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ORIGINAL ARTICLE

Social capital as a determinant of self-rated health and psychological well-being

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Abstract
Objective To examine whether specific dimensions of social capital are related to self-rated health and psychological well-being.
Methods Cross-sectional data from a health survey representing the adult Finnish population ($N = 8{,}028$) were used. Logistic regression analysis was used to reveal and quantify the possible associations between three dimensions of social capital (social support; social participation and networks; trust and reciprocity) and two general health indicators (self-rated health and psychological well-being). The roles of age, gender, education, living arrangements, income, type of region, functional capacity, and long-standing illness were also assessed.
Results Good self-rated health was associated with high levels of social participation and networks and trust and reciprocity, but social support did not remain statistically significant after adjustment for socio-demographic factors, long-standing illness, and functional capacity. The association between social support and psychological well-being was explained by the other two dimensions of social capital. The strong positive association between trust and psychological well-being persisted after controlling for all the other factors in our model.
Conclusions Our findings suggest that trust and reciprocity and social participation and networks contribute to good self-rated health and psychological well-being.

Keywords Individual-level social capital · Self-rated health · Psychological well-being · Socio-demographic factors

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Introduction

Social capital can be broadly defined as resources emerging from networks of trust (Bourdieu 1986; Kawachi and Kennedy 1997; Lin 1999; Paxton 1999; Putnam 2000). Social capital has received considerable attention in science and policy because research results suggest that it may have a positive impact on the well-being of individuals and nations.

There is currently no generally accepted instrument for measuring social capital. Measurements of social capital have varied in terms of its definition, context, and level (individual or collective). Social participation (Hyyppä and Mäki 2001; Lindström 2004) and trust and reciprocity (Zukewich and Norris 2005) have often been used as indicators of social capital. Social support is not an established measure of social capital as there are conflicting views on its role. According to some theories, social capital includes social support (Zukewich and Norris 2005) or is in fact the same concept as social support, albeit

renamed (McOrmond and Babb 2005).Other theories exclude social support from social capital (Lochner et al. 1999) or see it as a product of social capital (Portes 1998).

An increasing amount of literature has linked social capital to various health outcomes and well-being (Pevalin and Rose 2003; De Silva et al. 2005; Kim et al. 2008). It has been suggested that social capital and self-rated health have a positive association at both the individual and the collective level in terms of measures of civic participation, social participation and networks, interpersonal trust, reciprocity, and sense of security in the neighbourhood (Brehm and Rahn 1997; Onyx and Bullen 2000; Lindström 2004; Poortinga 2006a). Active social participation has been found to be associated with subjective health and psychological well-being independently of several conventional health-related confounding factors (Hyyppä and Mäki 2001; Pevalin and Rose 2003; Lindström 2004). Social capital may also be an important predictor of mortality (Dalgard and Håheim 1998; Sundquist et al. 2004; Hyyppä et al. 2007).

However, conflicting results have also been reported (Veenstra 2000; Kennelly et al. 2003). Veenstra used trust and social and civic participation as indicators of social capital. Only social participation was weakly related to health. Kennelly et al. compared the health in different countries using three measures of social capital (density of association membership; density of voluntary work; trust in people). They found very little evidence for the effect of social capital on population health.

Analysing the first nine annual waves of the British Household Panel Survey on adults, Pevalin and Rose (2003) found that a low level of neighbourhood attachment was associated with a high risk of mental illness (GHQ-12). The systematic review of De Silva et al. (2005) found an inverse association between individual-level cognitive social capital (feelings of trust and reciprocity) and mental disorders in seven out of eleven estimates in fourteen publications. The effect estimates came from studies with a combined sample size seven times greater than that of those showing no association. The results of Phongsavan et al. (2006) showed an inverse association between social capital (trust and safety; neighbourhood connections; reciprocity) and psychological distress (K10) in Australian adults. On the other hand, community participation was not connected to psychological distress. Most of the earlier studies have examined subpopulations in certain areas, and it is not necessarily possible to extrapolate the results to the general population. In studies on the association between social capital and health, analyses have also generally concentrated on either physical or mental health. Moreover, studies have seldom controlled for the medical and functional status of participants. Based on a systematic review of empirical studies on social capital and health, Kim et al. (2008) stated that these studies predominantly analysed single indicators of social capital.

In this paper, we study the associations between social capital and health in a large, nationally representative sample of adult Finns. Our data include a wide selection of indicators of social capital. We also follow the division of individual-level social capital in the cognitive and structural dimensions (Harpham et al. 2002; Almedom 2005; De Silva et al. 2005). In our study, the structural dimension emphasizes the behavioural manifestation of the concept, i.e. active social participation during leisure time, and the cognitive dimension is measured in terms of trust and reciprocity and social support. We measure social capital at the level of individuals, considering that an individual's investment in group activity reflects social capital seen as a resource connected with group membership, social networks and trust. Our aim is to find out which dimensions of individual-level social capital are related to self-rated health and psychological well-being.

Figure 1 presents the main associations between social capital and health as presumed in this study. Social capital may influence self-rated health and psychological well-being either by reducing the risk of diseases and functional limitations (a and b in Fig. 1) or by means of other mechanisms that are not specified in this study (c). However, in addition to acting as mediators, diseases and reduced functional capacity may also decrease social capital (e.g. long-standing illness and poor functional capacity may limit one's scope for social activities) and thus confound the association between social capital and our health outcomes. Based on previous literature, we presume that education (von dem Knesebeck et al. 2006), urbanization (Hodiamont et al. 2005) and living arrangements (Liu and Zhang 2004; Joutsenniemi et al. 2006) affect self-rated health and psychological well-being, with this effect being partly mediated by long-standing illnesses and functional capacity (d and e). In our previous study, we found that these socio-demographic factors were related to social

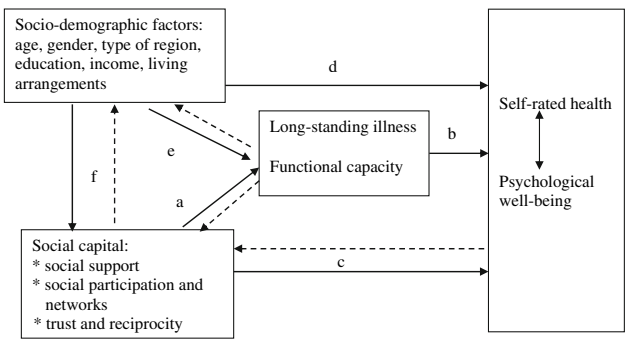

Fig. 1 Simplified model of main associations between social capital, socio-demographic variables, long-standing illness, functional capacity, self-rated health and psychological well-being

capital (f) and they might not only explain but also partly mediate the effect of social capital on health (Nieminen et al. 2008). In addition, socio-demographic factors may interact with social capital, that is, its connection with the outcome variables may vary between subgroups of the population.

Methods

Data

The study applied cross-sectional data from the national Health 2000 Examination Survey (Aromaa and Koskinen 2004; Heistaro 2008; http://www.terveys2000.fi), which was carried out from autumn 2000 to spring 2001. The two-stage cluster sample ($N = 8{,}028$) represents the Finnish adult population aged 30 or over (Laiho et al. 2008). The information used in our study was obtained in the Health 2000 Survey by means of an interview and two questionnaires. The response rates were, respectively, 87, 80 and 77%. Although the survey primarily focused on health, the data include a large number of variables that are often used in measuring various aspects of social capital in large population surveys (Iisakka 2006; Nieminen et al. 2008).

Outcome measures

We chose self-rated health and psychological well-being as our dependent variables because both of these are broad, often-used and approved indicators of different, albeit interrelated, aspects of health. Self-rated health has been considered to reflect the physical and functional aspects of health (Manderbacka 1998a), whereas psychological well-being is connected to mental health (Goldberg 1972). We included both of these variables to obtain a comprehensive view of health as a psychophysical entity.

Self-rated health was measured with the question: "Would you describe your current health status as good, rather good, average, rather poor or poor?" The response was transformed into a dichotomous variable with the two highest categories indicating good health.

As a measure of psychological health, we used the 12-item General Household Questionnaire (GHQ12). It contains items on general level of happiness, depression, anxiety, self-confidence and stress (Goldberg 1972). In this study, psychological well-being was measured with the reversed scale of the GHQ12, using 2/3 as the cut-off point, with 0–2 indicating psychological well-being (lack of psychological distress). The GHQ12 total score is a sum of 12 questions and ranges between 0 and 12. The GHQ12 total score was not calculated if fewer than ten questions had been answered. If one or two items were missing, the missing values were substituted by the average of the other items and the sum was rounded to the next integer. Cronbach's alpha for GHQ12 was 0.89.

Social capital

We measured social capital using several variables that constitute three dimensions. The development and characteristics of our measures of social capital have been described in detail in an earlier paper (Nieminen et al. 2008). A brief summary is presented here. We selected 36 separate variables that were assumed to reflect social capital, from the dataset on the basis of previous literature (Bygren et al. 1996; Kawachi et al. 1997; Onyx and Bullen 2000; Putnam 2000; Hyyppä et al. 2007).

On the basis of factor analysis, we distinguished three slightly correlated dimensions of social capital: social support (the belief that emotional support and practical help would be provided when needed), social participation and networks (social activities and meeting friends), and trust and reciprocity (trust in people, feeling of reciprocity, feeling safe in the neighbourhood). The reliability coefficients of the dimensions of social capital, as measured by regression factor scores from one-factor models, were 0.90 (social support), 0.75 (social participation and networks) and 0.82 (trust and reciprocity).

The dimension of social support was explored through four questions: having people whose help you can count on when feeling exhausted; people from whom you receive practical help when needed; people who can really make you feel better when you feel down; and people you think really care no matter what. Social support was seen as a sign of close networks and good social relationships.

The dimension of social participation and networks was covered by twenty questions about engagement in clubs and voluntary societies, cultural and sports attendance (visiting the theatre, the cinema, concerts, art exhibitions, sports events, etc.), congregational participation (church attendance or other congregational events), outdoor and productive activities (hiking, hunting, fishing, gardening, etc.), hobby activities (drama, singing, photography, painting, collecting, handicrafts, etc.), studying, and cultural interests (reading books, listening to recorded music), and the frequency of meeting friends and talking with them on the phone.

Twelve questions were asked about trust in people and reciprocity. For example, the respondents were asked for their views on the validity of statements such as "it is better not to trust anyone" and "most people would not want to go through the trouble of helping other people" as well as about their feelings of safety in their neighbourhood.

The correlation between social support and social participation and networks was 0.33, between social support

and trust and reciprocity 0.16 and between social participation and networks and trust and reciprocity 0.007. The respondents were classified into tertiles by the factor scores and grouped into high, medium and low social capital categories under each dimension (Nieminen et al. 2008).

Covariates

Other variables included in these analyses were age (classified into six groups), gender, education, living arrangements, income, type of region, long-standing illness and functional capacity. We classified education into three categories: basic (no matriculation examination and, at most, a vocational course or on-the-job training), intermediate (matriculation examination without vocational training, or completed vocational school) and higher education (degrees from higher vocational institutions, polytechnics and universities). Living arrangements were classified as married, cohabiting, living with persons other than a partner (e.g. with children, parents or siblings), and living alone, based on self-reported marital status and household composition.

Income was classified into quintiles according to monthly household income per consumption unit. Type of region describes the degree of urbanization and was classified into urban, semi-urban and rural municipalities. Respondents were asked about long-standing illness with the question: "Do you have any permanent or chronic illness or any defect, trouble or injury that reduces your working capacity or functional ability?" Long-standing illness was dichotomized as well as functional capacity (able to walk about half a kilometre without resting or either unable or found it difficult to walk this distance). The distributions of all variables are presented in Table 1 by gender and age group.

Statistical methods and analysis strategy

We applied logistic regression analysis in order to examine good self-rated health and psychological well-being through three dimensions of social capital (social support, social participation and networks, and trust and reciprocity) and other covariates (age, gender, education, income, living arrangements, type of region, long-standing illness and functional capacity).

We started the analysis by presenting the age and gender-adjusted associations between the outcome variable (SRH or GHQ) and each determinant separately (Model 0 in Tables 2, 3). We then added all the dimensions of social capital including age and gender simultaneously to the model (Model 1). In the next model, all socio-demographic and social capital variables were applied simultaneously (Model 2). Finally, we added functional capacity (Model 3) and long-standing illness (Model 4) to the model in order to assess their possible effect on the association between social capital and the outcome variables. Interactions between dimensions of social capital and socio-demographic factors (age, gender, education, income, living arrangements) and functional capacity and long-standing illness were also analysed to find out whether the associations between social capital and health are similar in different subgroups of the population. The data were analysed using SUDAAN, which takes into account the complex sampling design, that is, stratification, clustering and sampling weights (Research Triangle Institute 2001; Djerf et al. 2008).

Results

Social capital and self-rated health

All three dimensions of social capital were positively associated with self-rated health (SRH). There was a gradient between social capital and self-rated health: the higher the social capital, the better the self-rated health. High levels of trust and reciprocity (OR 2.35) and social participation and networks (2.22) were connected with good SRH more closely than social support (1.75) (Table 2). The association of SRH with social support was considerably attenuated after adjusting for the other dimensions of social capital (Model 1) and socioeconomic indicators (Model 2), and lost its statistical significance when functional capacity was also included in the model (Model 3). By contrast, high levels of social participation and networks, and trust and reciprocity had statistically significant associations with good self-rated health even after adjusting for all the other variables (Model 4).

All socio-demographic factors and long-standing illness and functional capacity were also associated with self-rated health (Model 0, age- and gender-adjusted), and except for living arrangements, these associations remained statistically significant when adjustments were made simultaneously for the dimensions of social capital (Model 2). After adjusting for all variables, young age, high education, high income and the absence of both long-standing illness and functional limitations were associated with good SRH (Model 4).

No statistically significant interactions (data not shown) were found between the dimensions of social capital and socio-demographic factors (age, gender, education, income, living arrangements) and long-standing illness. Social participation and networks interacted with functional capacity ($p < 0.05$). A high level of participation was related to good self-rated health irrespective of the level of functional capacity, but the association was stronger among those with functional limitations (OR 3.98) than among those without functional limitations (OR 1.89).

Table 1 Distribution of self-rated health, psychological well-being, dimensions of social capital, education, living arrangements, income, type of region, longstanding illness and functional capacity by gender and age group (%)

Variables	Men						Women					
	30–39	40–49	50–59	60–69	70–79	80+	30–39	40–49	50–59	60–69	70–79	80+
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100
n	794	843	791	480	311	104	760	827	793	547	473	265
Outcome variables												
SRH												
Poor	17	31	45	53	64	81	14	25	40	52	67	74
Good	83	69	55	47	36	19	86	75	60	48	33	26
GHQ												
Over 2 items	18	23	25	16	30	35	24	24	26	22	29	45
0–2 items	82	77	75	84	70	65	76	76	74	78	71	55
Dimensions of social capital												
Support												
Low	26	39	47	55	57	70	15	20	31	44	59	68
Medium	41	35	28	24	22	13	32	36	31	26	26	23
High	33	26	25	21	21	17	53	44	38	30	15	9
Social participation												
Low	32	40	44	49	51	68	17	21	24	25	31	61
Medium	39	35	33	27	32	18	33	37	34	31	36	22
High	29	25	23	24	17	14	50	42	42	44	33	17
Trust												
Low	21	27	33	34	34	28	33	39	41	36	35	38
Medium	37	33	31	29	27	28	37	33	34	34	32	30
High	42	40	36	37	39	44	30	28	25	30	33	32
Background variables												
Education												
Basic	12	31	43	60	74	74	10	25	42	65	74	81
Secondary	53	44	32	27	16	17	36	34	28	20	16	11
Higher	35	25	25	13	10	9	54	41	30	15	10	8
Living arrangements												
Married	47	63	68	73	69	58	57	64	61	59	35	18
Cohabited	23	12	10	4	4	2	20	12	10	3	1	0
Other, no partner	9	8	5	4	3	4	11	12	7	4	6	10
Alone	21	17	17	19	24	36	12	12	22	34	58	72
Income quintiles												
1 Lowest	13	14	15	19	36	38	15	12	15	25	46	59
2	21	19	11	18	24	23	22	22	12	17	12	5
3	13	17	15	31	26	24	17	18	21	33	28	25
4	29	25	23	18	9	9	31	25	24	16	11	7
5 Highest	24	25	36	14	5	6	15	23	28	9	3	4
Type of region												
Urban	65	58	62	53	50	49	68	63	64	63	58	58
Semi-urban	15	17	14	15	17	16	11	13	14	15	14	15
Rural	20	25	24	32	33	35	21	24	22	22	28	27
Functional capacity/walking												
Difficulties	1	2	7	13	27	59	1	2	5	14	34	71
No difficulties	99	98	93	87	73	41	99	98	95	86	66	29
Longstanding illness												
Yes	29	36	54	74	82	90	31	41	55	71	83	88
No	71	64	46	26	18	10	69	59	45	29	17	12

Data from 2000 to 2001 Finnish Health 2000 Health Examination Survey

Table 2 Odds ratios for good or quite good self-reported health according to dimensions of social capital, gender, age group, type of region, education, income, living arrangements, functional capacity, and long-standing illness

Variable	Model 0 age + sex + var[a] (OR)	Model 1 age + sex + soca[b] (OR)	Model 2 model 1 + socio-demogr.[c] (OR)	Model 3 model 2 + fc.[d] (OR)	Model 4 model 3 + LSI[e] (OR)	Confidence intervals (95%) for Model 4
Gender						
Male	1.00	1.00	1.00	1.00	1.00	
Female	1.19**	1.03	1.09	1.13	1.16	(1.00–1.35)
Age						
30–39	1.00	1.00	1.00	1.00	1.00	
40–49	0.48***	0.54***	0.57***	0.58***	0.60***	(0.49–0.75)
50–59	0.25***	0.28***	0.29***	0.31***	0.39***	(0.31–0.48)
60–69	0.17***	0.20***	0.26***	0.29***	0.45***	(0.35–0.58)
70–79	0.10***	0.12***	0.17***	0.22***	0.35***	(0.26–0.47)
80–	0.06***	0.10***	0.15***	0.29***	0.47***	(0.32–0.68)
Social support						
Low	1.00	1.00	1.00	1.00	1.00	
Medium	1.44***	1.30**	1.18*	1.17	1.15	(0.97–1.37)
High	1.75***	1.40***	1.21*	1.19	1.20	(0.99–1.46)
Social participation and networks						
Low	1.00	1.00	1.00	1.00	1.00	
Medium	1.61***	1.51***	1.41***	1.34**	1.32**	(1.09–1.60)
High	2.22***	2.00***	1.79***	1.65***	1.68***	(1.41–2.01)
Trust and reciprocity						
Low	1.00	1.00	1.00	1.00	1.00	
Medium	1.42***	1.35***	1.28**	1.25**	1.17	(0.99–1.38)
High	2.35***	2.17***	2.07***	2.07***	1.81***	(1.51–2.18)
Type of region						
Urban	1.00		1.00	1.00	1.00	
Semi-urban	0.92		0.99	1.01	1.03	(0.79–1.32)
Rural	0.77***		0.84*	0.87	0.88	(0.76–1.02)
Education						
Basic	1.00		1.00	1.00	1.00	
Secondary	1.59***		1.33**	1.30**	1.32**	(1.11–1.56)
Higher	2.60***		1.63***	1.59***	1.55***	(1.27–1.89)
Income						
1 Lowest quintile	1.00		1.00	1.00	1.00	
2	1.38***		1.16	1.15	1.13	(0.92–1.39)
3	1.53***		1.17	1.14	1.12	(0.93–1.36)
4	2.26***		1.69***	1.61***	1.42**	(1.12–1.80)
5 Highest quintile	3.05***		1.87***	1.75***	1.48**	(1.15–1.92)
Living arrangements						
Married	1.00		1.00	1.00	1.00	
Cohabiting	0.95		1.04	1.07	1.01	(0.79–1.29)
Living with others	0.69***		0.92	0.97	0.94	(0.73–1.22)
Alone	0.81**		0.92	0.98	0.99	(0.82–1.19)
Functional capacity						
Difficulties	1.00			1.00	1.00	
No difficulties	7.07***			5.83***	3.96***	(2.91–5.40)

Table 2 continued

Variable	Model 0 age + sex + var[a] (OR)	Model 1 age + sex + soca[b] (OR)	Model 2 model 1 + socio-demogr.[c] (OR)	Model 3 model 2 + fc.[d] (OR)	Model 4 model 3 + LSI[e] (OR)	Confidence intervals (95%) for Model 4
Longstanding illness						
Yes	1.00				1.00	
No	5.53***				4.55***	(3.91–5.30)

Data from 2000 to 2001 Finnish Health 2000 Health Examination Survey

var variable, *soca* social capital, *socio-demogr.* socio-demographic factor, *fc* functional capacity, *LSI* longstanding illness, *OR* odds ratios

*** $p<0.001$, ** $p<0.01$, * $p < 0.05$ (χ^2 test)

[a] Model 0 includes one indicator at a time, adjusting for age and sex

[b] Model 1 includes all dimensions of social capital simultaneously, adjusting for age and sex

[c] Model 2 includes age, sex, all the dimensions of social capital, type of region, education, income and living arrangements simultaneously

[d] Model 3 includes the variables of Model 2 and functional capacity simultaneously

[e] Model 4 includes all the indicators simultaneously

Social capital and psychological well-being

Social capital had a statistically significant positive association with psychological well-being (Table 3). The association between a high level of trust and psychological well-being was particularly strong (OR 4.20) compared with the corresponding association between psychological well-being and high levels of social support (OR 1.42) and social participation and networks (OR 1.49) (Model 0). When all the dimensions of social capital were added simultaneously in Model 1, the association between psychological well-being and social support was attenuated greatly and was no longer significant. However, for social participation and networks the association remained statistically significant even after adjusting for socio-demographic factors; this was also the case for trust and reciprocity (Model 2). The association between trust and reciprocity and psychological well-being was very strong (OR 3.67) even after all the other factors were taken into account (Model 4), and the corresponding association between social participation and networks and psychological well-being was also statistically significant, albeit much weaker (OR 1.30).

Looking at the age- and gender-adjusted covariates one at a time, younger age, male gender, high income, living with a partner, and the absence of both functional limitations and long-standing illness increased the odds for psychological well-being before adjustment for the other variables (Model 0). When the dimensions of social capital were added to the model (Model 2), living arrangements lost their statistical significance. When all the factors were adjusted for, no major changes occurred (Model 4).

Most of the interactions (data not shown) between the dimensions of social capital and socio-demographic factors were not statistically significant. However, there were statistically significant ($p < 0.05$) interactions between social participation and living arrangements, between social participation and education, and between trust and education. Active social participation and networks had a particularly strong connection with psychological well-being among persons living alone. On the other hand, those living alone who did not participate socially were in the worst position. The lower the educational level, the stronger the association between high levels of trust and reciprocity and social participation and networks. Functional capacity and long-standing illness did not interact with social capital.

Discussion

We hypothesized that high levels of social capital are associated with good self-rated health and psychological well-being independently and/or through the lack of both long-standing illness and functional limitations. Our results show a clear association between health indicators and social participation and networks, and especially trust and reciprocity. This association was only slightly attenuated by adding long-standing illness and functional capacity to the explanatory model. This suggests that these factors do not act as important mediators between social capital and our two health outcomes.

In all age groups, persons with higher levels of social participation and networks and trust and reciprocity reported better health than those with lower levels of social capital. Even after adjustment for other factors assumed to be strong determinants of self-rated health and psychological well-being, e.g. education, long-standing illness and functional limitations, social capital had a clear association with both health indicators. Regardless of whether they suffered from a long-standing illness or limitations in functional capacity, people felt physically and psychologically healthier if they

Table 3 Odds ratios for psychological well-being (GHQ12<3) according to dimensions of social capital, gender, age group, type of region, education, income, living arrangements, functional capacity, and long-standing illness

Variable	Model 0 age + sex + var[a] (OR)	Model 1 age + sex + soca[b] (OR)	Model 2 model 1 + socio-demogr.[c] (OR)	Model 3 model 2+ fc.[d] (OR)	Model 4 model 3+ LSI[e] (OR)	Confidence intervals (95%) for Model 4
Gender						
Male	1.00	1.00	1.00	1.00	1.00	
Female	0.84**	0.82**	0.83*	0.85*	0.85*	(0.73–0.99)
Age						
30–39	1.00	1.00	1.00	1.00	1.00	
40–49	0.87	1.04	1.03	1.03	1.07	(0.88–1.32)
50–59	0.79**	0.92	0.87	0.90	1.02	(0.83–1.25)
60–69	1.12	1.34*	1.29	1.38*	1.69***	(1.28–2.24)
70–79	0.66**	0.82	0.83	0.99	1.22	(0.89–1.68)
80–	0.39***	0.41***	0.44***	0.64*	0.79	(0.55–1.14)
Social support						
Low	1.00	1.00	1.00	1.00	1.00	
Medium	1.16*	1.05	1.03	1.03	1.01	(0.86–1.20)
High	1.42***	1.20	1.16	1.15	1.15	(0.94–1.40)
Social participation and networks						
Low	1.00	1.00	1.00	1.00	1.00	
Medium	1.38***	1.22*	1.23*	1.19*	1.18	(0.99–1.40)
High	1.49***	1.32**	1.38***	1.31**	1.30**	(1.09–1.53)
Trust and reciprocity						
Low	1.00	1.00	1.00	1.00	1.00	
Medium	2.14***	2.02***	2.02***	2.02***	1.98***	(1.69–2.32)
High	4.20***	3.90***	3.87***	3.85***	3.67***	(3.09–4.36)
Type of region						
Urban	1.00		1.00	1.00	1.00	
Semi-urban	1.16		1.01	1.03	1.03	(0.86–1.24)
Rural	1.04		1.00	1.03	1.04	(0.90–1.20)
Education						
Basic	1.00		1.00	1.00	1.00	
Secondary	1.08		0.95	0.93	0.92	(0.77–1.19)
Higher	1.10		0.78**	0.76**	0.74**	(0.61–0.89)
Income						
1 Lowest quintile	1.00		1.00	1.00	1.00	
2	1.20		1.04	1.04	1.02	(0.81–1.30)
3	1.43***		1.38**	1.35**	1.35**	(1.11–1.64)
4	1.72***		1.58***	1.53***	1.45***	(1.20–1.76)
5 Highest quintile	1.58***		1.32*	1.27*	1.18	(0.94–1.48)
Living arrangements						
Married	1.00		1.00	1.00	1.00	
Cohabiting	1.01		1.15	1.17	1.15	(0.91–1.45)
Living with others	0.72**		0.87	0.90	0.90	(0.69–1.18)
Alone	0.80**		0.88	0.91	0.92	(0.76–1.12)
Functional capacity						
Difficulties	1.00			1.00	1.00	
No difficulties	2.78***			2.20***	1.92***	(1.48–2.48)

Table 3 continued

Variable	Model 0 age + sex + var[a] (OR)	Model 1 age + sex + soca[b] (OR)	Model 2 model 1 + socio-demogr.[c] (OR)	Model 3 model 2+ fc.[d] (OR)	Model 4 model 3+ LSI[e] (OR)	Confidence intervals (95%) for Model 4
Longstanding illness						
Yes	1.00				1.00	
No	2.06***				1.79***	(1.53–2.09)

Data from 2000 to 2001 Finnish Health 2000 Health Examination Survey

var variable, *soca* social capital, *socio-demogr.* socio-demographic factor, *fc* functional capacity, *LSI* longstanding illness, *OR* odds ratios

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (χ^2 test)

[a] Model 0 includes one indicator at a time, adjusting for age and sex

[b] Model 1 includes all dimensions of social capital simultaneously, adjusting for age and sex

[c] Model 2 includes age, sex, all the dimensions of social capital, type of region, education, income and living arrangements simultaneously

[d] Model 3 includes the variables of Model 2 and functional capacity simultaneously

[e] Model 4 includes all the indicators simultaneously

had high levels of social capital—measured by social participation and networks as well as trust and reciprocity—compared with those with low levels of social capital. Earlier research has suggested similar results between trust and health and also between social participation and health (Onyx and Bullen 2000; Lindström 2004; Poortinga 2006b). On the other hand, some other indicators (e.g. civic participation) have had an inverse association with health (Phongsavan et al. 2006). Eller et al. (2008) found that social networks were associated with good SRH in type 2 diabetic patients, but not in non-diabetes group. They see social networks as providing a 'buffer effect' and suggest that those who are exposed to a high level of burden might benefit most from it.

Social support was not associated with either health indicator after controlling for the other explanatory factors. Social support and partnership were not as significant for health after adjustment for the other dimensions of individual-level social capital as previous literature might have led us to believe. Several earlier studies have presented results on the contribution of social support to health (Cobb 1976; Callaghan and Morrissey 1993) and psychological well-being (Leavy 1983). Our results suggest, however, that the connection between social support and health is much weaker than the connection between health and social participation and networks and trust and reciprocity. In our analysis, the positive associations between social support and SRH nearly disappeared when the other dimensions of social capital and socioeconomic position were included in the model.

The positive association between social support and psychological well-being was not very strong even in the age-adjusted model, and it was no longer statistically significant after adjusting for trust and reciprocity and social participation and networks. Earlier studies on the association between social support and health have generally not included other dimensions of social capital in their analyses.

Dalgard and Håheim (1998) have reported corresponding results on mortality: high levels of social participation predicted survival better than a high level of social support. According to them, social support is mainly provided by others during stressful life situations, while social participation is more related to control over your own life, including the feeling of being able to influence group decisions. On that basis, it might be that your own investment in social capital is more important for your health than support from other people. This self-activation or life control is known as empowerment and has been discussed in the literature on social capital.

Several studies have shown that married people feel healthier than people in other living arrangements (Macintyre 1992; Joutsenniemi et al. 2006). Our results suggest that a spouse per se is not the key to health while social contacts are. If people living alone actively participate in social occasions and trust other people, they feel as healthy as married people. This finding suggests that social capital may be a more important determinant of self-rated health and psychological well-being than living arrangements.

Strengths and limitations

Self-reported health is one of the most commonly used measures of perceived physical health. It has been found to be a reliable indicator of overall health and predictor of mortality. It is also one of the indicators for health monitoring recommended by the European Union Commission and the WHO (Mackenbach et al. 1994; Manderbacka 1998b). Mackenbach et al. (1994) have shown that a number of socio-demographic variables have largely

similar but mirrored patterns of association with excellent health and ill health. The 12-item GHQ is widely used as a measure of psychological distress and for screening psychological disorders. It was originally designed as a self-administered questionnaire that could be used to detect psychiatric disorders in the general population (Goldberg 1972). It has since become established as a reliable measure of psychological distress (Pevalin 2000).

Thus far, we have not included health habits in our analyses. However, limited support has been found for the hypothesis that health habits do not have a significant role in the relationship between social capital and health (Hyyppä and Mäki 2001; Poortinga 2006c).

As this and most of the earlier studies on social capital and health have been based on cross-sectional data, the causal relationship between these factors has remained unclear. However, as controlling for functional limitations and long-standing illness did not remove the association between social participation and self-rated health, we suggest that it is more likely that the causal path goes from social participation to health rather than vice versa. Some recent results also suggest a causal path from social capital to health (Rostila 2006; Sirven 2006), and some longitudinal prospective surveys suggest that individual-level social capital predicts survival (Sundquist et al. 2004; Hyyppä et al. 2007). In these papers social capital was measured with participation, social contacts and interpersonal trust. Thus, we also propose that our similar dimensions of social capital influences health.

As far as we know, results concerning causality between social capital and mental health are scarce. There is some evidence to suggest a causal path from support to mental health, but at the same time, it is probable that one's mental health status and personality characteristics affect the availability and experience of social support (Turner and Turner 1999). Results concerning the causal paths of the other measures of social capital have been contradictory (Pevalin and Rose 2003; De Silva et al. 2007). However, Putnam (2000) has suggested that social capital grows in childhood and remains fairly constant thereafter. As our results concern adults whose social capital has already developed, they can be interpreted as giving some support to the conclusion that social capital is a determinant of psychological well-being.

The advantages of this study were that it drew on a large, nationally representative population-based data with several suitable variables indicating social capital and thus provided the opportunity to examine different dimensions of social capital. Our results support the previous results demonstrating associations between health and social capital measured with trust and participation at the contextual (Kawachi et al. 1999) and individual level (Poortinga 2006a) and among subpopulations (Nummela et al. 2009). Trust represents cognitive and participation structural social capital. However, in interpreting the results concerning social capital, one should keep in mind that the measures of social capital vary from one study to another. The measures of individual social capital have varied from single questions to indexes and dimensions (e.g. Bolin et al. 2003; Onyx and Bullen 2000). Furthermore, the dimensions of social capital in different studies vary in terms of content and quantity, which makes it challenging to compare the results. In the present study, we used measures of social capital that have been validated for large population surveys (Iisakka 2006; Nieminen et al. 2008). As these findings stem from a population-based survey, it is possible to extrapolate them to the general population.

Implications

This study suggests that both high levels of social participation and networks and trust and reciprocity are greater contributors to good health and psychological well-being than social support. The positive effects of these two factors remain greater than social support, even when the person in question has limited functional capacity and health problems. Furthermore, people living alone feel healthy if they participate socially. Judging by this, intervention studies should be carried out to assess the impact of providing social contacts to those who are unable or even unwilling to take the initiative themselves. This should also be kept in mind in the case of elderly people suffering from social deprivation.

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