Individual Heterogeneity in the Association Between Social Participation and Self-rated Health: A Panel Study on BHPS

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Abstract

In the last ten years, interest in social capital as a mechanism for understanding actual and perceived health has been increasing among economists. Although the pathways by which social participation, as a dimension of social capital, may have a positive effect on health seem clearly identified, empirical evidence is mixed because the lack of longitudinal data makes it difficult to deal with individual heterogeneity. Our study investigates the relationship between social participation (as measured by being a member, active, or both a member and active) in associations and self-rated health in a panel setting, using the first five waves of the British Household Panel Survey from 1991 to 1995 (unbalanced panel $N=45,745$). To take into account heterogeneity, we implement three different kinds of estimations for fixed effects, two have been largely used in the literature and one method was recently proposed by Baetschmann et al. (J R Stat Soc Ser A 178: 685–703, 2015). We find positive effects but weak significance for active membership. When we control for reverse causality, using lagged independent variables and membership in specific organizations, we obtain more detailed and in some cases significant results.

Keywords Self-rated health · Social participation · Individual heterogeneity · Social capital · Ordered logit fixed effects model · British Household Panel Survey

JEL Classification C01 · C33 · C35 · H10 · Z10

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1 Introduction¹

In the last ten years, interest in social capital as a mechanism for understanding actual and perceived health has been increasing among economists (Folland 2006; Scheffler and Brown 2008; Ronconi et al. 2012; Ljunge 2014). In these studies, social capital is commonly referred to as “features of social organization, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions” (Putnam 1993, 167). Scholars disaggregate the notion of social capital into cognitive and structural components, with the former related to individuals’ perceptions resulting in values, norms and trust, and the latter representing the extent and intensity of formal and informal social networks (Uphoff 2000; Lochner et al. 2003). Moreover, the literature distinguishes between collective and individual social capital, with the former related to aggregate social relations within a community and the latter indicating the social relations of a particular person (Portes 1998; Kawachi et al. 2004; Iversen 2008). Individual structural social capital, i.e., participation in social networks, is commonly measured through membership in formal associations (Giordano et al. 2011). In this study, we focus on individual social participation.

The reason why it could be interesting to investigate the relationship between social participation and health is that the former may have a positive effect on the latter by several pathways well understood in the literature. Sociologists, psychologists and political scientists have pointed out the following mechanisms: (i) *social influence*—members of social networks obtain guidance about health-relevant behaviours, which may have a positive influence on general health (Berkman et al. 2000); (ii) *social integration*—integration in social networks may have positive effects on general health through social roles, self-esteem and belonging (Cohen 2004; Umberson and Montez 2010); and (iii) *social support*, i.e., social integration and integration in social networks—social relationships are channels of emotional (i.e., demonstrations of caring, esteem, value, and encouragement), informational (i.e., through the provision of facts and advice that may help an individual solve problems) and instrumental (i.e., through the provision of behavioural and material assistance) support (Thoits 2011).

While the theoretical background is well established, the same cannot be said regarding empirical evidence. Investigations on the association between individual social participation and perceived health, mainly the domain of the epidemiological field, show inconclusive results (see Table 1).

Several studies found no correlations (Veenstra 2000; Nyqvist et al. 2008; D’Hombres et al. 2010; Goryakin et al. 2014; Meng and Chen 2014), while some others found positive associations (Lindström 2004; Petrou and Kupek 2008; Nieminen et al. 2010; Hurtado et al. 2011). The main limitation of this field of research is that it uses a cross-sectional design that is unable to address the problem of individual heterogeneity. Taking into account individual heterogeneity bias implies the availability of micro-level panel surveys, which are also important when attempting to estimate the causal relationship with self-rated health because unobservable features, such as personality and motivation, may be associated with reporting health and social participation.

Indeed, Giordano and Lindström (2010) and Giordano et al. (2012) use longitudinal data, the British Household Panel Survey (BPHS), to study the relationships among trust and social participation and self-rated health for individuals. These scholars employed a

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Table 1 Papers on social participation and perceived health

Author(s)	Design	Dimension	Country	Year	Results
Veenstra (2000)	Cross sectional	Individual level	Canada	1999	Social participation is not strongly related to self-rated health
Lindström (2004)	Cross sectional	Individual level	Sweden	1999/2000	Low social participation is associated with bad self-rated health
Nyqvist et al. (2008)	Cross sectional	Individual level	Finland	2000/2001	Social participation does not explain self-reported health
Petrou and Kupek (2008)	Cross sectional	Individual level	England	2003	Civic participation is positively related to better self-reported health
Nieminen et al. (2010)	Cross-section	Individual level	Finland	2000	Social participation is associated with good self-rated health
Hurtado et al. (2011)	Cross-sectional	Individual level	Colombia	2004–2005	Associational membership is linked to better self-rated health
Meng and Chen (2014)	Cross sectional	Individual level	China	2005	Social participation is not related to self-rated health
D'Hombres et al. (2010)	Cross-section with instrumental variables	Individual level	Eight former Soviet countries	2000	The effect of being member of a Putnam-esque organisation is insignificantly related to self-rated health
Goryakin et al. (2014)	Cross-section with instrumental variables	Individual level	Nine former Soviet Republics	2010	Being a member of a Putnam-esque organisation is found to be insignificantly related to self-rated good health
Giordano and Lindström (2010)	Panel data	Individual level	UK	1999 and 2005	Social participation is found associated with good self-rated health

Table 1 (continued)

Author(s)	Design	Dimension	Country	Year	Results
Giordano et al. (2012)	Panel data	Individual level	UK	2000, 2003, 2005, 2007	Social participation is found associated with good self-rated health

subsample of observations that included individuals who were interviewed at the beginning and at the end of the period of analysis with a relevant time gap that could highlight sample selection problems, and although they used longitudinal data, they implemented a random effect rather than a fixed effect estimation. Therefore, they could not exclude individual heterogeneity, and they did not advise precaution when interpreting the results due to omitted variable problems.

In this paper, we aim to test the longitudinal relationship between social participation and self-rated health in the UK, taking into account individual heterogeneity bias. We contribute to the literature in several ways. First, we use continuous longitudinal data, the BPHS, for all years between 1991 and 1995. Second, we consider individuals who are both passive and active members in associations: the grouping of the two positions can be considered a further measure of social capital. Third, in addition to OLS and a logistic framework with fixed effects, we use the ordered logit model with fixed effects implemented by Baetschmann et al. (2015). Moreover, to control for reverse causality, we employ lagged independent variables for social participation and all control variables. Finally, we distinguish among the different kinds of associations to assess for each of them the relationship between social participation variables and self-rated health.

Our main results show a positive but weak significant relationship between being an active member in an organization and self-rated health for all fixed effect methods used. Our results are robust when controlling for reverse causality by introducing lagged independent variables. When checking for all subgroups of associations, we find that some of them are positive and significant. These results suggest a possible intervention that can be used by policy makers to improve the self-rated health of the population by assigning a special weight for some specific kind of associations.

In what follows, Sect. 2 focuses on social participation in the UK. Section 3 describes the data, variables and econometric model. Section 4 reports the results. The last section provides the discussion and conclusion.

2 Social Participation in the United Kingdom

By social participation, we mean several kinds of personal involvement in various clubs, including sports clubs and associations; social involvement with friends and neighbours; other types of participation, such as involvement in community or civic organizations; and participation in gender-based groups (only for women, only for men). Therefore, the participation we consider covers involvement in a large range of social groups. Some of those groups are oriented to pursue leisure and cultural aims; this could be the case for both sports clubs and cultural organizations that support and develop the arts and culture, making them accessible to most individuals through social interaction. Other clubs are aimed at sharing specific categories of workers' interests; this could be the case for working men's clubs. People involved in parent and school associations perform or sustain activities aimed at improving school life and the education of children. Other kinds of groups are based on the preferences of the community; for instance, environmental associations aim to improve the health of the planet. People living within a specific area who come together to raise issues of common concern to the area or to organize community events are likely to participate in tenants and residents groups. People involved in religious associations generally contribute to the community and society through communication, fundraising, or development strategies. We also consider social participation in other groups or organizations that

engage in activities not easily affordable from a psychological point of view, such as helping to care of sick people in hospitals (helping to improve a patient's experience) or in their home, supporting them helping to address their needs.

In the years we are focusing on, as reported by Hall (1999) and Li et al. (2002), trends in social participation in Britain did not decline as they did in the US: many of the key indicators of social participation used by Putnam (2000) showed no equivalent trends in Britain. Indeed, over the past twenty years up until the study period and beyond, membership in community associations among British people stayed fairly constant. In particular, evidence from the BPHS shows that this decline was due to the decreasing numbers of male members in trade unions and working men's clubs, while female involvement increased during the 1990s. In the first half of the 1990s, 84% of adults reported membership in at least one association. In contrast to what happened in the US, according to Hall (1999), people in the UK socially participate due to better levels of education, changes in the class structure and broad state support for voluntary associations. Hall (1999) describes the upkeep of levels of social capital in Britain as caused mainly by three factors. (a) Increased levels of education "massive expansion of both secondary and postsecondary education". Better educated people have a higher propensity to share community affairs both participating in associations and providing voluntary work. (b) Changes in the class structure of British society, characterised by economic and political developments that changed the distribution of occupations and life situations among the British population. Indeed changes in the British class structure impacted on the social capital with the working class suffering from a lack of social connections and with different levels of sociability among different social classes. C) Wide government actions aimed at supporting and encouraging for voluntary associations involvement.

As reported by the House of Commons (2019), social prescribing has become very common in the UK: general practitioners (GPs) and other healthcare professionals refer people to activities in their community as an alternative to medications. Evidence shows that social prescribing is increasing the connection between health and the arts; however, the potential of this practice is yet to be realized (House of Commons 2019). This means that participation in cultural, arts, leisure and sports clubs is likely to become even more widespread in the next years. According to Eurostat (2017), in 2015, the percentage of active citizens (measured as participation in activities related to political groups, associations or parties) in the UK was among the highest (20.2% of people aged 16 and over) in Europe closely following Sweden, the Netherlands, France and Finland. The last evidence from wave 17 of the BPHS shows that the percentage of members (on average from 50% to 40%) and active participants (on average from 47% to 39%) in the organizations we consider decreased.

3 Methods

3.1 Data

We use data from waves 1–5 of the British Household Panel Survey covering the survey years 1991–1995. We limit our study to the first five waves because our social participation variables are continuously present only for those years. The BHPS is a longitudinal survey of randomly selected private households in Great Britain. Individuals within selected households are interviewed annually for the purpose of identifying social and economic

Table 2 Participation rates and individuals observed across waves

	1991	1992	1993	1994	1995
Total# obs	10,264	9845	9600	9481	9249
Response#	9822	9352	8904	8965	8718
Non-response	4.31%	4.99%	7.25%	5.44%	5.74%
Unbalanced non-response	9822	19,174	28,078	37,043	45,761

BHPS, UK; individuals aged 16 and over

changes within the British population. The BHPS data contain information on various domains of the respondents' lives, ranging from income to jobs, household consumption, education, health, and social and political values. We use an unbalanced panel of individuals aged 16 and over, excluding missing data on any relevant variables. Table 2 shows the participation rates and information on the individuals observed across the waves.

Due to the aim of this paper, there are a number of advantages in using the BHPS. This survey involves a national representative sample; it provides a longitudinal dataset that can be used to track changes in an individual's data over time; and it includes a number of variables useful to identify both social participation and general perceived health.

3.2 Dependent Variable

The dependent variable is self-rated health. In the years from 1991 to 1995, the same individuals were asked: "Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been excellent, good, fair, poor, very poor?".

The first variable *SOH* is represented by an ordinal variable that takes five values from the lowest value that represents the lowest health level (very poor) to the highest level that represents the highest health level (Excellent).

In addition, we use a dichotomization of the ordered variable *SOH2*. *SOH2* takes the value of 0 if *SOH* is equal to very poor, poor or fair; otherwise, it takes the value of 1 if *SOH* is equal to good or excellent.

Self-rated health is widely used in the literature as a convenient aggregate of all aspects of health (Bilger and Carrieri 2013), and previous studies have shown self-rated health to be correlated with objective measures of health such as mortality (Idler and Benyamini 1997; Lee 2000; De Salvo et al. 2006).

3.3 Social Participation

Our independent variables of interest are *Member* and *Active*. From 1991 to 1995, the same individuals were asked: "Are you currently a member of any of the kinds of organizations on this card" and "Are you currently active in any of the kinds of organizations on this card".

Member indicates if the interviewee has been a member of at least one of the organizations listed below during the year. *Active* specifies whether she or he has had an active role in at least one of the organizations listed below. They are both dummy variables and take the value of 1 if the respondent is a member of/active in at least one of the organizations.

The kinds of organizations used for determining both the above variables are Environmental (orgmc, orgac), Parental (orgmd, orgad), Tenant or Resident (orgme, orgae), Religious (orgmf, orgaf), Voluntary Service (orgmg, orgag), Community (orgmh, orgah), Social (orgmi, orgai), Sports club (orgmj, orgaj), Women's Institute (orgmk, orgak), Women's Group (orgml, orgal) and Others (orgmm, orgam).

It is possible that an *Active* within the organization is not a *Member* of the organization. For this reason, we add the interaction variable—Member*Active—in our regressions. The interaction variable is the product of *Member* and *Active*, and it aims to capture the simultaneous effect of both variables.

3.4 Control Variables

To control for other factors that might simultaneously influence perceived health and social participation, we include in the analysis a full set of socio-demographic variables that are largely used in the literature (Contoyannis et al. 2004).

We grouped several features as socioeconomic status (SES) variables: (1) *Married*, a dummy variable taking the value of 1 if the person is married; (2) *Children* is the number of children; (3) *O_CSE*, *HND_A*, *DEGREE*, which indicate three levels of education (taking no qualification as the reference group); and iv) *C_age* and *C_age2*, which represent the demeaned age and age square.²

The economic group of control variables is constituted by *LNINCOME*, which is the equivalent uninflated income, and by *Unemployed*, a dummy indicating if the interviewee is currently unemployed (question CD13 in the BHPS questionnaire, see Table 3).

The group of controls for health status includes *hl2gp*, the number of visits to the general practitioner (more visits to the GP is likely to imply poor health; however, going to the GP with a precautionary/preventive aim is a good practise to improve health) and *HFPR*, a dummy that indicates if the interviewee has health problems (problems with arms, legs, hands, sight, hearing, skin conditions/allergy, chest, heart/blood pressure, stomach or digestion, diabetes). Finally, we control for the year and region using year dummies and regional dummies.

Table 3 reports the descriptive statistics and indicates the number of the question in the BHPS questionnaire that relates to each variable.

3.5 Methodology

Our main aim is to analyse the effect of social participation on self-rated health status while avoiding heterogeneity. This kind of analysis is usually implemented using short panels with a large number of observations and employing fixed effects to deal with individual heterogeneity problems. Actually, fixed effects are applied, instead of random effects, only if there is a correlation between the unobserved effect and explanatory variables. We employed the Hausman test for each estimation to support our choice of fixed effects against the random effects.

We implement three types of regressions. First, we use OLS with fixed effects for the *SOH* ordered variable. This regression should account for heterogeneity, but it could

² We demean the variable age to avoid the effect of collinearity that may arise by introducing the variable and its square in a regression. As a consequence, our regressions have a small VIF.

Table 3 Descriptive Statistics

Question n.	Variable	Definition	Mean	SD	min	max
CM1	SOH	= Self-rated health ordered variable 1 = poor 5 = Excellent	3.880	0.919	1	5
CM1	SOH2	= Self-rated health dichotomous variable 1 = Excellent or good	0.725	0.446	0	1
CV16	Member	= 1 if interviewed is only member at least in one of the organizations	0.513	0.500	0	1
CV18N	Active	= 1 if interviewed is only active in at least in one the organizations	0.475	0.499	0	1
	Member*Active	= 1 if interviewed is both member and active	0.412	0.492	0	1
CHG7	C_age	= demeaned age = age-mean(age)	- 0.020	18.39	- 29.01	52.99
CD22	Married	= 1 if married	0.568	0.495	0	1
CNKIDS	Children	= number of children in household	0.589	0.949	0	9
CD16	DEGREE	= 1 if graduated and higher	0.087	0.282	0	1
CD16	HND_A	= 1 if higher school (Higher National Certificate, Higher National Diploma, A-level)	0.299	0.458	0	1
CD16	O_CSE	= 1 if lower than lower school (O-level, Certificate of Secondary Education)	0.108	0.311	0	1
CP64	LNINCOME	= logarithm of equalised real income, adjusted using the Retail Price Index and McClement's scale to adjust for household size and composition	9.213	0.717	- 0.524	12.04
CD13	Unemployed	= 1 if her/his current situation is of unemployment	0.336	0.472	0	1
CM10	hl2gp	= number of visits to GP; 1 = none, 5 = more than ten	2.384	1.192	1	5
CM4A	HMPR	= 1 if there are any physical problem(arms, legs, hands, sight, hearing, skin conditions/allergy, chest, heart/blood pressure, stomach or digestion, diabetes)	0.058	0.234	0	1
# Observation			45,745			

bias the estimated parameters because of the violation of the OLS assumption (Cameron and Trivedi 2005). The second framework utilizes the dichotomized variable *SOH2* as the dependent variable and implements a logistic fixed effect estimation. In this case, we account for heterogeneity, but the process of dichotomization is subjective and can effectively influence the regression parameters (Greene 2012). Finally, the last estimator we use is the ordered logit model with fixed effects implemented by Baetschmann et al. (2015). This estimator uses a “Blow Up and Cluster” (BUC) technique to improve previously employed estimators.

A large body of literature dealing with ordered variables fixed effects estimation involves the dichotomization of the dependent variable. This is due to the incidental parameter problem that is solved only for the bivariate case. An observation is informative if it passes from one status to another. In the bivariate case (logit), we have relevant information if we switch from zero to one or vice versa. There is no information from an observation that remains zero or another value. An improvement in the BUC overcomes the incidental parameter problem in two stages. In the first stage, the sample is enlarged (Blow Up) in terms of the number of categories. Given the number of ordered categories, we substitute $k - 1$ observations in the original model. In our case, the dependent variable (*SOH*) consists of five ordered categories, and we enlarge the database from 45,745 observations to 182,980. This increase in the number of observations has to capture all informative changes in the dependent variable. In our case, for instance, some of the scales range from excellent to good, fair, poor or very poor. This first stage is relevant when compared with past estimators that use only one dichotomization per individual to estimate the parameters. In the BUC case, increasing the number of dichotomizations can improve the efficiency of the estimation.

In the second stage (cluster), the BUC treats all changes as dichotomous variables and applies a restricted logistic regression with fixed effects (conditional maximum likelihood estimation) to the enlarged sample but clusters the standard errors for all changes per individual. This occurs due to the construction of the new sample. In fact, the observations resulting from the first stage are not independent. Therefore, the estimation has to implement individual clustering.

In their Monte Carlo simulation, Baetschmann et al. (2015) show that their methods improve the estimation better than traditional estimators based on the dichotomization of dependent variables for cases where a low response occurs for some categories and for cases with short time periods. Moreover, Riedl and Geishecker (2014) compare six estimation strategies for the ordered logistic regression with fixed effects, all based on dichotomization. In their study, the BUC estimation method results are less biased than those of the other methods.

We apply the BUC estimator to analyse whether *Member*, *Active*, and *Member*Active* are correlated to *SOH* controlling for all other variables (*Z*). We compare our results with the OLS and dichotomized logit estimates for the following specifications:

$$SOH_{it} = \alpha + \beta_1 Member_{it} + \beta_2 Active_{it} + \beta_3 Member_{it} * Active_{it} + \gamma Z_{it} + u_i + \varepsilon_{it} \quad (1)$$

This is the simplest specification where all variables are measured at the same time, where u_i is the unobserved individual specific component assumed to be time invariant and correlated with the observed explanatory variables.

Another problem we have to deal with in this analysis is reverse causality. We seek to determine whether social participation can influence health status. However, it is plausible that health status can affect social participation. Indeed, anyone with worsened her/

his health may have difficulty meeting other people. To break this chain, we introduce a lagged variable in our estimation for the social participation variables. In this way, we try to understand whether being a member and/or an active participant of an organization in the last year (time $t-1$) can improve self-rated health in the following year (time t). The persistence of being a member and/or an active participant of associations could be of relevance in our study. The BUC estimation with the social participation lagged variables is

$$SOH_{it} = \alpha + \beta_1 Member_{it-1} + \beta_2 Active_{it-1} + \beta_3 Member_{it-1} * Active_{it-1} + \gamma Z_{it} + u_i + \varepsilon_{it} \quad (2)$$

However, due to the introduction of a lagged independent variable, there is a reduction in the number of observations. Thus, to compare the results of the contemporary and lagged variables, we run regressions reducing the number of observations to that of the case using lagged variables (the second column in the regression tables). It could be stated that our control variable may be endogenous. In this sense, we lag all control variables. Our regression takes the following form:

$$SOH_{it} = \alpha + \beta_1 Member_{it-1} + \beta_2 Active_{it-1} + \beta_3 Member_{it-1} * Active_{it-1} + \gamma Z_{it-1} + u_i + \varepsilon_{it} \quad (3)$$

Finally, to compare all possible results, we use the last regression specification (4). We employ contemporaneous and lagged social participation variables and contemporaneous control variables:

$$SOH_{it} = \alpha + \beta_1 Member_{it} + \beta_2 Active_{it} + \beta_3 Member_{it} * Active_{it} + \beta_4 Member_{it-1} + \beta_5 Active_{it-1} + \beta_6 Member_{it-1} * Active_{it-1} + \gamma Z_{it} + u_i + \varepsilon_{it} \quad (4)$$

4 Results

Tables 4, 5 and 6 report the results of the estimation methods. In each table, we have five regression specifications. In the first column, we have the regression stated in Eq. (1): all membership and control variables are contemporaneous of the self-rated health status. In the second column, we have the same regression specification, but we restrict the sample at time $t-1$ to make it compatible with the following regression specification (with fewer observations). In the third column, we have the regression that includes only the lagged social participation variables (Eq. 2). In the fourth column, we report the results for the lagged social participation variables and lagged control Variables (Eq. 3). Finally, in the fifth column, we show the findings for all contemporaneous and lagged social participation variables and contemporary control variables (Eq. 4).

We do not show the results for the time and regional dummies due to space limitations. Under the coefficients, we report some typical measures of fit. Among others, we show the variation inflation factors (VIF), which are always low enough to affirm that there is no effect of collinearity on coefficient significance, while the Hausman tests support the use of fixed effects in all specifications and estimation methods.

Table 4 provides the results of the OLS regressions for the ordered dependent variable *SOH*. The findings show that all coefficients of contemporary social participation variables are positively correlated with self-rated health. However, only one is significant at the 10 percent level, *Active* (Columns 2 and 5). Indeed, when we consider both contemporaneous and lagged social participation variables in Column (5), the coefficient

Table 4 OLS fixed effects estimates on SOH

	(1)	(2)	(3)	(4)	(5)
	t	$t-1$	SP_{t-1}	All $t-1$	t, SP_{t-1}
SOH					
Member	0.017 (0.014)	0.023 (0.016)			0.026 (0.017)
Active	0.024 (0.015)	0.037* (0.019)			0.038* (0.019)
Member*Active	0.017 (0.011)	0.020 (0.014)			0.021 (0.014)
Member $t-1$			0.015 (0.016)	0.017 (0.017)	0.019 (0.016)
Active $t-1$			- 0.004 (0.018)	0.007 (0.019)	0.003 (0.018)
Member $t-1$ *Active $t-1$			0.013 (0.014)	0.011 (0.014)	0.013 (0.014)
C_age2 ($t-1$)	- 0.000* (0.000)	- 0.000*** (0.000)	- 0.000*** (0.000)	- 0.001*** (0.000)	- 0.000*** (0.000)
C_age($t-1$)	- 0.028* (0.016)	- 0.038** (0.019)	- 0.038** (0.019)	0.014 (0.019)	- 0.039** (0.019)
Married($t-1$)	0.043** (0.022)	0.056** (0.028)	0.052* (0.028)	- 0.006 (0.027)	0.056** (0.028)
Children($t-1$)	0.030*** (0.009)	0.040*** (0.012)	0.041*** (0.012)	0.016 (0.011)	0.040*** (0.012)
DEGREE($t-1$)	0.122** (0.054)	0.136** (0.068)	0.130* (0.068)	- 0.010 (0.069)	0.138** (0.068)
HND_A($t-1$)	0.067** (0.027)	0.048 (0.035)	0.047 (0.034)	- 0.071** (0.035)	0.048 (0.035)
O_CSE($t-1$)	- 0.040 (0.050)	0.025 (0.091)	0.018 (0.092)	- 0.068 (0.061)	0.025 (0.091)
LNINCOME($t-1$)	0.020** (0.008)	0.015 (0.010)	0.015 (0.010)	0.011 (0.011)	0.015 (0.010)
Unemployed($t-1$)	- 0.019 (0.012)	- 0.028* (0.017)	- 0.024 (0.017)	0.019 (0.014)	- 0.028* (0.017)
hl2gp($t-1$)	- 0.200*** (0.005)	- 0.196*** (0.006)	- 0.195*** (0.006)	- 0.004 (0.005)	- 0.196*** (0.006)
HFPR($t-1$)	- 0.167*** (0.011)	- 0.161*** (0.013)	- 0.160*** (0.013)	0.003 (0.013)	- 0.161*** (0.013)
Costant	4.130*** (0.108)	4.309*** (0.135)	4.322*** (0.134)	3.893*** (0.135)	4.301*** (0.135)
Obs.	45,745	32,531	32,754	33,440	32,531
R^2	0.097	0.092	0.092	0.008	0.093
r^2_a	0.097	0.092	0.091	0.007	0.092
Rmse	0.495	0.467	0.468	0.494	0.467
F	63.541	43.975	44.023	4.977	40.427
LI	- 32,703.757	- 21,358.357	- 21,584.388	- 23,865.150	- 21,357.151
Regions dummies	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES

Table 4 (continued)

	(1) t	(2) $t-1$	(3) SP_{t-1}	(4) All $t-1$	(5) t, SP_{t-1}
VIF	3.20	3.31	3.31	3.30	3.25
Hausman test	1313.67***	1293.00***	1026.63***	3127.86***	970.83***

Standard errors are in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

for *Active* remains stable compared to the same coefficient estimated in Column (2) in a more restricted sample. By contrast, the results for the coefficients of the lagged social participation variables are not statistically significant (Columns 3, 4 and 5).

Hence, the OLS estimations with fixed effects indicate a weak correlation between contemporary active membership and self-perceived health. Indeed, these results can be due to a bias of the OLS estimation for the ordered variable; for this reason, we implement additional regressions using the dichotomous dependent variable (*SOH2*) as well as the ordered dependent variable (*SOH*).

Table 5 shows the results of the logit fixed effects for the perceived health dichotomized variable *SOH2*. As above, the only contemporary social participation variable statistically significant at the 10 percent level is *Active* (Columns 2 and 4). Furthermore, looking at the lagged social participation variables, being a *Member* at time $t-1$ is statistically significant at the 10 percent level (Columns 3, 4 and 5). In short, using a dichotomous variable for self-perceived health does not help to show a robust positive relationship between contemporary active membership and self-rated health (time t). However, we find a weak causal effect of being a member of an organization in the previous year (time $t-1$) and self-perceived (good) health in the following year (time t), an issue that has not been widely examined in previous studies on this topic.

In Table 6, we show the results of the BUC regressions. Findings on the contemporary and lagged social participation variables are similar to those reported in Table 4. The coefficients are positively related to self-rated health, and in the case of *Active* (Column 2 and Column 5), they are significant at the 10 percent level. In these two cases, intensity seems to be closer to the dichotomous case shown in Table 5 rather than to the OLS estimates. Moreover, the coefficients for the lagged social participation variables are not statistically significant. In summary, using an ordered logistic regression with fixed effects still leads to a weak correlation between contemporary active membership in organizations and self-perceived health.

The control variables show the same sign as that reported in the literature (see D'Hombres et al. 2010; Goryakin et al. 2014). In particular, age and age squared are negatively related to self-rated health, and this is true in all regressions, and in all the estimates, there are only some differences in the significance. Being married is positively related to the state of health, and its significance is different in the ordered fixed effect models: the results for the OLS and the dichotomous regressions are similar; however, in the case of the BUC, the estimates are never significant. The number of children is always significant in all models for the state of health. The higher the level of education is, the better self-perceived health. Income is always positively related to self-rated health. In contrast, unemployment is negatively related to the state of health. The number of general practitioner visits and health problems are always negatively and significantly related to the state of health.

Table 5 Logit fixed effects estimates on SOH2

	(1)	(2)	(3)	(4)	(5)
	t	$t-1$	$SPt-1$	All ($t-1$)	t, SP_{t-1}
SOH2 (1/0)					
Member	- 0.034 (0.074)	- 0.115 (0.094)			- 0.081 (0.096)
Active	0.055 (0.085)	0.191* (0.111)			0.206* (0.114)
Member*Active	0.005 (0.060)	0.016 (0.078)			0.028 (0.078)
Member $t-1$			0.178* (0.094)	0.167* (0.086)	0.169* (0.097)
Active $t-1$			0.036 (0.106)	0.071 (0.096)	0.074 (0.110)
Member $t-1$ * Active $t-1$			0.106 (0.075)	0.087 (0.069)	0.097 (0.076)
C_age2 ($t-1$)	- 0.001*** (0.000)	- 0.002*** (0.000)	- 0.002*** (0.000)	- 0.003*** (0.000)	- 0.002*** (0.000)
C_age ($t-1$)	- 0.325*** (0.091)	- 0.465*** (0.114)	- 0.478*** (0.114)	- 0.035 (0.110)	- 0.467*** (0.114)
Married ($t-1$)	0.212** (0.105)	0.315** (0.146)	0.292** (0.145)	0.008 (0.128)	0.313** (0.146)
Children ($t-1$)	0.081* (0.047)	0.194*** (0.068)	0.186*** (0.068)	0.072 (0.056)	0.194*** (0.068)
DEGREE ($t-1$)	0.305 (0.370)	0.204 (0.501)	0.267 (0.501)	- 0.709 (0.505)	0.215 (0.501)
HND_A ($t-1$)	0.084 (0.145)	- 0.036 (0.209)	- 0.026 (0.209)	- 0.391** (0.184)	- 0.034 (0.210)
O_CSE ($t-1$)	- 0.225 (0.231)	0.380 (0.453)	0.296 (0.439)	0.107 (0.273)	0.377 (0.453)
LNINCOME ($t-1$)	0.105** (0.044)	0.132** (0.059)	0.117** (0.057)	0.120** (0.055)	0.132** (0.059)
Unemployed ($t-1$)	- 0.046 (0.061)	- 0.125 (0.089)	- 0.105 (0.088)	0.059 (0.068)	- 0.121 (0.089)
hl2gp ($t-1$)	- 0.711*** (0.022)	- 0.738*** (0.028)	- 0.729*** (0.028)	0.030 (0.023)	- 0.737*** (0.028)
HFPR ($t-1$)	- 0.661*** (0.056)	- 0.658*** (0.073)	- 0.652*** (0.073)	- 0.008 (0.063)	- 0.658*** (0.073)
Obs.	17,705	10,946	11,088	11,455	10,946
N_g	3983.000	2959.000	2989.000	3099.000	2959.000
r2_p	0.130	0.139	0.137	0.015	0.140
chi ²	1747.150	1140.855	1135.566	127.078	1144.259
ll	- 5834.971	- 3524.805	- 3582.197	- 4223.269	- 3523.103
aic	11,739.943	7117.610	7232.394	8514.538	7120.206
bic	12,012.299	7365.835	7481.057	8764.308	7390.333
Regions dummies	YES	YES	YES	YES	YES

Table 5 (continued)

	(1) t	(2) $t-1$	(3) SP_{t-1}	(4) $All(t-1)$	(5) t, SP_{t-1}
Time dummies	YES	YES	YES	YES	YES
VIF	3.44	3.59	3.60	3.50	3.50
Hausman test	944.82***	163.17***	724.29***	3127.86***	687.40***

Standard errors are in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

To explore whether the type of group and level of active participation show different patterns with self-rated health, we focus on the relationship between each of the following organizations we considered as one group in the previous section and self-rated health: Environmental, Parental, Tenant or Resident, Religious, Voluntary Service, Community, Social, Sports club, Women's Institute, Women's Group and Others.³

Table 7 reports the results only for the contemporary and lagged social participation due to space limitations.⁴

Table 7 shows different patterns. First, the contemporary and lagged social participation variables in the Environmental, Parental, Community, Women's Institute and Women's Groups are never statistically significant. For the other organizations, the results are mixed.

Actively participating in Tenant and Resident groups at time $t-1$ (Active $t-1$) is positively correlated with self-rated health. This is likely to happen since people benefit from discussing issues of common concern in the area where they live or from organizing community events, not just when they perform those activities but later in time.

Being active at time $t-1$ in religious groups is positively correlated with self-rated health, meaning that being involved in activities such as contributing to the community and society through communication, fundraising, or developing strategies, which are generally performed by religious groups, is good for health later on.

Moreover, there is a robust positive correlation between being both a member of and actively participating in sports clubs at time $t-1$ and time t and self-perceived health; in addition, there is a robust positive correlation between being active at time t and self-perceived health. This result shows that, as expected, practising sports is not only fun but also has health benefits both while at the time they practised and at a later time. In addition, being active at time $t-1$ in other groups is positively correlated with self-rated health.

Finally, being a member at time $t-1$ of voluntary service groups as well as being active at time $t-1$ in social organizations is negatively associated with self-rated health. This result suggests that social participation could also have a dark side (see Sect. 5).

5 Discussion and Conclusions

In this paper, we examined the relationship between social participation, measured by passive, active, and both passive and active membership in associations, and self-rated health using a large representative sample of the British population using data from the BHPS (from 1991 to 1995) and controlling for socioeconomic status (SES) and economic and health variables. We took into account unobserved individual heterogeneity using panel

³ We thank the anonymous referee who recommended that we consider each organization separately.

⁴ The full results are available on request.

Table 6 Ordered logit fixed effects estimates on SOH

	(1)	(2)	(3)	(4)	(5)
	t	$t-1$	$SPt-1$	All $t-1$	$t, SPt-1$
SOH					
Member	0.054 (0.055)	0.055 (0.067)			0.063 (0.070)
Active	0.100 (0.061)	0.150* (0.078)			0.151* (0.080)
Member*Active	0.057 (0.043)	0.077 (0.055)			0.078 (0.056)
Member $t-1$			0.044 (0.066)	0.057 (0.063)	0.056 (0.069)
Active $t-1$			- 0.019 (0.074)	0.021 (0.070)	0.014 (0.076)
Member $t-1$ *Active $t-1$			0.028 (0.054)	0.035 (0.053)	0.030 (0.056)
C_age2 ($t-1$)	- 0.001*** (0.000)	- 0.001*** (0.000)	- 0.001*** (0.000)	- 0.002*** (0.000)	- 0.001*** (0.000)
C_age($t-1$)	- 0.129** (0.065)	- 0.161** (0.082)	- 0.163** (0.081)	0.085 (0.076)	- 0.162** (0.082)
Married ($t-1$)	0.115 (0.084)	0.153 (0.113)	0.143 (0.113)	- 0.038 (0.099)	0.153 (0.113)
Children ($t-1$)	0.103*** (0.035)	0.167*** (0.051)	0.170*** (0.050)	0.038 (0.042)	0.168*** (0.051)
DEGREE ($t-1$)	0.544** (0.237)	0.726** (0.308)	0.703** (0.306)	0.009 (0.327)	0.733** (0.309)
HND_A ($t-1$)	0.253** (0.107)	0.175 (0.145)	0.180 (0.145)	- 0.299** (0.134)	0.177 (0.145)
O_CSE ($t-1$)	- 0.082 (0.177)	0.026 (0.307)	- 0.028 (0.310)	- 0.270 (0.213)	0.022 (0.307)
LNINCOME ($t-1$)	0.079** (0.033)	0.062 (0.043)	0.061 (0.042)	0.043 (0.042)	0.063 (0.043)
Unemployed ($t-1$)	- 0.014 (0.045)	- 0.070 (0.065)	- 0.059 (0.065)	0.083 (0.051)	- 0.070 (0.065)
hl2gp ($t-1$)	- 0.676*** (0.018)	- 0.696*** (0.022)	- 0.693*** (0.022)	- 0.001 (0.017)	- 0.696*** (0.022)
HFPR ($t-1$)	- 0.613*** (0.043)	- 0.615*** (0.053)	- 0.614*** (0.053)	0.024 (0.048)	- 0.614*** (0.053)
Obs.	44,120	27,026	27,378	29,117	27,059
r2_p	0.113	0.117	0.116	0.011	0.117
chi ²	2058.998	1338.965	1340.575	145.908	1336.700
ll	- 14,785.825	- 8913.094	- 9045.151	- 10,752.421	- 8925.416
aic	29,641.650	17,894.187	18,158.302	21,572.841	17,924.831
bic	29,945.963	18,173.142	18,437.697	21,854.330	18,228.445
Regions dummies	YES	YES	YES	YES	YES

Table 6 (continued)

	(1) t	(2) $t - 1$	(3) $SPt - 1$	(4) All $t - 1$	(5) $t, SPt - 1$
Time dummies	YES	YES	YES	YES	YES
Hausman Test	1567.43***	1095.97***	1127.23***	99.02***	1098.58***

Standard errors are in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

data and employed OLS and logistic frameworks with fixed effects and the ordered logit model with fixed effects implemented by Baetschmann et al. (2015).

Self-rated health has been shown to be correlated with social participation in several cross-sectional studies. In particular, previous investigations in the UK using cross-sectional and panel data with random effects found a strong relationship between social participation and self-rated health (Petrou and Kupek 2008; Giordano and Lindström 2010; Giordano et al. 2012).

Our main results are as follows:

- (a) In line with the literature, we find a positive relationship between active participation in associations and self-rated health, although statistical significance is at the 10 percent level. Such a result is not surprising, and it is likely to be influenced by the methodology we used, the BUC (see Sect. 3), which is less biased than other methodologies generally used for this kind of estimation. Indeed, active participation is good for health for at least three reasons: (1) it provides information about health-relevant behaviours (Berkman et al. 2000); (2) it allows social integration (Cohen 2004; Umberson and Montez 2010); and (3) it offers social support (Thoits 2011).
- (b) In contrast to the existing literature, here, a further result is that when we employ the dichotomous dependent variable (SOH2) and standard methodologies (the logit model), passive participation at time $t - 1$ (Member $t - 1$) has a positive relationship with self-rated health at time t . This result seems to show that the relationship between social participation and health goes from social participation to health and not vice versa. Indeed, social prescribing has been widespread in the UK (see Sect. 2).
- (c) When we consider each association, we find (a) a positive and robust causal effect of being both member and active in sports club at time $t - 1$ on self-perceived health at time t ; (b) a positive and robust causal effect of being active in tenant, resident or other associations at time $t - 1$ on self-perceived health at time t ; (c) a negative and robust causal effect of being active in social associations at time $t - 1$ on self-perceived health at time t .

Our main results highlight both methodological and theoretical considerations. From a methodological point of view, it seems relevant for future research to use micro longitudinal data with fixed effects estimators to take into account individual heterogeneity bias. From a theoretical point of view, our results for some types of organizations may indicate that social participation may have a dark side that needs to be fully evaluated in future studies. For example, social relationships can be stressful, and relationship stress undermines health through behavioural and psychological pathways (Umberson and Montez 2010). Moreover, caring for sick people and the elderly may also be harmful to health. Therefore, when social participation involves being *Active* within such an association that engages in such activities, the effects on health may be ambiguous and may involve personal health

Table 7 Ordered logit fixed effects estimates for each organization

	(1) <i>t</i>	(2) <i>t</i> − 1	(3) SP <i>t</i> − 1	(4) All <i>t</i> − 1	(5) <i>t</i> , SP <i>t</i> − 1
Environmental (orgmc, orgac)					
Member	0.058 (0.121)	0.101 (0.142)			0.123 (0.146)
Active	0.033 (0.245)	− 0.039 (0.259)			0.010 (0.270)
Member*Active	− 0.081 (0.137)	− 0.023 (0.166)			− 0.024 (0.170)
Member <i>t</i> − 1			0.104 (0.139)	0.074 (0.134)	0.119 (0.144)
Active <i>t</i> − 1			0.273 (0.308)	0.368 (0.322)	0.253 (0.325)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.010 (0.155)	− 0.008 (0.154)	− 0.034 (0.159)
Obs.	44,120	27,026	27,378	29,117	27,059
Parental (orgmd, orgad)					
Member	− 0.020 (0.150)	0.213 (0.185)			0.238 (0.189)
Active	0.125 (0.097)	0.143 (0.122)			0.145 (0.125)
Member*Active	− 0.149 (0.106)	− 0.037 (0.130)			− 0.023 (0.131)
Member <i>t</i> − 1			0.157 (0.175)	0.140 (0.177)	0.207 (0.179)
Active <i>t</i> − 1			− 0.026 (0.120)	− 0.041 (0.116)	0.004 (0.124)
Member <i>t</i> − 1*Active <i>t</i> − 1			0.153 (0.132)	0.141 (0.126)	0.151 (0.132)
Obs.	44,120	27,026	27,378	29,117	27,059
Tenants or residents (orgme, orgae)					
Member	− 0.028 (0.076)	− 0.032 (0.131)			− 0.009 (0.094)
Active	− 0.050 (0.200)	− 0.398 (0.362)			− 0.170 (0.254)
Member*Active	− 0.088 (0.084)	− 0.128 (0.142)			0.001 (0.106)
Member <i>t</i> − 1			− 0.065 (0.091)	− 0.073 (0.088)	− 0.066 (0.093)
Active <i>t</i> − 1			0.450** (0.227)	0.485** (0.205)	0.403* (0.238)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.139 (0.105)	− 0.147 (0.101)	− 0.147 (0.107)
Obs.	44,120	27,026	27,378	29,117	27,059

Table 7 (continued)

	(1) <i>t</i>	(2) <i>t</i> − 1	(3) <i>SPt</i> − 1	(4) All <i>t</i> − 1	(5) <i>t</i> , <i>SPt</i> − 1
Religious (orgmf, orgaf)					
Member	− 0.056 (0.124)	− 0.204 (0.206)			− 0.123 (0.155)
Active	0.013 (0.106)	0.003 (0.183)			− 0.023 (0.137)
Member*Active	− 0.046 (0.081)	− 0.087 (0.137)			− 0.058 (0.106)
Member <i>t</i> − 1			− 0.020 (0.161)	0.026 (0.142)	− 0.035 (0.168)
Active <i>t</i> − 1			0.153 (0.125)	0.218* (0.124)	0.175 (0.130)
Member <i>t</i> − 1*Active <i>t</i> − 1			0.018 (0.108)	− 0.025 (0.102)	0.015 (0.110)
Obs.	44,120	27,026	27,378	29,117	27,059
Voluntary service (orgmg, orgag)					
Member	− 0.077 (0.153)	− 0.278 (0.236)			− 0.089 (0.188)
Active	− 0.167 (0.158)	0.379 (0.325)			− 0.075 (0.217)
Member*Active	− 0.036 (0.089)	0.020 (0.168)			− 0.075 (0.117)
Member <i>t</i> − 1			− 0.343* (0.207)	− 0.250 (0.192)	− 0.347 (0.223)
Active <i>t</i> − 1			− 0.361 (0.223)	− 0.219 (0.195)	− 0.343 (0.234)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.161 (0.114)	− 0.088 (0.109)	− 0.157 (0.115)
Obs.	44,120	27,026	27,378	29,117	27,059
Community (orgmh, orgah)					
Member	0.400** (0.193)	1.559*** (0.479)			0.741*** (0.278)
Active	0.233 (0.231)	1.041** (0.477)			0.198 (0.354)
Member*Active	0.103 (0.100)	0.414** (0.173)			0.200 (0.127)
Member <i>t</i> − 1			0.542 (0.426)	− 0.015 (0.271)	0.559 (0.408)
Active <i>t</i> − 1			0.347 (0.353)	0.099 (0.263)	0.398 (0.373)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.068 (0.205)	0.105 (0.103)	− 0.046 (0.209)
Obs.	44,120	27,026	27,378	29,117	27,059

Table 7 (continued)

	(1) <i>t</i>	(2) <i>t</i> − 1	(3) <i>SPt</i> − 1	(4) All <i>t</i> − 1	(5) <i>t</i> , <i>SPt</i> − 1
Social (orgmi, orgai)					
Member	0.078 (0.078)	− 0.027 (0.128)			0.030 (0.100)
Active	0.083 (0.126)	0.025 (0.217)			− 0.013 (0.158)
Member*Active	0.073 (0.063)	0.192* (0.111)			0.127 (0.082)
Member <i>t</i> − 1			0.027 (0.091)	− 0.022 (0.087)	0.022 (0.096)
Active <i>t</i> − 1			− 0.318** (0.133)	− 0.210 (0.133)	− 0.317** (0.137)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.068 (0.078)	− 0.040 (0.075)	− 0.052 (0.080)
Obs.	44,120	27,026	27,378	29,117	27,059
Sports club (orgmj, orgaj)					
Member	0.009 (0.092)	− 0.016 (0.159)			0.036 (0.117)
Active	0.174** (0.078)	0.306** (0.133)			0.216** (0.101)
Member*Active	0.113** (0.056)	0.142 (0.104)			0.149** (0.074)
Member <i>t</i> − 1			0.175* (0.105)	0.121 (0.105)	0.177 (0.113)
Active <i>t</i> − 1			0.100 (0.101)	0.021 (0.093)	0.145 (0.105)
Member <i>t</i> − 1*Active <i>t</i> − 1			0.196*** (0.069)	0.132** (0.067)	0.210*** (0.071)
Obs.	44,120	27,026	27,378	29,117	27,059
Womens Institute (orgmk, orgak)					
Member	0.771* (0.398)	0.630 (0.722)			0.810 (0.536)
Active	0.324 (0.279)	0.475 (0.448)			0.374 (0.386)
Member*Active	0.014 (0.189)	0.167 (0.289)			− 0.080 (0.241)
Member <i>t</i> − 1			0.028 (0.448)	0.125 (0.430)	0.164 (0.427)
Active <i>t</i> − 1			0.316 (0.334)	0.225 (0.288)	0.407 (0.385)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.214 (0.243)	− 0.139 (0.221)	− 0.146 (0.247)
Obs.	44,120	27,026	27,378	29,117	27,059

Table 7 (continued)

	(1) <i>t</i>	(2) <i>t</i> − 1	(3) <i>SPt</i> − 1	(4) All <i>t</i> − 1	(5) <i>t</i> , <i>SPt</i> − 1
Womens group (orgml, orgal)					
Member	− 0.095 (0.317)	0.266 (0.462)			0.091 (0.377)
Active	− 0.351 (0.316)	0.976** (0.486)			0.232 (0.390)
Member*Active	0.041 (0.166)	0.209 (0.314)			0.064 (0.224)
Member <i>t</i> − 1			0.542 (0.426)	0.372 (0.367)	0.559 (0.408)
Active <i>t</i> − 1			0.347 (0.353)	0.096 (0.360)	0.398 (0.373)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.068 (0.205)	− 0.170 (0.208)	− 0.046 (0.209)
Others (orgmm, orgam)					
Member	− 0.012 (0.101)	− 0.197 (0.174)			− 0.086 (0.126)
Active	0.069 (0.153)	0.617** (0.282)			0.330 (0.208)
Member*Active	− 0.024 (0.063)	0.015 (0.112)			− 0.051 (0.081)
Member <i>t</i> − 1			0.014 (0.110)	0.004 (0.114)	− 0.001 (0.115)
Active <i>t</i> − 1			0.460** (0.210)	0.476** (0.190)	0.546** (0.221)
Member <i>t</i> − 1*Active <i>t</i> − 1			− 0.071 (0.073)	− 0.052 (0.071)	− 0.081 (0.075)
Obs.	44,120	27,026	27,378	29,117	27,059

Standard errors are in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

costs. Furthermore, social participation could have harmful effects on an individual's health because of the stress linked to the sense of reciprocity and the obligations towards others that come from social participation itself (Kawachi and Berkman 2001). In our study, we are unable to identify the mechanisms by which social participation weakly improves general health; thus, future investigations are welcome to explore such channels.

Although the main results for the types of organizations are not contemporaneous but relative to a past time, they could have implications for the present in terms of policy suggestions. As reported in section II social prescribing has become very common in the UK. General practitioners (GPs) refer people to activities in their community as an alternative to medications. However, the potential of this practice is yet to be realized (House of Commons 2019). Our results could be a step for moving in the direction of a larger promotion of participation in tenant and resident groups, in religious groups and sports clubs in the next years. Tenant and resident groups should be supported since groups in which people

share common concerns and engage in activities relevant for the area in which they live have the opportunity to improve their health. Social participation in this kind of organizations has been very important during the pandemic time when societies have been undergoing rapid changes and needs of specific groups come out. Good neighbour relations among residents groups have been crucial in the joint response to COVID-19. According to Marston et al. (2020), our results suggest that community participation is essential and governments should incorporate the community voice into the pandemic response. In the same way, social participation in religious groups should be encouraged since it is good for health. In addition, most people should have the right information regarding the health benefits of social participation in sports clubs and, at the same time, the possibility of participating with the government's support. Therefore, it seems that it is important encourage social participation but assigning a special weight for some specific kind of associations.

The paper has several strengths: (a) it employs continuous longitudinal data from the BPHS for all years between 1991 and 1995, and this allows for the full representation of the population in the UK; (b) it considers individuals who are both passive and active members in associations as a further measure of social capital; (c) in addition to using OLS and logistic frameworks with fixed effects, it employs the ordered logit model with fixed effects implemented by Baetschmann et al. (2015); (d) it uses lagged independent variables to control for the reverse causality problem; and (e) it distinguishes among different kinds of associations. A limitation of the paper is the endogeneity of the results for the variable Active at time t . A possible improvement in this study would have been to use an instrumental variable estimation or a continuous dependent variable to measure health status.

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