SOCIAL CAPITAL AND ITS RELATIONSHIP WITH MEASURES OF HEALTH STATUS: EVIDENCE FROM THE HEALTH SURVEY FOR ENGLAND 2003

Authors

Stavros Petrou, PhD, health economist[a,b] and Emil Kupek, PhD, honorary research fellow[a]

[a] National Perinatal Epidemiology Unit (NPEU), Department of Public Health, University of Oxford.

[b] Health Economics Research Centre (HERC), Department of Public Health, University of Oxford

Correspondence: stavros.petrou@npeu.ox.ac.uk

Summary

Social capital is a concept that attempts to describe the quantity and quality of social interactions in a community. This study explores the relationship between individual measures of social capital and alternative measures of health status within the context of a large national survey of population health. Using data for 13,753 adult participants in the 2003 Health Survey for England, linear regression with weighted least squares estimation and Tobit regression with upper censoring were used to model the relationship between individual measures of social capital and EQ-5D utility scores. In addition, logistic regression was used to model the relationship between individual measures of social capital and a dichotomous self-reported health status variable. The study demonstrated that low stocks of social capital across the domains of trust and reciprocity, perceived social support and civic participation are significantly associated with poor measures of health status. The implications for health economists and, potentially, for policy makers are discussed.

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Introduction

Social capital, as defined by its principal theorists, is a concept that attempts to describe the quantity and quality of social interactions in a community (Coleman, 1990; Putnam, 1993). Social capital can broadly be defined as the structured social networks, trusting relationships and cultural norms that act as resources for individuals and facilitate collective action (Kawachi *et al*., 1997). Some commentators distinguish between cognitive and structural components of social capital; the cognitive components are said to include norms, values, attitudes and beliefs, whilst the structural components refer to externally observable aspects of social organisation, such as the density of social networks or patterns of civic engagement (Islam *et al*., 2006).

A number of empirical studies have linked social capital to health and broader well-being (Hawe and Shiell, 2000). A number of US studies have found an association between high stocks of a variety of indicators of social capital (trust, reciprocity, group membership) and improved health outcomes (lower all-cause and cause-specific mortality and improved self-reported health status) (Holtgrave and Crosby, 2003; Holtgrave and Crosby, 2004; Kawachi *et al*., 1997; Lochner et al., 2003; Milyo and Mellor, 2003; Wilkinson et al., 1998). Using British Household Panel Study data for the years 1998 and 1999, McCulloch found that measures of social disorganisation are associated with an increased risk of psychiatric morbidity (McCulloch, 2001). Analyses of panel data from the Swedish Survey of Living Conditions found that having a close friend outside of the household was positively associated with improved self-reported health status (Bolin *et al*., 2003). Lindström's analyses of cross-sectional data from Scandinavia revealed an association between high levels of social participation and trust of others and improved self-reported health status amongst both men and women (Lindström, 2004).

The pathways by which social capital might causally be associated with health and well-being are not well understood. Sociologists and political scientists have pointed to the direct and beneficial effects of high stocks of social capital on boosting self esteem, providing social support, helping people to access better resources and services, and acting as a buffer against stressful life events (Veenstra *et al*., 2005). Further, social capital may also influence broader aspects of the economy and polity, such as through access to economic opportunities and housing, in ways that might have consequences for the health and well-being of individuals and whole communities (Kawachi *et al*., 1997; Veenstra *et al*., 2005).

Nevertheless, the relationship between social capital and health and broader well-being remains controversial. Some commentators have criticised the published empirical studies for their definitional ambiguities surrounding the concept of social capital, their reliance on ecological rather than individual-level data, and their failure to control for important individual and contextual covariates (Durlauf, 2002).

Health economists have entered the debate concerning the relationship between social capital and health and well-being rather late. Three recent reports have explored the relationship between measures of social capital and EQ-5D utility scores among residents of the city of Hull in East Yorkshire (Hunter *et al*., 2005) and among residents of the former coalfield communities of Barnsley, Doncaster and Rotherham in South Yorkshire (Green *et al*., 2000; Green *et al*., 2005). All three reports provide some evidence of a positive association between individual measures of social capital and EQ-5D utility scores. However, the authors of the reports highlight the specific geographical contexts of their studies and note the failure to control for demographic, socioeconomic and clinical covariates that might be of interest (Green *et al*., 2000; Green *et al*., 2005; Hunter *et al*., 2005). In this paper, we explore the relationship between individual measures of social capital and alternative measures of health status within the context of a large national survey of population health. In so doing, we attempt to avoid the methodological limitations of earlier studies in this area.

Methods

Study population

Data from the 2003 Health Survey for England formed the basis of the investigation. The 2003 Health Survey for England was the twelfth of a series of cross-sectional national surveys commissioned by the Department of Health with the view to monitoring trends in the nation's health. The 2003 Health Survey for England used a stratified multi-stage probability sampling design of the population in private households in England using the Postcode Address File as a frame (Sproston and Primatesta, 2004). All adults (aged 16 years or older) identified as residing in 13,680 eligible households were invited to participate in a two-stage survey: a CAPI (computer assisted) home interview and a subsequent nurse visit. A maximum of two children (aged 0-15 years) residing in each household were also eligible for the survey (with random sampling performed if a household had more than two children).

The 2003 Health Survey for England collected data on 14,836 adults and 3,717 children (representing data from 73% of eligible households and 90% of adults in co-operating households). Further details about the 2003 survey, its sampling procedures and methodology and response rates, are reported elsewhere (Sproston and Primatesta, 2004). This study draws upon data for the 14,836 adults who participated in the 2003 survey.

Measures of health status

Adult participants in the 2003 Health Survey for England were asked to complete a booklet about their general health as part of the home interview. They were encouraged to complete the booklet on their own without interference from, or discussion with, others in the room, although the interviewers were able to advise them if they were clearly having difficulties. The booklet included a question that asked participants to categorise their general state of health as very good, good, fair, bad or very bad. Self-assessed health status has been identified as a good predictor of morbidity and mortality (Idler and Benyamini, 1997; Lundberg and Manderbacka, 1996). The booklet also included the descriptive system of the United Kingdom EQ-5D measure, a generic health-related quality of life instrument with pre-existing preference weights that can be attached to each permutation of responses (Brooks, 1996). The descriptive system defines health-related quality of life in terms of five dimensions: 'mobility', 'self care', 'usual activities', 'pain/discomfort' and 'anxiety/depression' (Brooks, 1996; EuroQol Group, 1990). Responses in each dimension are divided into three ordinal levels, coded: (1) no problems; (2) some or moderate problems; and (3) severe or extreme problems. The potential responses to the descriptive system can theoretically generate 243 (3^5) different health states. For the purposes of our investigation, we applied the York A1 tariff to each set of responses to the descriptive system in order to generate an EQ-5D utility score for each subject (Dolan, 1997). The York A1 tariff set had been derived from a survey of the UK population (n = 3337), which used the time trade-off valuation method to estimate preference weights for a subset of 45 EQ-5D health states, with the remainder of the EQ-5D health states subsequently valued through the estimation of a multivariate model (Dolan, 1997; Dolan *et al*., 1996). Health state utility scores in the York A1 tariff set range from no problems on any of the five dimensions in the EQ-5D descriptive system (utility score = 1.0) to severe or extreme impairment on all five dimensions (utility score = -0.594) (Dolan *et al.*, 1996).

Measures of social capital

To measure the key concepts of social capital, a set of questions had previously been identified on the basis of a comprehensive review of existing instruments across a range of surveys in the UK and the US, as well as a literature review of the link between social capital and health and well-being (Bajekal and Purdon, 2001). The selected battery of questions was interrogated using cognitive piloting to ensure that questions are unambiguous and easily understood and to test alternative formats of questions that tap into similar concepts (Bajekal and Purdon, 2001). The final individual measures of social capital that were incorporated into the self-completed booklet were used to derive: (1) Three dichotomous measures of trust and reciprocity that were adapted from the questions included in the US General Social Survey by the political scientist Robert Putnam (Putnam, 1995). These measures identified whether the individual perceived that other people could generally be trusted (yes, no), whether the individual felt that other people were helpful most of the time (yes, no), and whether the individual felt that other people would take advantage of them if they had the opportunity (yes, no); (2) a categorical measure of perceived social support by family members and friends (no, some or severe lack); and (3) a dichotomous measure of civic participation, based on the individual's activities in a range of political, environmental, educational, religious, voluntary, sporting and social organisations (none or some, with some defined by participation in at least one organisation).

Statistical methods

All analyses were based upon participants who completed the general health booklet as part of the home interview; no replacement or imputation was performed on missing response items. The demographic, socioeconomic, social capital and clinical characteristics of participants who did and did not complete all items for the general health booklet were compared using the χ^2 test.

Linear regression with weighted least squares estimation was employed to model the relationship between individual measures of social capital and the EQ-5D utility scores, with and without adjustment for potential confounding factors. The regressions employed individual probability weights, which were calculated as the inverse of the probability of being a responding individual within a responding household multiplied by the household

weight; the household weight having being calculated to adjust for non-contact and for refusals of entire households (Sproston and Primatesta, 2004). Box-Cox transformations of the dependent variable (the EQ-5D utility score) did not indicate any advantage in transforming its scale. Tobit regression with upper censoring at 1.0 and robust (Huber-White) standard error estimation was also performed, but produced results broadly similar to those from the linear regression with weighted least squares estimation. Therefore, for the purposes of brevity, only the latter are presented in detail in this paper.

Three models are presented for the linear regression with weighted least squares estimation. Model 1 presents the unadjusted regression coefficients for each covariate considered *a priori* as potentially predictive of the EQ-5D utility score. This included social capital variables on trust, the helpfulness of others, whether others take advantage, perceived social support and regular civic participation. It also included the following covariates: sex, age, social class, educational status, ethnicity, marital status, equivalised household income (Sproston and Primatesta, 2004), employment status, perception of status within workplace, household tenure, long-standing illness, cigarette smoking status, frequency of alcohol consumption, body mass index, fruit and vegetable consumption, neighbourhood deprivation and urbanisation of neighbourhood. Model 2 presents the adjusted regression coefficients for the social capital variables and a restricted set of covariates commonly considered in utility studies (sex, age, social class, educational status, ethnicity and marital status) (Dolan *et al*., 1996). Model 3 presents the adjusted regression coefficients for the social capital variables, in addition to all other covariates included in Model 1. Missing values for covariates were treated as separate categories and fitted in the models in order to account for possibly informative non-responses. Application of the Belsley test revealed no evidence of multicollinearity in the models (Belsley test statistic equalled 8.5 for model 3) (Greene, 2003). Furthermore, the Hausman test (Greene, 2003) was used to check model specification with and without the social capital variables. It clearly showed that there were no systematic differences in the regression coefficients of the other covariates when the social capital variables were omitted (P=0.973 for Model 3).

The robustness of our results across other measures of health status was tested by a logistic regression that modeled the relationship between individual measures of social capital and self-reported health status; the latter having been converted into a dichotomous variable by dividing the sample into those whose health status was reported as very good or good and those whose health status was reported as fair, bad or very bad. As with the linear regression with weighted least squares estimation, the logistic regression employed individual

probability weights. All analyses were performed using STATA software (StataCorp. 2005. *Stata Statistical Software:* Release 9. College Station, TX: StataCorp LP).

Results

Of the 14,836 adults who participated in the 2003 survey, 13,753 (92.7%) completed the general health booklet as part of the home interview and were included in the study. An examination of the characteristics of the 1083 adults who did not complete the general health booklet revealed that they were more likely to be of lower social class and educational status, economically inactive, of non-white ethnic background and experiencing a long-standing illness ($P<0.05$). There were, however, no statistically significant differences in the alternative measures of social capital between participants who did and did not complete the general health booklet. The mean EQ-5D utility score for the study participants was 0.862 (standard deviation: 0.223) and the median utility score was 1.0 (inter-quartile range: 0.796, 1.0). The number (%) of study participants who described their own health as very good, good, fair, bad or very bad were 4638 (33.7%), 5726 (41.6%), 2545 (18.5%), 640 (4.7%) and 203 (1.5%), respectively, with 1 ‘don’t know’ response.

The results of the linear regression with weighted least squares estimation exploring the association between measures of social capital and EQ-5D utility scores are reported in table 1. The crude unadjusted results reveal that a lack of general trust in others was associated with a 0.033 (95% confidence interval (CI): 0.025, 0.041; $P<0.001$) reduction in the EQ-5D utility score. Similarly, a perception that others ‘look out for themselves’ most of the time (0.025; 95% CI: 0.017, 0.034), a feeling that others would take advantage if they had an opportunity (0.040; 95% CI: 0.030, 0.050), a perceived severe lack of social support by family members and friends (0.073; 95% CI: 0.061, 0.086) and a lack of participation in at least one civic organisation (0.043; 95% CI: 0.035, 0.051) were all associated with a statistically significant reduction in the EQ-5D utility score ($P<0.001$).

Following adjustment for a limited set of covariates (Model 2), all measures of low stock of social capital remained associated with a statistically significant reduction in the EQ-5D utility score ($P<0.001$). The decrements in the EQ-5D utility score were only slightly attenuated following adjustment for all covariates (Model 3): 0.009 (95% CI: 0.003, 0.016) for a lack of general trust in others ($P=0.005$), 0.011 (95% CI: 0.004, 0.018) for a perception that others ‘look out for themselves’ most of the time ($P=0.002$), 0.021 (95% CI: 0.013,

0.030) for a feeling that others would take advantage if they had an opportunity (P<0.001), 0.026 (95% CI: 0.016, 0.036) for a perceived severe lack of social support by family members and friends (P<0.001), and 0.007 (95% CI: 0.000, 0.013) for a lack of participation in at least one civic organisation (P=0.037). Other covariates associated with statistically significant reduction in the EQ-5D utility score included being aged 25 years or older, equivalised household income in the 2nd or 3rd quintile of the income distribution, economic inactivity, living in rented accommodation, being divorced or widowed, long-standing illness, being a current smoker, obesity and residing in a deprived area (Model 3).

A separate analysis that compared a best case versus worst case notional scenario, where the former was defined by a population that exhibited the highest level of social capital for each measure and the latter by a population that exhibited the lowest level of social capital for each measure, found that the worst case scenario was associated with a 0.136 (95% CI: 0.118, 0.153; P<0.001) reduction in the EQ-5D utility score following adjustment for a limited set of covariates (Model 2) and a 0.075 (95% CI: 0.060, 0.089; P<0.001) reduction following adjustment for all covariates (Model 3).

The results of the logistic regression exploring the association between measures of social capital and self-reported health status are reported in table 2. As with the linear regression with weighted least squares estimation, the results of three separate models are presented. The full adjusted results (Model 3) reveal that a lack of general trust in others was associated with a 18.7% reduction in the likelihood of reporting very good or good health status (P<0.001). Similarly, a perception that others 'look out for themselves' most of the time (17.7%), a perceived severe lack of social support by family members and friends (35.1%) and a lack of participation in at least one civic organisation (19.4%) were all associated with a statistically significant reduction in the likelihood of reporting very good or good health status (P<0.001). Separate analyses that compared the best case versus worst case notional social capital scenario found that the worst case scenario was associated with a 79.5% reduction in the likelihood of reporting very good or good health status (P<0.001) following adjustment for a limited set of covariates (Model 2) and 68.2% reduction (P<0.001) following adjustment for all covariates (Model 3).

Discussion

The recent surge in interest in the link between social capital and health and broader well-being has largely been overlooked by the health economics community. This study has demonstrated that low stocks of social capital across the domains of trust and reciprocity, perceived social support and civic participation are significantly associated with poor measures of health status. The decrement in the EQ-5D utility score associated with a worst case notional scenario for social capital varied between 0.075 and 0.136, depending on the covariates adjusted for; far in excess of the 0.030 minimally important difference in utility score postulated in the literature for evaluative purposes (Drummond, 2001; Marra *et al*., 2005). Moreover, the results remained robust when an alternative measure of health, namely self-reported health status, was applied.

The study was based on data from a large, nationally representative sample of the English nation's health. It attempted to avoid many of the methodological limitations that plague the broader literature in this area, including vague definitions of concepts, poorly measured data, the reliance on ecological rather than individual-level data, and the paucity of important demographic, socioeconomic and clinical covariates.

There are two broad caveats to the study results that should be borne in mind by readers. First, the data fields of the Health Survey for England precluded an exploration of the relationship between contextual or environmental measures of social capital and alternative measures of health status. Some commentators have claimed that social capital may act as a collective as well as an individual resource for health and well-being (Kawachi *et al*., 1997). Indeed, a number of US studies have suggested that living in an area with higher level social capital (as measured by indicators such as civic trust, reciprocity and civic engagement, volunteering, density of local networking, and social cohesion) is associated with improved individual health and well-being (Kawachi *et al*., 1999; Subramanian *et al*., 2001; Wen *et al*., 2003). A limited number of studies have used multi-level modeling techniques to explore the effects of area level and individual level measures of social capital on health and well-being. The two most recent empirical analyses on this topic suggest that the beneficial properties of social capital are largely found at the individual level (Poortinga, 2006; Veenstra, 2005). Nevertheless, more research is required that examines the complex interactions between individuals, their networks, the wider social environment and health outcomes. The second caveat is that we are unable to say with any degree of certainty whether the observed

associations are causal or due to reverse causality, perhaps through ill-health reducing an individual's social networks or civic participation. However, the consistency of our results across all the domains of individual social capital, including trust and reciprocity, reinforces the need for serious investigation into the causal pathways that link social capital and health.

Our findings have important implications for the health economics research community and potentially for policy makers. For health economists, a future research agenda in this area might revolve around analysing panel datasets with the view to investigating the causal pathways between individual and contextual measures of social capital, absolute and relative measures of deprivation, and preference-based and other measures of health status. Analyses of panel data studies, such as the British Household Panel Study and the UK Millennium Cohort Study, would allow researchers to explore the dynamics of individual behaviour and would also provide more scope for dealing with individual heterogeneity for variables such as measures of health status. If a causal link between social capital and health is clearly established, what might be the policy implications? New initiatives aimed at community development and participation in community organizations, such as those already being considered by some local authorities (Green *et al*., 2000; Green *et al*., 2005; Hunter *et al*., 2005), might enter more forcefully on to the political agenda. Indeed, it might be incumbent on those who share some responsibility for propogating the myth of economic man to consider the cost of policies that rely on its assumed truth and the cost-effectiveness of new community-oriented initiatives aimed at improving the health and well-being of the population.

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Table 1: Results of linear regression with weighted least squares estimation exploring the association between measures of social capital and EQ-5D utility scores (*n* = 13,753)

Covariate	Level	*n*	Unadjusted: Model 1		Adjusted: Model 2		Adjusted: Model 3	
			β (95% CI)	P>|t|	β (95% CI)	P>|t|	β (95% CI)	P>|t|
Social capital variables								
Can people be trusted?	Can be trusted*	4946						
	Can't be too careful	7682	-0.033 (-0.041, -0.025)	<0.001	-0.014 (-0.022, -0.007)	<0.001	-0.009 (-0.016, -0.003)	0.005
	Missing	1125	-0.014 (-0.028, 0.000)	0.044	0.000 (-0.013, 0.012)	0.946	-0.001 (-0.012, 0.010)	0.909
Do people try to be helpful?	Try to be helpful*	7489						
	Look out for themselves	4953	-0.025 (-0.034, -0.017)	<0.001	-0.018 (-0.026, -0.010)	<0.001	-0.011 (-0.018, -0.004)	0.002
	Missing	1311	-0.001 (-0.014, 0.011)	0.863	-0.005 (-0.018, 0.007)	0.407	-0.002 (-0.013, 0.009)	0.673
Do people take advantage of you?	Try to be fair*	8546						
	Take advantage	2956	-0.040 (-0.050, -0.030)	<0.001	-0.038 (-0.048, -0.028)	<0.001	-0.021 (-0.030, -0.013)	<0.001
	Missing	2251	-0.018 (-0.028, -0.007)	0.001	-0.019 (-0.029, -0.010)	<0.001	-0.013 (-0.021, -0.005)	0.002
Perceived social support	No lack*	8396						
	Some lack	3381	-0.028 (-0.037, -0.020)	<0.001	-0.015 (-0.022, -0.007)	<0.001	-0.007 (-0.014, -0.001)	0.033
	Severe lack	1798	-0.073 (-0.086, -0.061)	<0.001	-0.045 (-0.057, -0.032)	<0.001	-0.026 (-0.036, -0.016)	<0.001
	Missing	178	-0.118 (-0.159, -0.077)	<0.001	-0.048 (-0.088, -0.008)	0.018	-0.021 (-0.051, 0.010)	0.193
Regular civic participation	Yes*	7905						
	No	5113	-0.043 (-0.051, -0.035)	<0.001	-0.021 (-0.028, -0.013)	<0.001	-0.007 (-0.013, 0.000)	0.037
	Missing	735	-0.057 (-0.075, -0.040)	<0.001	-0.025 (-0.042, -0.008)	0.004	-0.010 (-0.024, 0.005)	0.193
Other covariates								
Sex	Men*	6092						
	Women	7661	-0.025 (-0.032, -0.019)	<0.001	-0.017 (-0.023, -0.010)	<0.001	-0.002 (-0.009, 0.004)	0.494
Age	16-24*	1536						
	25-34	2175	-0.021 (-0.032, -0.010)	<0.001	-0.039 (-0.053, -0.026)	<0.001	-0.017 (-0.030, -0.005)	0.005
	35-44	2743	-0.043 (-0.054, -0.032)	<0.001	-0.062 (-0.078, -0.047)	<0.001	-0.029 (-0.042, -0.016)	<0.001
	45-54	2248	-0.075 (-0.088, -0.063)	<0.001	-0.092 (-0.108, -0.077)	<0.001	-0.042 (-0.056, -0.028)	<0.001
	55-64	2253	-0.118 (-0.132, -0.104)	<0.001	-0.128 (-0.146, -0.111)	<0.001	-0.052 (-0.068, -0.036)	<0.001
	65-74	1579	-0.134 (-0.149, -0.119)	<0.001	-0.135 (-0.154, -0.116)	<0.001	-0.036 (-0.058, -0.014)	0.002
	75+	1219	-0.221 (-0.238, -0.205)	<0.001	-0.202 (-0.225, -0.180)	<0.001	-0.070 (-0.095, -0.045)	<0.001
Social class	Higher managerial/professional *	1364						
	Lower managerial/professional	3101	-0.028 (-0.039, -0.018)	<0.001	-0.014 (-0.025, -0.003)	0.013	0.001 (-0.010, 0.011)	0.905
	Intermediate	1837	-0.052 (-0.064, -0.040)	<0.001	-0.024 (-0.036, -0.011)	<0.001	-0.006 (-0.019, 0.007)	0.378

	Small employer	1125	-0.059 (-0.075, -0.044)	<0.001	-0.017 (-0.033, -0.002)	0.032	-0.015 (-0.032, 0.002)	0.087
	Lower supervisory/technical	1339	-0.080 (-0.095, -0.065)	<0.001	-0.041 (-0.057, -0.025)	<0.001	-0.010 (-0.025, 0.005)	0.177
	Semi-routine	2517	-0.076 (-0.088, -0.063)	<0.001	-0.039 (-0.053, -0.026)	<0.001	-0.008 (-0.022, 0.005)	0.229
	Routine	1925	-0.097 (-0.111, -0.083)	<0.001	-0.045 (-0.061, -0.030)	<0.001	-0.002 (-0.017, 0.013)	0.792
	Never worked	306	-0.168 (-0.205, -0.131)	<0.001	-0.107 (-0.144, -0.071)	<0.001	-0.017 (-0.051, 0.016)	0.301
	Other	239	-0.002 (-0.025, 0.022)	0.889	-0.036 (-0.061, -0.012)	0.004	0.040 (0.013, 0.067)	0.003
Educational status	NVQ4/NVQ5/degree/equivalent*	2300						
	Higher education below degree	1509	-0.024 (-0.036, -0.013)	<0.001	0.006 (-0.006, 0.018)	0.337	0.010 (0.000, 0.020)	0.051
	NVQ3/GCE A level equivalent	1678	-0.010 (-0.020, 0.000)	0.053	-0.002 (-0.013, 0.009)	0.699	0.001 (-0.008, 0.011)	0.772
	NVQ2/GCE O level equivalent	3352	-0.035 (-0.044, -0.026)	<0.001	-0.001 (-0.011, 0.009)	0.904	0.006 (-0.003, 0.015)	0.218
	NVQ1/CSE other equivalent	728	-0.072 (-0.091, -0.054)	<0.001	-0.018 (-0.036, 0.001)	0.059	0.000 (-0.015, 0.015)	0.992
	Foreign/other	663	-0.107 (-0.129, -0.086)	<0.001	-0.026 (-0.049, -0.004)	0.022	-0.015 (-0.034, 0.004)	0.125
	No qualification	3523	-0.141 (-0.151, -0.130)	<0.001	-0.036 (-0.050, -0.022)	<0.001	-0.007 (-0.019, 0.005)	0.268
Ethnicity	White*	12816						
	Mixed	78	0.008 (-0.038, 0.053)	0.736	-0.030 (-0.072, 0.012)	0.158	-0.004 (-0.040, 0.032)	0.820
	Black	122	0.020 (-0.014, 0.054)	0.255	0.018 (-0.016, 0.052)	0.305	0.040 (0.011, 0.069)	0.007
	Black British	144	0.034 (0.005, 0.063)	0.022	0.021 (-0.007, 0.048)	0.137	0.016 (-0.007, 0.039)	0.174
	Asian	226	0.030 (0.004, 0.056)	0.026	0.009 (-0.015, 0.034)	0.458	0.011 (-0.014, 0.035)	0.387
	Asian British	225	0.019 (-0.006, 0.045)	0.139	0.001 (-0.022, 0.025)	0.910	0.007 (-0.015, 0.029)	0.526
	Other	142	0.005 (-0.037, 0.048)	0.805	-0.018 (-0.057, 0.021)	0.369	-0.004 (-0.038, 0.030)	0.805
Marital status	Single*	2669						
	Married	7455	-0.044 (-0.052, -0.036)	<0.001	0.009 (-0.002, 0.020)	0.105	-0.007 (-0.016, 0.003)	0.178
	Separated	315	-0.088 (-0.116, -0.060)	<0.001	-0.034 (-0.061, -0.006)	0.017	-0.014 (-0.036, 0.009)	0.242
	Divorced	867	-0.106 (-0.126, -0.086)	<0.001	-0.035 (-0.055, -0.015)	0.001	-0.018 (-0.034, -0.002)	0.024
	Widowed	1081	-0.183 (-0.202, -0.165)	<0.001	-0.029 (-0.052, -0.006)	0.014	-0.022 (-0.041, -0.002)	0.029
	Cohabitee	1366	-0.001 (-0.013, 0.010)	0.824	0.009 (-0.002, 0.021)	0.115	0.000 (-0.010, 0.010)	0.979
Quintiles of	5^{th} (top 20%)*	2404						
equivalised income	4^{th}	2429	-0.009 (-0.018, -0.001)	0.030			0.000 (-0.008, 0.007)	0.931
	3^{rd}	2301	-0.044 (-0.054, -0.033)	<0.001			-0.010 (-0.019, -0.001)	0.030
	2^{nd}	2425	-0.106 (-0.118, -0.094)	<0.001			-0.012 (-0.023, -0.001)	0.036
	1^{st} (bottom 20%)	2293	-0.131 (-0.145, -0.117)	<0.001			-0.008 (-0.020, 0.004)	0.199
	Missing	1901	-0.073 (-0.085, -0.061)	<0.001			-0.008 (-0.019, 0.002)	0.127
Employment status	In employment*	7860						
	ILO unemployed	659	-0.005 (-0.017, 0.007)	0.434			-0.017 (-0.029, -0.004)	0.009
	Retired	2960	-0.148 (-0.159, -0.138)	<0.001			-0.040 (-0.055, -0.025)	<0.001
	Other economically inactive	2274	-0.170 (-0.184, -0.156)	<0.001			-0.084 (-0.096, -0.072)	<0.001
Perception of status	Manager*	2413						
within workplace	Foreman or supervisor	1464	-0.033 (-0.047, -0.019)	<0.001			-0.003 (-0.015, 0.009)	0.622

	Other employee	8096	-0.039 (-0.047, -0.030)	<0.001	-0.002 (-0.011, 0.008)	0.750
	Missing	1780	-0.034 (-0.047, -0.021)	<0.001	0.015 (0.001, 0.029)	0.041
Household tenure	Owns property outright*	4104				
	Bought property mortgage/loan	6227	0.076 (0.067, 0.084)	<0.001	-0.008 (-0.016, 0.001)	0.067
	Shared ownership	61	-0.009 (-0.076, 0.057)	0.787	0.002 (-0.042, 0.046)	0.931
	Renting	3173	-0.023 (-0.035, -0.010)	<0.001	-0.021 (-0.031, -0.010)	<0.001
	Living rent free	138	0.033 (-0.005, 0.070)	0.086	0.000 (-0.027, 0.027)	0.997
	Missing	50	0.047 (-0.003, 0.097)	0.065	-0.012 (-0.055, 0.031)	0.582
Long-standing illness	None*	7361				
	Non-limiting	2903	-0.053 (-0.059, -0.047)	<0.001	-0.037 (-0.043, -0.031)	<0.001
	Limiting	3489	-0.299 (-0.310, -0.289)	<0.001	-0.241 (-0.251, -0.231)	<0.001
Smoking status	Never smoked at all*	5994				
	Used to smoke occasionally	844	-0.004 (-0.018, 0.009)	0.527	-0.001 (-0.012, 0.010)	0.870
	Used to smoke regularly	3485	-0.056 (-0.066, -0.047)	<0.001	-0.003 (-0.011, 0.005)	0.428
	Current smoker	3430	-0.044 (-0.053, -0.034)	<0.001	-0.017 (-0.025, -0.009)	<0.001
Frequency of alcohol consumption in past 12 months	Not at all*	1309				
	Once or twice a year	1063	0.028 (0.005, 0.051)	0.016	0.023 (0.005, 0.041)	0.015
	Once every couple of months	877	0.059 (0.036, 0.082)	<0.001	0.029 (0.011, 0.046)	0.002
	Once or twice a month	1648	0.101 (0.082, 0.119)	<0.001	0.033 (0.018, 0.048)	<0.001
	Once or twice a week	4102	0.114 (0.097, 0.131)	<0.001	0.032 (0.018, 0.046)	<0.001
	Three or four days a week	2133	0.129 (0.111, 0.148)	<0.001	0.032 (0.017, 0.048)	<0.001
	Five or six days a week	639	0.138 (0.119, 0.157)	<0.001	0.038 (0.021, 0.055)	<0.001
	Almost every day	1982	0.070 (0.051, 0.090)	<0.001	0.025 (0.009, 0.041)	0.002
Body mass index	20-25*	4176				
	<20	621	-0.007 (-0.023, 0.009)	0.410	-0.005 (-0.018, 0.008)	0.477
	>25-30	4775	-0.018 (-0.026, -0.010)	<0.001	0.002 (-0.005, 0.009)	0.599
	>30	2882	-0.067 (-0.077, -0.057)	<0.001	-0.018 (-0.026, -0.009)	<0.001
	Missing	1299	-0.133 (-0.152, -0.114)	<0.001	-0.058 (-0.072, -0.044)	<0.001
Fruit/vegetable intake	Per unit increase	13753	0.003 (0.001, 0.005)	0.001	0.000 (-0.001, 0.001)	0.917
Deprivation index	Per unit increase	13753	-0.017 (-0.020, -0.014)	<0.001	-0.005 (-0.008, -0.003)	<0.001
Urbanisation indicator	Per unit increase	13753	0.004 (0.000, 0.008)	0.066	-0.002 (-0.006, 0.002)	0.241
				R^2 = 0.139	R^2 = 0.392	

CI denotes confidence interval; NVQ denotes national vocational qualification; ILO denotes International Labour Organisation.
* Baseline category for each covariate.

Table 2: Results of logistic regression exploring the association between measures of social capital and very good or good self-reported health status (*n* = 13,753)

Covariate	Level	*n*	Unadjusted: Model 1		Adjusted: Model 2		Adjusted: Model 3	
			OR (95% CI)	P>|z|	OR (95% CI)	P>|z|	OR (95% CI)	P>|z|
Social capital variables								
Can people be trusted?	Can be trusted*	4946						
	Can't be too careful	7682	0.647 (0.593, 0.705)	<0.001	0.789 (0.715, 0.872)	<0.001	0.813 (0.726, 0.910)	<0.001
	Missing	1125	0.744 (0.633, 0.873)	<0.001	0.892 (0.740, 1.076)	0.233	0.838 (0.676, 1.038)	0.106
Do people try to be helpful?	Try to be helpful*	7489						
	Look out for themselves	4953	0.724 (0.665, 0.788)	<0.001	0.790 (0.713, 0.876)	<0.001	0.823 (0.730, 0.927)	0.001
	Missing	1311	0.883 (0.763, 1.021)	0.093	0.829 (0.698, 0.984)	0.032	0.837 (0.682, 1.027)	0.089
Do people take advantage of you?	Try to be fair*	8546						
	Take advantage	2956	0.705 (0.644, 0.772)	<0.001	0.774 (0.693, 0.863)	<0.001	0.938 (0.829, 1.061)	0.308
	Missing	2251	0.914 (0.822, 1.016)	0.095	0.989 (0.874, 1.120)	0.866	1.098 (0.944, 1.276)	0.225
Perceived social support	No lack*	8396						
	Some lack	3381	0.713 (0.645, 0.789)	<0.001	0.842 (0.758, 0.935)	0.001	0.908 (0.807, 1.022)	0.111
	Severe lack	1798	0.439 (0.391, 0.494)	<0.001	0.600 (0.526, 0.684)	<0.001	0.649 (0.555, 0.758)	<0.001
	Missing	178	0.332 (0.247, 0.446)	<0.001	0.637 (0.451, 0.901)	0.011	0.781 (0.522, 1.171)	0.232
Regular civic participation	Yes*	7905						
	No	5113	0.562 (0.518, 0.610)	<0.001	0.707 (0.648, 0.771)	<0.001	0.806 (0.722, 0.900)	<0.001
	Missing	735	0.458 (0.388, 0.541)	<0.001	0.644 (0.540, 0.768)	<0.001	0.703 (0.565, 0.876)	0.002
Other covariates								
Sex	Men*	6092						
	Women	7661	0.956 (0.892, 1.025)	0.205	1.050 (0.961, 1.147)	0.279	1.183 (1.057, 1.325)	0.003
Age	16-24*	1536						
	25-34	2175	0.919 (0.754, 1.120)	0.404	0.744 (0.590, 0.940)	0.013	1.065 (0.808, 1.404)	0.653
	35-44	2743	0.603 (0.503, 0.724)	<0.001	0.473 (0.373, 0.599)	<0.001	0.748 (0.566, 0.987)	0.040
	45-54	2248	0.445 (0.371, 0.534)	<0.001	0.345 (0.272, 0.437)	<0.001	0.624 (0.473, 0.822)	0.001
	55-64	2253	0.312 (0.259, 0.377)	<0.001	0.255 (0.200, 0.325)	<0.001	0.572 (0.425, 0.770)	<0.001
	65-74	1579	0.247 (0.203, 0.301)	<0.001	0.215 (0.167, 0.276)	<0.001	0.577 (0.417, 0.798)	0.001
	75+	1219	0.154 (0.127, 0.185)	<0.001	0.148 (0.113, 0.193)	<0.001	0.470 (0.328, 0.674)	<0.001
Social class	Higher managerial/professional *	1364						
	Lower managerial/professional	3101	0.737 (0.611, 0.888)	<0.001	0.877 (0.719, 1.068)	0.192	1.107 (0.882, 1.391)	0.381
	Intermediate	1837	0.556 (0.455, 0.678)	<0.001	0.761 (0.606, 0.955)	0.018	0.919 (0.679, 1.244)	0.584

	Small employer	1125	0.464 (0.374, 0.575)	<0.001	0.835 (0.665, 1.048)	0.120	1.119 (0.783, 1.598)	0.538
	Lower supervisory/technical	1339	0.380 (0.307, 0.471)	<0.001	0.667 (0.527, 0.844)	0.001	0.966 (0.723, 1.290)	0.814
	Semi-routine	2517	0.397 (0.329, 0.479)	<0.001	0.639 (0.514, 0.794)	<0.001	0.925 (0.692, 1.238)	0.601
	Routine	1925	0.274 (0.226, 0.332)	<0.001	0.523 (0.419, 0.653)	<0.001	0.821 (0.611, 1.104)	0.191
	Never worked	306	0.221 (0.166, 0.294)	<0.001	0.419 (0.302, 0.581)	<0.001	1.189 (0.725, 1.950)	0.494
	Other	239	0.948 (0.589, 1.525)	0.825	0.752 (0.449, 1.258)	0.278	1.765 (0.908, 3.430)	0.094
Educational status	NVQ4/NVQ5/degree/equivalent*	2300						
	Higher education below degree	1509	0.569 (0.464, 0.699)	<0.001	0.786 (0.632, 0.977)	0.030	0.858 (0.670, 1.098)	0.223
	NVQ3/GCE A level equivalent	1678	0.787 (0.655, 0.945)	0.010	0.877 (0.721, 1.067)	0.190	0.956 (0.758, 1.207)	0.707
	NVQ2/GCE O level equivalent	3352	0.489 (0.413, 0.579)	<0.001	0.713 (0.592, 0.859)	<0.001	0.815 (0.651, 1.021)	0.075
	NVQ1/CSE other equivalent	728	0.340 (0.273, 0.423)	<0.001	0.627 (0.490, 0.803)	<0.001	0.843 (0.628, 1.133)	0.257
	Foreign/other	663	0.316 (0.254, 0.392)	<0.001	0.663 (0.521, 0.843)	0.001	0.803 (0.608, 1.061)	0.123
	No qualification	3523	0.181 (0.157, 0.209)	<0.001	0.496 (0.415, 0.594)	<0.001	0.668 (0.540, 0.826)	<0.001
Ethnicity	White*	12816						
	Mixed	78	0.815 (0.477, 1.392)	0.453	0.465 (0.263, 0.822)	0.008	0.559 (0.305, 1.027)	0.061
	Black	122	0.980 (0.628, 1.530)	0.929	0.860 (0.517, 1.431)	0.562	0.969 (0.603, 1.558)	0.897
	Black British	144	0.982 (0.665, 1.452)	0.929	0.842 (0.542, 1.307)	0.442	0.745 (0.462, 1.200)	0.226
	Asian	226	1.192 (0.832, 1.706)	0.338	0.839 (0.590, 1.192)	0.327	0.690 (0.446, 1.070)	0.097
	Asian British	225	0.996 (0.724, 1.370)	0.979	0.736 (0.523, 1.037)	0.080	0.654 (0.457, 0.934)	0.020
	Other	142	1.136 (0.745, 1.732)	0.555	0.785 (0.510, 1.208)	0.271	0.942 (0.585, 1.516)	0.805
Marital status	Single*	2669						
	Married	7455	0.661 (0.582, 0.750)	<0.001	1.183 (0.996, 1.405)	0.055	0.942 (0.770, 1.154)	0.565
	Separated	315	0.418 (0.325, 0.537)	<0.001	0.716 (0.535, 0.957)	0.024	0.847 (0.604, 1.186)	0.333
	Divorced	867	0.368 (0.306, 0.443)	<0.001	0.736 (0.590, 0.919)	0.007	0.861 (0.660, 1.122)	0.267
	Widowed	1081	0.234 (0.200, 0.274)	<0.001	0.922 (0.737, 1.152)	0.473	0.898 (0.689, 1.170)	0.425
	Cohabitee	1366	0.928 (0.767, 1.123)	0.442	1.003 (0.807, 1.247)	0.978	0.915 (0.709, 1.180)	0.493
Quintiles of	5^{th} (top 20%)*	2404						
equivalised income	4^{th}	2429	0.820 (0.688, 0.977)	0.026			0.968 (0.78, 1.201)	0.770
	3^{rd}	2301	0.531 (0.447, 0.631)	<0.001			0.838 (0.671, 1.046)	0.119
	2^{nd}	2425	0.281 (0.241, 0.329)	<0.001			0.795 (0.635, 0.995)	0.045
	1^{st} (bottom 20%)	2293	0.213 (0.180, 0.252)	<0.001			0.777 (0.616, 0.978)	0.032
	Missing	1901	0.396 (0.334, 0.468)	<0.001			0.814 (0.652, 1.016)	0.069
Employment status	In employment*	7860						
	ILO unemployed	659	0.813 (0.657, 1.006)	0.057			0.822 (0.625, 1.082)	0.163
	Retired	2960	0.248 (0.224, 0.276)	<0.001			0.678 (0.561, 0.820)	<0.001
	Other economically inactive	2274	0.236 (0.212, 0.263)	<0.001			0.522 (0.448, 0.609)	<0.001
Perception of status	Manager*	2413						
within workplace	Foreman or supervisor	1464	0.672 (0.572, 0.790)	<0.001			1.052 (0.846, 1.308)	0.647

	Other employee	8096	0.586 (0.521, 0.659)	<0.001	1.042 (0.852, 1.274)	0.691
	Missing	1780	0.631 (0.543, 0.734)	<0.001	0.957 (0.697, 1.314)	0.786
Household tenure	Owns property outright*	4104				
	Bought property mortgage/loan	6227	2.010 (1.806, 2.238	<0.001	0.809 (0.690, 0.947)	0.009
	Shared ownership	61	0.893 (0.482, 1.657)	0.720	1.014 (0.466, 2.210)	0.971
	Renting	3173	0.677 (0.602, 0.760)	<0.001	0.656 (0.550, 0.782)	<0.001
	Living rent free	138	1.578 (1.022, 2.436)	0.039	1.238 (0.728, 2.105)	0.430
	Missing	50	1.922 (0.822, 4.497)	0.132	1.149 (0.486, 2.717)	0.752
Long-standing illness	None*	7361				
	Non-limiting	2903	0.248 (0.215, 0.286)	<0.001	0.269 (0.232, 0.313)	<0.001
	Limiting	3489	0.048 (0.043, 0.054)	<0.001	0.069 (0.061, 0.078)	<0.001
Smoking status	Never smoked at all*	5994				
	Used to smoke occasionally	844	0.922 (0.766, 1.111)	0.394	0.919 (0.725, 1.166)	0.487
	Used to smoke regularly	3485	0.530 (0.480, 0.586)	<0.001	0.906 (0.798, 1.028)	0.125
	Current smoker	3430	0.511 (0.460, 0.567)	<0.001	0.614 (0.533, 0.706)	<0.001
Frequency of alcohol consumption in past 12 months	Not at all*	1309				
	Once or twice a year	1063	1.116 (0.934, 1.335)	0.227	1.143 (0.906, 1.441)	0.260
	Once every couple of months	877	1.366 (1.131, 1.649)	0.001	1.129 (0.881, 1.447)	0.336
	Once or twice a month	1648	2.130 (1.785, 2.542)	<0.001	1.275 (1.022, 1.592)	0.031
	Once or twice a week	4102	2.686 (2.334, 3.090)	<0.001	1.407 (1.161, 1.705)	<0.001
	Three or four days a week	2133	3.504 (2.927, 4.194)	<0.001	1.559 (1.225, 1.985)	<0.001
	Five or six days a week	639	3.300 (2.579, 4.223)	<0.001	1.352 (0.990, 1.846)	0.058
	Almost every day	1982	1.868 (1.583, 2.205)	<0.001	1.414 (1.145, 1.747)	0.001
Body mass index	20-25*	4176				
	<20	621	0.969 (0.774, 1.212)	0.780	1.106 (0.822, 1.489)	0.507
	>25-30	4775	0.769 (0.694, 0.852)	<0.001	0.959 (0.848, 1.083)	0.500
	>30	2882	0.450 (0.404, 0.501)	<0.001	0.664 (0.575, 0.766)	<0.001
	Missing	1299	0.387 (0.332, 0.451)	<0.001	0.675 (0.557, 0.817)	<0.001
Fruit/vegetable intake	Per unit increase	13753	1.068 (1.049, 1.088)	<0.001	1.021 (0.997, 1.046)	0.086
Deprivation index	Per unit increase	13753	0.798 (0.771, 0.825)	<0.001	0.916 (0.877, 0.958)	<0.001
Urbanisation indicator	Per unit increase	13753	1.125 (1.062, 1.191)	<0.001	1.052 (0.982, 1.128)	0.149
					Pseudo R^2 = 0.116	Pseudo R^2 = 0.321

OR denotes odds ratio; CI denotes confidence interval; NVQ denotes national vocational qualification; ILO denotes International Labour Organisation.
* Baseline category for each covariate.