individual level are considered: trust, membership and social isolation, all represented by dummy variables. Trust takes the value of 1 if the respondent declares that the majority of people deserve to be trusted. Membership takes the value of 1 if the respondent reports membership of a voluntary local organization (e.g. religious, sporting, artistic, musical, neighbourhood, youth, women, and charitable organisations). Social isolation equals 1 if the respondent feels being alone and isolated from the community. These are all commonly used indicators in the empirical social capital literature.[21]

Assessing the impact of social capital on individual health at a micro level must address at least three concerns. First, individual measures of social capital are self-reported and thus dependent on the respondent's attitude, state of mind during the interview, and past experiences. Therefore, the available measure reported by the

respondent is likely to differ from the true level of social capital, with an uncertain direction of bias. This is a non-random measurement error which makes self-reported indicators of social capital endogenous and hence unsuitable for a standard Ordinary Least Squares regression.

Second, there is reverse causality, as *membership* and *social isolation* are likely to be influenced by individual health. A healthier respondent will find it easier to participate in activities of local voluntary organizations; a sick respondent, in contrast, might feel socially isolated because of his or her own constraints in meeting friends. To address these two issues, we have used instrumental variable estimates as in our earlier study using pooled data from all eight countries.[18]

Third, it is necessary to disentangle the role of social capital from other factors. For instance, economic and material conditions at individual and community level determine both individual health and individual social capital. An affluent person will find it easier to obtain health care of good quality and to participate in charitable organizations or sporting associations. Omitting common covariates would lead to an under- or over-estimate of the true impact of social capital on health. This has been addressed by controlling for many variables at individual and household level and by using fixed effects to capture all unobserved heterogeneity at the community level.

The three social capital indicators are instrumented by “special” community averages of the three social capital indicators: community averages are calculated for each individual as the mean of *all other individuals* living in the same community. These averages are “special” in the sense that they vary at the individual level. This is to avoid spurious correlation especially in small villages.

Although our choice of instruments parallels that in our earlier paper, where a detailed discussion is included, it is nonetheless necessary to present briefly the key elements of the justification. Individual self-reported perceptions of social capital are a distorted reflection of true social capital, a reflection shaped by individual idiosyncrasies. Technically, self-reported social capital is social capital plagued by measurement error, which is likely to be correlated with individual observable and unobservable characteristics. Instead the averages of social capital over the (other) members of the community are likely to be uncorrelated with such idiosyncrasies and at the same time are likely to be correlated with true social capital, as they are the

product of the same social context in which the individual lives. However, such instruments would not be acceptable if community social capital had a direct impact on individual health or an indirect impact through other community-level variables. To address this concern, we capture all the community-level relevant determinants of individual health by including community fixed effects into the model. Additional information on the validity of our instruments has been published previously.[18]

Observations containing missing data have been omitted from the analysis. The resulting sample comprises slightly more than 11,000 respondents with information on all relevant variables.

Country estimates: what drives country differences in the return to social capital?

The first step in the analysis was to estimate instrumental variable community fixed effects coefficients for each country. In the second step we sought to explain the differences among countries. To that end, the data were pooled and each social capital indicator was interacted with variables capturing potentially relevant policy characteristics at the country level. In particular we have considered the influence of one set of proxies for the quality of governance and another set capturing the extent of formal social support policies. While we use a diverse set of governance indicators, our overarching hypothesis is that better governance will increase the ability of social capital to create greater health benefits. For instance, greater democracy should allow emerging social networks to work openly, free from repression. We have selected indicators of formal support policies because we hypothesise that they may act as a substitute for informal social capital. Hence, we would expect formal social support to diminish the association between social capital and health because formal systems would substitute for informal ones [22-24].

Table 2 shows the six variables we have selected : (1) The voice and accountability (VA) indicator is an index of political and civil liberties and of human rights in 2000 [25]. (2) The logarithm of the number of days necessary to enforce a contract (DAYS) is a measure of the effectiveness of the legal system and, hence, of the transaction costs incurred by agents when contracting with others.[26] (3) The share of the unofficial economy (UE) is a proxy for the importance and frequency of informal transactions,

outside the protection of the legal system. The last three variables capture different aspects of social protection: (4) the level of employment protection (EP), (5) old age and disability benefits (ADB) and (6) sickness and health benefits (SHB). The latter is an indicator which captures the generosity of social protection in the event of an employee's sickness. The variables UE, EP, ADB, and SHB are available only for six out of eight countries. VA ranges between -2.5 and 2.5. UE, EP, ADB, and SHB range between 0 and 1. Additional details are reported in the note to Table 2.

[Table 2 ABOUT HERE]

We rescaled all these variables so that one benchmark country takes the value of zero: for voice and accountability we defined Moldova as the reference (i.e. the best scoring country) and for the remaining indicators we used the worst performer. This allows the coefficients of the non-interacted social capital indicators to be interpreted as the social capital impact in the reference country.

Finally, we interacted a community-level (rather than country-level) variable with the indicators of social capital: the population size of the community. In this way we tested the hypothesis that the impact of social capital would depend on the community population: trusting others should be easier in small communities, with greater opportunities for repeated interactions and lower costs of monitoring and acquiring information. [27] Hence, the impact of *trust* on health would be expected to be stronger in smaller communities.

Results

Table 3 reports instrumental variable community fixed effects estimates for the pooled sample and country by country. The results for each country are broadly in line with those for the pooled sample, discussed at length in our earlier paper: for most countries *trust* has a significant positive impact on health, *social isolation* a significant negative impact and *membership* no impact. Nevertheless, there are some differences in the magnitude of these effects. As for *membership*, Russia and Moldova are different in that they show a positive influence (significant only for Moldova).

[Table 3 ABOUT HERE]

Table 4 (columns 2-7), based on the full sample, reports the instrumental variable fixed effects estimates of the health equation, augmented by the interaction of each social capital indicator interacted with one of the measures of democracy, effectiveness of the legal system and social protection discussed in Table 2. Column 8 reports the interaction with community size. As a reference, non-interacted estimates are reported in column 1.

[Table 4 ABOUT HERE]

Turning first to VA, in column (2), it appears that civil liberties and political participation do not affect the impact of *trust* or *social isolation* on self-reported health. By contrast, the impact of *membership* on individual health is influenced by VA in the sense that in countries with a high level of civil liberties and political participation (higher than about -0.5) there is a substantial positive impact of membership on health. Moldova is the country with the highest level of VA in 2000, among the eight countries of the sample. This explains one of the idiosyncrasies noticed in the country-specific estimations according to which the effect of membership on health was biggest in Moldova.

Column (3) reports the effect of a measure of the number of days necessary to enforce a contract (DAYS). The level of transaction costs does not influence the health effect of any of the social capital indicators. Column (4) shows that the larger the informal economy, the more dangerous it is (health-wise) to be socially isolated.

The next three columns report the results of the interactions with EP, ADB, and SHB. The only significant interaction is with employment protection. When this is strong the impact of trust on health is diminished.

As predicted, in smaller communities *trust* has a larger impact although its size remains small in absolute terms (column 8). On the other hand, social isolation has a negative and significant impact in larger communities.

Discussion

This paper takes advantage of a unique data set, with information collected consistently and simultaneously from eight countries with a shared cultural legacy that developed during seventy years of communist rule, yet with diverse social and political experiences in the subsequent decade. This provides a valuable opportunity

to understand how national characteristics, many within the realm of government, influence the well-established contribution of social capital to health.

We confirm that, as in other parts of the world, social capital makes an important input to the production of health in this region. Indeed, as we showed in an earlier paper, it rivals some of the more traditional health determinants. Thus, the impact of *trust* on individual health turned out to be slightly higher than the impact of adequate access to water.[28] However, both the level and health impact of social capital vary among these countries. We have attempted to interpret these differences by taking into account certain country-specific economic and institutional characteristics. Overall, our results suggest that returns to social capital are larger in more democratic countries and in countries where contracts are more effectively enforced.

The finding that civil liberties have very little influence on how those aspects of social capital that relate primarily to the sphere of family and friends (such as *trust*) affect health is intuitive as it is here that the institutional framework is least relevant. This is also the case for the impact of social isolation on health. However, well entrenched civil liberties, which encourage the emergence of voluntary associations, create a situation whereby the membership of such associations has an especially beneficial effect on health. This is consistent with other research showing how such associations support circulation of information and provide an extended network that can be relied upon in case of need.[29-31] On the other hand, in undemocratic countries, which tend to repress and discourage voluntary associations, being member of such an association can be associated with discrimination and other forms of persecution (such as restricted access to medical facilities or even physical and psychological violence). In such countries, associations are less likely to fulfil their role as a forum for information exchange and mutual support. In these circumstances, it is understandable that membership may negatively affect individual health.

The effectiveness of the legal system has no impact on the effect of social capital on health as the social deals triggered and favoured by social capital are typically informal and do not require any legal protection.

The danger of being socially isolated in the presence of a large informal economy is explicable by the risk of being excluded from local networks which can provide

opportunities of economic transactions and occasional jobs, as well as opportunities to obtain goods otherwise not accessible.

The diminished impact of trust on health where employment protection is well developed, with formal insurance against the risk of being fired, is likely to be due to informal insurance mechanisms mattering less in such circumstances. However, the extension of this argument would suggest that higher old-age and sickness benefits should also reduce the importance of social capital, as formal and informal insurance act as (partial) substitutes. In particular we would expect that the negative impact on health of *social isolation* should be reduced. However, this was not the case and might indicate that informational and psychological benefits provided by aspects of social capital dominate those relating to economic protection and care provision. However, we remain cautious about this interpretation as the indicators used display limited variability across countries.

The influences of community size on the relationship between trust and social isolation and health can be interpreted from a relative "deprivation" perspective: the detrimental effect of social isolation on health is inversely related to the social isolation status of neighbourhoods. In large cities, there will be more opportunities for social exchange, so that the expected average level of social isolation is lower, and the perception of social isolation and its negative effect on health is more readily perceived.

In light of our results, traditional health policies that have thus far focussed on improving health care infrastructure should consider broader intervention strategies that incorporate social capital promotion, for instance, by supporting associations, voluntary groups and spontaneous networks. Such policies could be particularly beneficial in the former Soviet Union, where there is great scope for improving social capital, coupled with an even greater need to reduce what are some of the worst adult health outcomes in the world. 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, or by generating "enthusiasm among communities and their leaders to develop social capital".[12] In practice, as Kawachi and Berkman noted earlier, there are hardly any examples in the literature analysing interventions that intentionally seek to improve social capital.[32] . A notable example is a recent, encouraging study by Pronyk et al, who demonstrate the positive effects

of an intervention in rural South Africa, combining group-based microfinance with participatory gender and HIV training in order to promote changes in solidarity, reciprocity and social group membership as a means to reduce women's vulnerability to intimate partner violence and HIV.[33]

The testing of interventions to promote social capital in the transition countries context, where there appears to be particular scope for improving social capital, should be high on the agenda of applied social and health policy research.

Table 1 Social capital indicators from the third round of the World Values Survey

			Confidence in				
	Trust	Membership	Army	Press	Unions	Police	Parliament
Armenia	25%	14%	72%	34%	19%	32%	30%
Belarus	42%	10%	70%	41%	28%	40%	37%
Georgia	19%	5%	52%	60%	28%	38%	41%
Moldova	15%	31%	57%	44%	33%	35%	35%
Russia	24%	11%	67%	30%	31%	29%	19%
Ukraine	27%	14%	69%	47%	38%	33%	27%
CIS-6	25%	14%	64%	42%	29%	34%	32%
Low income	20%	46%	73%	65%	54%	47%	63%
Lower middle income	25%	25%	63%	44%	34%	51%	39%
Upper middle income	21%	35%	56%	48%	36%	46%	34%
High income	36%	54%	59%	39%	40%	69%	40%
Gap	Ns	-66%	ns	ns	-26%	-41%	-24%

Source: World Values Survey, 1999-2000
Note: Data are available for 77 countries. For Azerbaijan, Australia, Armenia, Brazil, Colombia, Dominican Rep, El Salvador, Georgia, New Zealand, Norway, Switzerland, Uruguay data refer to 1995-97. For these countries inactive membership is code as no membership. Armenia, Belarus, Georgia, Moldova Russia and Ukraine are the only CIS countries for which data are available. The CIS line averages over these six countries. Countries are classified as low, lower middle, upper middle and high income following the World Bank criteria. The trust variable is a dummy which takes the value 1 if the respondent considers that most people can be trusted and 0 if the respondent says that he needs to be very careful in dealing with people. The membership variable is a dummy which takes the value 1 if the respondent belongs to one organization related to church, cultural activities, human rights, conservation, environment, animal rights, youth work, sports, women's group, peace movement, 0 otherwise. We also use other social capital indicators related to the degree of confidence in the army, press, labour unions, police and parliament. These indicators takes the value 1 if the respondent has "a great deal " or "a lot" of confidence, 0 otherwise ("not very much" or "not at all" confidence) in the organization. The average gap between CIS countries and the rest of the world is reported only when it is significantly different from zero at a confidence level of 95%; otherwise "ns" (non significant) is indicated. This gap is derived as follows: we regress each social capital measure over per capita GDP in 2000 and a dummy taking the value 1 if a country was a CIS country. Next we compute the ratio between the average of the predicted values of the CIS countries and the average of the predicted values of the rest of the world.

Table 2 Country indicators of economic and institutional framework

Country	Voice and accountability (VA)	Log of number of days necessary to enforce a contract (DAYS)	Share of unofficial economy (UE)	Employment protection (EP)	Old age & disability benefits (ADB)	Sickness & health benefits (SHB)
Armenia	-0.302	5.273	0.463	0.602	0.474	0.982
Belarus	-1.213	5.521				
Georgia	-0.206	5.927	0.673	0.771	0.597	0.000
Kazakhstan	-0.908	5.991	0.432	0.780	0.585	0.000
Kyrgyz Republic	-0.676	6.198	0.398	0.746	0.574	0.970
Moldova	-0.008	5.635				
Russian Federation	-0.436	5.799	0.461	0.828	0.586	1.000
Ukraine	-0.393	5.595	0.522	0.661	0.592	1.000

Source: Voice and Accountability (VA) is an index ranging between -2.5 and 2.5 developed by Kauffman et al. (2002) and included among the World Bank Governance Indicators. Higher values correspond to better governance. All other indicators have been produced by Prof. Andrei Shleifer and are available at http://www.economics.harvard.edu/faculty/shleifer/dataset. DAYS is the logarithm of days necessary to enforce a contract. UE is the size of the shadow economy as share of GDP. EP, ADB and SHB are indices ranging between 0 and 1 , Higher values mean greater social protection.. They result from averaging out several sub-indicators also available on Shleifer's page where we refer readers to for a complete description.

EP measures the protection of labor and employment laws as the average of: (1) Alternative employment contracts; (2) Cost of increasing hours worked; (3) Cost of firing workers; and (4) Dismissal procedures.

ADB measures the level of old age, disability and death benefits as the average of the following four normalized variables: (1) the difference between retirement age and life expectancy at birth; (2) the number of months of contributions or employment required for normal retirement by law; (3) the percentage of the worker's monthly salary deducted by law to cover old-age, disability, and death benefits; and (4) the percentage of the net pre-retirement salary covered by the net old-age cash-benefit pension.

SHB measures the level of sickness and health benefit as the average of the following four normalized variables: (1) the number of months of contributions or employment required to qualify for sickness benefits by law; (2) the percentage of the worker's monthly salary deducted by law to cover sickness and health benefits; (3) the waiting period for sickness benefits; and (4) the percentage of the net salary covered by the net sickness cash benefit for a two-month sickness spell.

Table 3 Determinants of health: Instrumental variable, community fixed-effect estimates by country

	Pooled Sample	Armenia	Belarus	Georgia	Kazakhstan	Kyrgyzstan	Moldova	Russia	Ukraine
Trust	0.0761***	0.141**	0.0948***	0.0750*	0.0473**	0.0432	0.0376	0.0713***	0.118***
	(6.9041)	(2.2347)	(2.9354)	(1.9083)	(2.0275)	(1.1249)	(1.1636)	(3.3355)	(4.0200)
Membership	-0.00843	-0.188*	-0.0883	-0.153	-0.0563	-0.0965	0.0919*	0.0373	-0.0182
	(-0.3843)	(-1.6919)	(-1.3931)	(-0.9232)	(-1.0998)	(-1.2153)	(1.8657)	(0.9184)	(-0.2762)
Social Isolation	-0.112***	-0.163***	-0.101***	-0.161***	-0.108***	-0.0417	-0.0742**	-0.139***	-0.142***
	(-8.9958)	(-2.6544)	(-2.7901)	(-3.5510)	(-3.9475)	(-1.0212)	(-2.2232)	(-5.6192)	(-3.9487)
Observations	11178	785	1468	1508	1740	671	1581	2190	1235
Number of communities	366	10	59	48	52	22	51	69	55
R-squared	0.1671	0.1402	0.1519	0.1879	0.1952	0.2702	0.1521	0.1719	0.2174

Source: Living Standards, Lifestyles and Health Survey, 2001
Note: Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%.
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 fixed effects. Instruments are the means of all social capital indicators over all other individuals in the community.
GMM estimators have been used.

Table 4 Determinants of health: Instrumental variable fixed effects estimates and interactions with social capital

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES		Int = VA	Int = DAYS	Int = UE	Int = EP	Int = ADB	Int = SHB	Int = POP
Trust	0.0761***	0.0754***	0.114***	0.0687***	0.130***	0.119**	0.0554***	0.0802***
	(6.9041)	(3.8292)	(4.0949)	(3.6258)	(4.1631)	(2.0781)	(2.6292)	(6.8190)
Membership	-0.00843	0.0595*	-0.00717	-0.0334	-0.112*	-0.180*	-0.0581	-0.00728
	(-0.3843)	(1.6490)	(-0.1319)	(-0.7052)	(-1.7392)	(-1.7419)	(-1.1261)	(-0.3103)
Social Isolation	-0.112***	-0.123***	-0.128***	-0.0931***	-0.149***	-0.124**	-0.120***	-0.105***
	(-8.9958)	(-5.8916)	(-4.3068)	(-4.4304)	(-4.3208)	(-2.2783)	(-5.0379)	(-8.0396)
Trust * Int		-0.00119	-0.0810	0.135	-0.325*	-0.344	0.0373	-0.0183**
		(-0.0396)	(-1.5550)	(0.7775)	(-1.8291)	(-0.6690)	(1.4338)	(-1.9736)
Membership * Int		0.124**	-0.00335	0.104	0.544	1.455	0.0405	-0.00334
		(2.1760)	(-0.0310)	(0.1772)	(1.5285)	(1.5352)	(0.6742)	(-0.2281)
Social Isolation * Int		-0.0194	0.0340	-0.359*	0.158	-0.00603	-0.00593	-0.0322***
		(-0.6147)	(0.6134)	(-1.8684)	(0.8123)	(-0.0122)	(-0.2041)	(-3.0746)
Observations	11178	11178	11178	8129	8129	8129	8129	11178
Number of communities	366	366	366	256	256	256	256	366
R-squared	0.1671	0.1674	0.1673	0.1781	0.1782	0.1778	0.1780	0.1672

Source: Living Standards, Lifestyles and Health Survey, 2001
Note: Absolute value of z statistics in parentheses; * Significant at 10%; ** significant at 5%; *** significant at 1%
Results reported in the first column correspond to the IV FE estimate of the health equation based on the full sample. In columns 2-7 are reported estimates of the same model augmented by interactions of all social capital indicators with the variable defined as 'int' in the column head (in the table trust*int, membership*int, social isolation*int). The set of control variables included is the same as in Table 3.

Web appendix: further details on the estimates

Table A Definition of the variables

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
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 otherwis
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
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 of 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	
Community trust	For each individual, share of all other individuals in the community who report to trust=1
Community membership	For each individual, share of all other individuals in the community who report to membership=1
Community social isolation	For each individual, share of all other individuals in the community who report to social isolation=1

Table B: Summary Statistics by country

	Pooled Sample	Armenia	Belarus	Georgia	Kazak.	Kyrgyz.	Moldova	Russia	Ukraine
Number of observations	11178	785	1468	1508	1740	671	1581	2190	1235
Health									
Self reported good health (%)[1]	**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 (%)[2]	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[3]	0.63	0.80	0.59	0.77	0.63	0.92	0.75	0.52	0.39
Road leading to the place in Asphalt	94.95	87.43	98.03	86.4	100	87.5	94.4	95.9	99.9
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
Instruments (shares)[4]									
Community trust	0.479	0.495	0.496	0.356	0.564	0.666	0.285	0.571	0.466
Community membership	0.055	0.047	0.058	0.008	0.048	0.051	0.091	0.072	0.053
Community social isolation	0.236	0.357	0.239	0.122	0.233	0.226	0.273	0.249	0.229

Source : Living Conditions, Lifestyle and Health dataset, 2001; Life expectancy at birth is from WHO Health for All Database, version January 2006.

[1] Percentage of individuals that reports to be in good, or quite good health.
[2] Percentage of individuals that reports to be in very good, good or on average financial situation.
[3] Percentage of individuals that reports that the quality of the water in their water pope is good or quite good
[4] Share of the community members other than the respondent who report to trust, to be part of a voluntary organization and to feel socially isolated.

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