



Social determinants of health – A question of social or economic capital? Interaction effects of socioeconomic factors on health outcomes

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ABSTRACT

Social structures and socioeconomic patterns are the major determinants of population health. However, very few previous studies have simultaneously analysed the “social” and the “economic” indicators when addressing social determinants of health. We focus on the relevance of economic and social capital as health determinants by analysing various indicators. The aim of this paper was to analyse independent associations, and interactions, of lack of economic capital (economic hardships) and social capital (social participation, interpersonal and political/institutional trust) on various health outcomes. Data was derived from the 2009 Swedish National Survey of Public Health, based on a randomly selected representative sample of 23,153 men and 28,261 women aged 16–84 year, with a participation rate of 53.8%. Economic hardships were measured by a combined economic hardships measure including low household income, inability to meet expenses and lacking cash reserves. Social capital was measured by social participation, interpersonal (horizontal) trust and political (vertical/institutional trust) trust in parliament. Health outcomes included; (i) self-rated health, (i) psychological distress (GHQ-12) and (iii) musculoskeletal disorders. Results from multivariate logistic regression show that both measures of economic capital and low social capital were significantly associated with poor health status, with only a few exceptions. Significant interactive effects measured as synergy index were observed between economic hardships and all various types of social capital. The synergy indices ranged from 1.4 to 2.3. The present study adds to the evidence that both economic hardships and social capital contribute to a range of different health outcomes. Furthermore, when combined they potentiate the risk of poor health.

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Introduction

Today, there is ample evidence of associations between levels of economic capital (e.g. low income and self-reported financial stress) and various health outcomes (Laaksonen et al., 2007; Lorant, Croux et al., 2007; Lynch, Kaplan, & Shema, 1997; Weich & Lewis, 1998; Wildman, 2003; Zimmerman & Katon, 2005), and also of the association between individual level social capital (e.g., civic engagement, interpersonal and institutional trust) and diverse health behaviours and health outcomes (Hyyppa, Maki, Impivaara, & Aromaa, 2007; Kawachi, Kennedy, & Glass, 1999; Subramanian, Kim, & Kawachi, 2002; Veenstra, 2002). However, very few previous studies have simultaneously analysed associations of both

social and economic capital in relation to health at the individual level. While most previous studies including both social capital and economic capital indicators have investigated one of the variables as predictor variable including the other as control variable, few others have investigated the importance of both in relation to health. Carlson (2004) has found both economic (economic satisfaction) and social factors (social capital; organisational activity and trust) to be important in explaining health differences (self-rated health) between countries in central and Eastern Europe, the former Soviet Union and Western countries. Carlson concluded that economic factors seemed to be most important in relation to area differences in self-rated health.

Rose (2000) has analysed the importance of household income and social capital (networks, friends, life control, and trust) in Russia, and found both aspects to be equally important and independent of each other with respect to physical and emotional health. Stuckler and colleagues have also linked rapid privatisation,

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social capital and health outcomes in Eastern Europe (e.g., Stuckler, King, & McKee, 2009).

Stafford, De Silva, Stansfeld, and Marmot (2008) have found associations between neighbourhood social capital (trust, reciprocity and associational membership) and common mental disorders (GHQ-12) in the subgroup living in deprived circumstances in England and Scotland. Finally, a recent study by Sun, Rehnberg, and Meng (2009) has found an association between poverty (minimum living allowance) and low individual level social capital (a five dimensional measure) in rural China. The researchers also found a synergy effect between lack of social capital (neighbourhood social cohesion) and poverty, indicating an aggravating effect on health (self-rated health) of the two.

Hence, among the scarce evidence so far, most studies have found independent associations between both the 'social' and the 'economic' capital variables and health. However, it is also possible, as previously investigated by Sun et al. (2009) in China, that there might be interactive effects between lack of social capital and economic hardships on health outcomes. It is thus most possible that social capital generates material outcomes and vice versa, and that a combination contributes to a double burden on health.

There are several plausible pathways by which a combination of economic and social capital exposures may result in a higher risk of poor health. Lack of economic or financial resources may restrain the individual's choice of social activities, membership in organizations and contact surfaces, i.e. lack of economic resources may result in lower social capital. Unemployed people for instance report lower social capital than people employed or self-employed (Lindström, 2000). Second, low social capital with poorer social networks and lower trust may contribute to lower economic resources as a result of minimised job opportunities, thus low social capital may lead to economic hardships (Granovetter, 1974). Third, a lack of economic and social capital might also affect health directly through psychobiological pathways. These may be caused by high stress levels due to financial difficulties and feelings of mistrust caused by social isolation. Fourth, lack of economic and social capital might also affect health indirectly via social support mechanisms. For example, lack of economic and social capital might contribute to less inclination to participate in society and to benefit from support mechanisms provided by society. A lack of both social and economic capital can thus be considered as a lack of capabilities in several areas or dimensions, which severely constrains life (Sen, 1992, 1999) and contributes to poor health outcomes.

A framework for studying economic and social capital as health determinants

Lack of economic capital, is in this study considered as a multi-dimensional phenomenon. According to Sen's (Sen, 1992, 1999) capability approach, poverty is a complex, multifaceted concept dependent on each person's own personal characteristics and other social circumstances. Economic capital is also conceptualised in the light of Ringen (1988), who noticed that income and consumption are not always related and therefore suggested that a household should only be classified as deprived if it has both a low income and other symptoms of poverty. In our study economic hardships are measured by three indicators, capturing different dimensions of economic vulnerability (both income and non-income related), combined into one single economic hardships measure.

Social capital is examined at the individual level "comprising social resources that evolve in accessible social networks and social structures characterized by mutual trust" (Rostila, 2010, p.14). These social resources can facilitate access to various instrumental and expressive returns, which might benefit both the individual and the collective (Rostila, 2010). These resources do not reside within the

individual (i.e., intrapersonal resources) but in the structure of his/her social networks, and to gain access to social capital an individual must be related to others. Thus, social capital in this view is always relational and inherent in the social structure (Rostila, 2010). Social capital is also conceptualised as the cognitive and structural dimensions that constitute the preconditions for social capital (e.g. Harpham, Grant, & Thomas, 2002; Rostila, 2010).

In our study, the structural dimension highlights the "social" side of the concept and the behavioural manifestation of social networks, i.e. social participation. The cognitive dimension highlights the social trust that emerges in social relations and is measured by horizontal (interpersonal) and vertical (political/institutional) aspects of trust.

A wide range of health outcomes is selected in order to get a deeper understanding of the effects of socioeconomic determinants on broad measures of health. Self-rated health measures a combination of different aspects of health and has proved to be a robust and reliable measure of a person's overall health status and a strong predictor of mortality (Burstrom & Fredlund, 2001; Ferraro, Farmer, & Wybraniec, 1997; Idler & Benyamini, 1997; Lundberg & Manderbacka, 1996).

A vast literature has shown an association between psychological distress and adverse health outcomes such as CHD (cardiovascular diseases) (Eaker, Sullivan, Kelly-Hayes, D'Agostino, & Benjamin, 2005; Kawachi, Sparrow, Vokonas, & Weiss, 1994; Kubzansky, Kawachi, Weiss, & Sparrow, 1998), and also subsequent risks of suicide attempt, psychiatric disease, hospital care and all-cause mortality (Eaton, Badawi, & Melton, 1995; Fogel, Eaton, & Ford, 2006; Ringback Weitoft & Rosen, 2005).

In Sweden, musculoskeletal disorders are the most reported causes of poor health, and the leading causes of work absence, long-term work disability and early retirement, especially among women (Persson, 2001). In addition, some musculoskeletal disorders have been associated with inflammatory process that increases the risk for CHD (Maradit-Kremers, Nicola, Crowson, Ballman, & Gabriel, 2005; Solomon et al., 2003) and contribute substantially to the burden of disease (Moradi, Allebeck, Jacobsson, & Mathers, 2006).

We expect positive associations between economic hardships and aspects of social capital, respectively, and poor health on all three outcomes. We also hypothesise positive interactions between economic hardships and social capital in relation to each of the three health outcomes. In this study we therefore aim to investigate independent associations of lack of economic capital (economic hardships) and social capital (social participation, interpersonal and political/institutional trust) on various health outcomes (self-rated health, psychological distress and musculoskeletal disorders). Furthermore, we aim to investigate whether our social capital variables interact with economic hardships to increase the odds of health problems. The paradox that men have higher mortality but lower prevalence of both mental and somatic chronic health problems is the reason for stratification by sex in this study. Thus, we also attempt to investigate if the health effects differ by gender.

Methods

Study population

The Swedish National Public Health Survey 2009 was used. The survey is carried out by Statistics Sweden, in collaboration with a number of health care regions and districts in Sweden, coordinated by the Swedish National Institute of Public Health. It was sent out to a randomly selected representative sample of the Swedish population combined with a randomly selected supplementary sample from a number of county councils and municipalities (aged 18–64 years) each year since 2004. The total study population

comprised 10,373 individuals combined with a randomly selected supplementary sample from four county councils (Halland, Jönköping, Östergötland and Kronoberg) and three municipalities (Gotland, Göteborg and Jönköping) including a total of 51,414 individuals (23,153 men and 28,261 women) aged 16–84 years who participated in the 2009 survey.

Data collection

The data was collected through a self-administered postal survey sent to the respondent's home address in the spring of 2009 (March–June). Respondents could choose either to complete the postal questionnaire or to log on to a website and complete a web-based questionnaire. Participants were informed about data linkage on income, educational level, marital status and family characteristics with registry data from Statistics Sweden. The response rate was 53.8%. Data were anonymized and controlled for errors, inconsistencies and internally missing data (Lundström & Särndal, 2001).

The study was approved by the Department of Data Inspection, the Research Ethical Committee at the Swedish National Board of Health and Welfare (20031208) and the Stockholm Regional Ethics Committee (DNR 2005/1146-3; 2010/1576-32).

Assessment of variables

Outcome variables

- (i) *Self-rated health* is a robust and reliable measure of individual's overall health status (Ferraro et al., 1997; Lundberg & Manderbacka, 1996) and a strong predictor of mortality (Burstrom & Fredlund, 2001; Idler & Benyamini, 1997). The question reads; "How do you assess your general health?" with five response alternatives (very good, good, fair, bad, very bad), and the cut-off point was set between the top two and the bottom three alternatives.
- (ii) *Psychological distress* was measured by the 12-item version of the General Health Questionnaire (GHQ-12) (Goldberg & Williams, 1988). The General Health Questionnaire is a widely used measure of minor psychiatric morbidity that are recent, general and non-psychotic (Goldberg et al., 1997) and also predicts more severe mental disorders (Makowska, Merez, Moscicka, & Kolasa, 2002). The GHQ-12 is based on the respondents' assessment of their present state relative to their usual, or normal, state (Goldberg & Williams, 1988). The 12-item version has been validated in a variety of settings (Gureje & Obikoya, 1990; Jacob, Bhugra, & Mann, 1997; Pan & Goldberg, 1990; Pevalin, 2000) and the validity is unlikely to be affected by the language of the questionnaire (Goldberg et al., 1997). The items included in the GHQ-12 are listed in Appendix 1. [INSERT LINK TO ONLINE FILES] The first eight items had four alternative answers: "More/better than usually", "As usual", "Less than usual" and "Much less than usual" and were dichotomised into two alternatives denoting "good" psychological health and two alternatives denoting "bad" psychological health. The four latter items had somewhat different alternative answers. The four alternative answers to these four items were; "Not at all", "Not more than usually", "More than usually", and "Much more than usually". The first two of these answers were categorised as psychological distress and the two remaining as no psychological distress. The GHQ-12 gives a total score ranging from 0 to 12. A commonly used cut-off point of three or more symptoms was used in this study to indicate psychological distress (Goldberg & Williams, 1988).

- (iii) Some musculoskeletal disorders have been associated with inflammatory process that increases the risk for CHD (Maradit-Kremers et al., 2005; Solomon et al., 2003) and contributes substantially to the burden of disease (Moradi et al., 2006). Musculoskeletal disorders were measured based on a combination of three questions measuring different symptoms of musculoskeletal disorders. Questions were; (i) "Do you suffer from pain in the shoulders or neck"? (ii) "Do you suffer from back pain, backache, hip pains or ischias"? (iii) "Do you suffer from aches or pains in hands, elbows, legs or knees"? The three alternative answers were "No", "Yes, mild" and "Yes, severe". The two latter categories were categorised as musculoskeletal disorders.

Main determinants

Economic capital -economic hardships

Following the example of Ringen (1988), we consider both income and other indicators denoting financial difficulties in our measure of economic hardships. Thus, three variables were used to define economic hardships; (i) low household income (ii) inability to meet expenses and (iii) lack of cash reserves. The first variable, low household income, was based on information on disposable annual household income (equivalised on number of adults and children in the household) in the tax register office the year previous to the study. Household income was categorised as low based on the lowest 20% of the total distribution household income of study participants (less or equal to 182,046 SEK/year). Household income has previously been recommended to be a good indicator of wealth showing clear associations with health outcomes (Der, Macintyre, Ford, Hunt, & West, 1999; Fritzell, Nermo, & Lundberg, 2004).

The two latter indicators of economic hardships were based on two self-reported questions; (i) inability to meet expenses (difficulties in managing current expenditure for food, rent, bills, etc. during the past 12 months) and (ii) lacking cash reserves (not being able to get hold of 15,000 SEK within a week if needed). These two questions have been previously used in Swedish studies to measure subjective economic hardships, and have shown clear associations with health outcomes (Fritzell & Burstrom, 2006; Persson, 2001).

The average inter-item correlation between the three economic hardships measures was low, with a standardised Chronbachs alpha coefficient of 0.48. However, we are foremost interested in the combined economic hardships measure as a combination of three separate economic hardships indicators each capturing separate dimensions of the multifaceted construct of economic hardships, and not as an index in statistical terms. Thus, we constructed an index that captures the vulnerabilities from these socioeconomic factors, given the social context of the Swedish welfare state. The three economic hardships factors were recorded in a binary way and summed up, resulting in sums of zero to three. Economic hardships were categorized present if the sum was equal to zero or one and not present if the sum to two or three.

Social capital

Social capital was measured by social participation (structural) and two measures of trust, interpersonal and institutional/political trust (cognitive). These are all self-reported variables, and both interpersonal trust and social participation are commonly used as empirical indicators of social capital (Macinko & Starfield, 2001).

Social participation describes how actively the person takes part in the activities of formal and informal groups and in other activities in society and was assessed by the question; "Have you taken part in any of the following activities during the past 12 months?" (study circle/course at your workplace, study circle/course in free

time, trade/professional union meeting, other association meeting, theatre/cinema, art exhibition, religious meeting, sports event, writing letters to the press, demonstration of any kind, public place of entertainment, e.g. night club, dance or similar, largish family meeting, private party in somebody's home). Those who answered positively to one or more of these 13 activities were judged to participate and those who did not participate at all were judged as not. This question has been used in previous studies in Sweden (Lindstrom, 2004) with a high reported validity (Hanson, Ostergren, Elmstahl, Isacson, & Ranstam, 1997). In the present study we chose a cut of less than two activities as low social participation because this cut-off resulted in a prevalence of low participation at 20% and because just one activity seems to constitute a rather small contact surface.

Interpersonal (horizontal) trust measures the cognitive dimension and the horizontal aspect of trust and reflects the person's perception of trust in other people, and has been used in previous studies, e.g. in the US (Kawachi et al., 1999) and Sweden (Lindstrom, 2004). Low interpersonal trust was recorded present if the respondents gave a "no" answer to the question "Do you think that other people can be trusted in general?"

Political trust (an indicator of the cognitive dimension and the institutional/vertical aspect of trust) reflects the person's perception of trust in the Swedish national parliament (Riksdag). This item is not a commonly used indicator in the social capital-health literature but has previously been used to measure political trust in Sweden (Rothstein, 2005), and other countries (Inglehart, Basáñez, & Menéndez Moreno, 1998). The question reads "How much trust do you have in the Riksdag?" Response options were; "Very high", "Fairly high", "Low", "No trust at all" and "No opinion". It was dichotomised with the two first alternatives depicting high political trust and the two latter as low trust. As more than 20% of the women and more than 10% of the men answered "No opinion" the results for this answer were presented separately in the analysis.

Explanatory variables

Age, country of birth, educational level, employment status, family status, and long-term illness were adjusted for in the analyses as confounding factors.

Age was categorized into 4 age groups: 16–29, 30–44, 45–64 and 65–84 years.

Country of birth was categorized as (i) Sweden, (ii) other OECD countries (other Nordic countries, Europe) and (iii) other countries (Africa, Asia, Latin America, Middle East).

Educational attainment was categorized into three levels (based on the highest examination level passed); (i) low (nine years compulsory school or less), (ii) intermediate (upper secondary school or less), and (iii) high (university/college level).

Occupational status was categorised as (i) manual workers, (ii) lower non-manual workers, (iii) non-manual workers, (iv) farmers and self-employed and (v) unclassified occupational status (e.g., students).

Employment status was categorized as (i) employed, (ii) other economically inactive (e.g., students, sick-leave absence or maternity leave), and (iii) unemployed.

Family status was based on four categories; living alone without children, living alone with children, cohabiting without children or cohabiting with children in a household.

Long-term illness is reported to be a confounding factor for mental illness (Nash & McDermott, 2011), we have therefore adjusted for long-term illness in the multivariate analyses. Long-term illness was based on the "yes" or "no" answer question; "Are you suffering from any long-term illness, after effects from accident or other ailment?" Respondents who answered "yes" were regarded as suffering from long-term illness.

Statistical methods

Data analyses

Analyses were performed using SAS, version 9.1.3. Prevalences (%) of social capital, economic hardships and demographic, other socioeconomic and health variables were calculated (Table 1). We conducted three multiple logistic regression analyses to estimate the association between social capital, economic hardships and health outcomes (Table 2a and b).

In the first model we adjusted for age and in the second model we further adjusted for age, country of birth, educational level, employment status, occupational status, family status and long-term illness. In these two models, the three social capital variables and economic hardships were entered separately. In the final model, we adjusted for variables as in model 2 and included social capital variables and economic hardships, in order to analyse their independent effects. In the logistic regression analysis, we used the regression coefficients (standard errors) to obtain OR (95% CI).

Finally, we quantified a possible interaction of effects between each of the social capital variables and economic hardships on health problems by calculating the Synergy Index (SI) using a SAS program developed by Lundberg, Fredlund, Hallqvist, and Diderichsen (1996). Calculation of SI has been recommended while studying interactions in social epidemiology (Hallqvist, Ahlbom, Diderichsen, & Reuterwall, 1996; Rothman, 1986). We assessed the interactions on the basis of departures from additive rates or risks. If the value for synergy exceeds 1.0 we have synergy and we will be able to detect the existence of a co-operative effect. The use of SI allowed studying interaction based on odds ratios from logistic models (Hosmer & Lemeshow, 1992; Skrondal, 2003) (Table 3a and b). All analyses were stratified for gender.

The reasons for stratifying by sex concern both the prevalence of institutional trust, economic hardships and health problems. Women seem to have poorer self-reported health, poorer self-rated mental health and more self-reported problems concerning musculoskeletal disorders than men. Women are also on sick leave for mental health reasons to a higher extent than men (Socialstyrelsen, 2005). Trust of women also differs from trust of men (Ahnquist, Lindstrom, & Wamala, 2008; Inglehart & Norris, 2003). Women generally report higher prevalences of economic hardships (Ahnquist, Fredlund, & Wamala, 2007). As mentioned earlier, the well-known paradox that men have higher mortality but lower prevalence of both mental and somatic chronic health problems is an additional reason for stratification by sex in this study.

Results

The characteristics of the sample population are summarised in Table 1. The proportion of women experiencing economic hardships was 17% compared to 12% for the men. Approximately one fourth of the respondents among both women and men (24%) reported low participation, while approximately one fifth of women (18%) and men (21%) reported low interpersonal trust.

Approximately one third of the women (33%) and men (29%) suffered from poor self-rated health, while 19% of the women and 14% of the men reported that they suffered from psychological distress. Nearly one half of all women (49%) and about one third of the men (34%) suffered from musculoskeletal disorders.

Tables 2a and 2b show associations between the economic hardships variables, each of the three social capital variables, and mental health problems. Social capital and economic hardships were simultaneously entered in the model together with other covariates for women and men respectively. We found economic hardships and low interpersonal (horizontal) trust and low

Table 1
Prevalence (%) of social capital, economic hardships, socioeconomic and demographic characteristics (the Swedish National Public Health Survey 2009).

	Men (N = 23,153)		Women (N = 28,261)	
	%		%	
Exposures				
Presence of economic hardships				
No	88.4	83.3		
Yes	11.6 (509)	16.7 (723)		
Social capital -low social participation				
No	76.5	76.3		
Yes	23.5 (460)	23.7 (561)		
Social capital -low interpersonal trust				
No	79.1	82.4		
Yes	20.9	17.6		
Missing	(510)	(607)		
Social capital -low political/institutional trust in Riksdag				
No	35.0	33.9		
Yes	51.7	47.1		
No opinion	13.3	24.4		
Missing	(779)	(480)		
Background factors				
Age (years)				
16–29	16.2	17.4		
30–44	22.9	24.0		
45–64	36.1	35.8		
65–84	24.8	22.9		
(Missing)	(0)	(0)		
Country of birth				
Sweden	88.5	87.7		
OECD (Other Nordic, Europe, North America)	7.7	8.6		
Other (Asia, Latin America, Africa)	3.8	3.8		
(Missing)	(8267)	(9923)		
Educational level				
High	17.9	21.8		
Intermediate	34.1	33		
Low	48.0	45.1		
(Missing)	(2073)	(2553)		
Occupational status				
Non-manual workers	36.8	36.2		
Lower non-manual workers	9.4	17.8		
Workers	41.9	37.8		
Farmers and self-employed	7.4	3.1		
Unclassified occupational status	4.6	5.2		
(Missing)	(1462)	(2126)		
Employment status				
Employed	57.1	54.1		
Other activities (students, parental leave etc.)	38.4	41.3		
Unemployed	4.4	4.7		
(Missing)	(806)	(1186)		
Living alone (with or without children)				
No	69.5	65.9		
Yes	30.5	34.2		
(Missing)	(530)	(618)		
Long term illness				
No	91.0	89.1		
Yes	9.0	10.9		
(Missing)	(350)	(503)		
Health outcomes				
SHR (Self rated health)				
No	71.0	67.3		
Yes	29.0	32.7		
(Missing)	(437)	(544)		
Psychological distress (GHQ-12)				
No	86.1	81.0		
Yes	13.9	19.0		
(Missing)	(99)	(119)		
Musculoskeletal disorders				
No	62.0	50.7		
Yes	34.3	49.3		
(Missing)	(202)	(199)		

Table 2a
Odds ratios (95% CI) for health problems in relation to social capital and economic hardships (the Swedish National Public Health Survey 2009), men.

	SRH (self-rated health)			Psychological distress (GHQ-12)			Musculoskeletal disorders		
	OR (95% CI)			OR (95% CI)			OR (95% CI)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Men (N=23,153)									
Presence of economic hardships									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	3.07 (2.82–3.35)	2.26 (1.95–2.61)	2.04 (1.76–2.38)	3.36 (3.06–3.69)	2.27 (1.95–2.64)	2.04 (1.74–2.39)	2.08 (1.91–2.26)	1.74 (1.53–2.00)	1.62 (1.41–1.86)
Social capital -low social participation									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	2.22 (2.07–2.38)	1.51 (1.34–1.70)	1.33 (1.18–1.51)	1.81 (1.66–1.98)	1.44 (1.25–1.67)	1.25 (1.08–1.46)	1.56 (1.46–1.67)	1.17 (1.05–1.30)	1.05 (0.94–1.18)
Social capital -low interpersonal trust									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	2.23 (2.08–2.38)	1.87 (1.68–2.08)	1.65 (1.47–1.84)	2.28 (2.11–2.47)	1.87 (1.66–2.11)	1.73 (1.57–1.96)	1.79 (1.68–1.91)	1.48 (1.35–1.63)	1.34 (1.22–1.48)
Social capital -low political/institutional trust									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	1.79 (1.67–1.92)	1.63 (1.47–1.81)	1.45 (1.31–1.62)	1.35 (1.24–1.48)	1.32 (1.17–1.50)	1.16 (1.02–1.32)	1.78 (1.66–1.89)	1.57 (1.44–1.72)	1.48 (1.36–1.63)
No opinion	1.80 (1.63–1.98)	1.30 (1.11–1.53)	1.14 (0.96–1.34)	1.26 (1.11–1.43)	1.17 (0.96–1.41)	1.02 (0.84–1.24)	1.78 (1.63–1.95)	1.27 (1.11–1.46)	1.20 (1.04–1.38)

Model 1; Adjusted for age.

Model 2; Adjusted for age, long-term illness, country of birth, occupational status, educational level and living alone.

Model 3; Social capital and economic hardships variables were simultaneously entered in the model together with other covariates (age, long-term illness, country of birth, occupational status, educational level and living alone).

Table 2b
Odds ratios (95% CI) for health problems in relation to social capital and economic hardships (the Swedish National Public Health Survey 2009), women.

	SRH (self-rated health)			Psychological distress (GHQ-12)			Musculoskeletal disorders		
	OR (95% CI)			OR (95% CI)			OR (95% CI)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Women (N = 28,261)									
Presence of economic hardships									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	2.89 (2.70–3.10)	2.10 (1.87–2.36)	1.84 (1.63–2.08)	2.47 (2.31–2.64)	1.95 (1.75–2.18)	1.78 (1.59–2.00)	2.06 (1.93–2.20)	1.67 (1.50–1.86)	1.52 (1.36–1.69)
Social capital - low social participation									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	2.62 (2.45–2.80)	1.56 (1.39–1.76)	1.33 (1.17–1.50)	1.70 (1.58–1.84)	1.16 (1.01–1.32)	0.95 (0.83–1.10)	1.56 (1.46–1.67)	1.12 (1.00–1.25)	0.99 (0.89–1.11)
Social capital - low interpersonal trust									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	2.47 (2.32–2.62)	2.00 (1.82–2.21)	1.74 (1.57–1.92)	2.29 (2.15–2.45)	2.03 (1.84–2.24)	1.89 (1.66–2.03)	1.90 (1.79–2.02)	1.66 (1.52–1.82)	1.50 (1.37–1.64)
Social capital - low political/institutional trust									
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	1.92 (1.80–2.05)	1.78 (1.61–1.96)	1.54 (1.40–1.69)	1.54 (1.43–1.65)	1.53 (1.38–1.70)	1.34 (1.20–1.49)	1.83 (1.73–1.94)	1.61 (1.49–1.75)	1.49 (1.38–1.62)
No opinion	2.16 (2.01–2.32)	1.62 (1.44–1.82)	1.44 (1.28–1.63)	1.41 (1.30–1.54)	1.28 (1.13–1.70)	1.15 (0.99–1.31)	1.76 (1.64–1.88)	1.40 (1.27–1.55)	1.32 (1.19–1.46)

Model 1: Adjusted for age.

Model 2: Adjusted for age, long-term illness, country of birth, occupational status, educational level and living alone.

Model 3: Social capital and economic hardships variables were simultaneously entered in the model together with other covariates (age, long-term illness, country of birth, occupational status, educational level and living alone).

political/institutional (vertical) trust in Riksdag, i.e., the cognitive aspects of social capital, to be independently associated with women's and men's health (all health measures). The no opinion category for the institutional trust measure showed, however, only statistically significant associations with musculoskeletal disorder for men and women.

The results for the structural indicator of social capital, i.e., social participation, were, however, more inconclusive, and only significantly associated with poor self-rated health for women and poor self-rated health and psychological distress for men. For example, the multivariate adjusted regression analysis (Table 2a; Model 3) of independent associations between interpersonal trust and health showed that men with low interpersonal trust had an odds ratio of 1.7 (95% CI 1.5–1.8) for poor self-rated health; an odds ratio of 1.7 (95% CI 1.6–2.0) for psychological distress and an odds ratio of 1.3 (95% CI 1.2–1.5) for musculoskeletal disorders compared to men who were not exposed to low interpersonal trust. The corresponding figures for women were 1.7 (95% CI 1.6–1.9) for self-rated health; 1.9 (95% CI 1.7–2.0) for psychological distress and 1.5 (95% CI 1.4–1.6) for musculoskeletal disorders (Table 2b; Model 3).

Analysis of independent associations between presence of economic hardships and health revealed a two-fold increase in odds for poor self-rated health (OR = 2.0; 95% CI: 1.8–2.4) and psychological distress (OR = 2.0; 95% CI: 1.7–2.4), and a one-fold risk of musculoskeletal disorders (OR = 1.6; 95% CI: 1.4–1.9) for men compared with men without economic hardships (Model 3; Table 3a). The corresponding figures for women were 1.8 (95% CI 1.6–2.1) for self-rated health; 1.8 (95% CI 1.6–2.0) for psychological distress and 1.5 (95% CI 1.4–1.7) for musculoskeletal disorders (Table 2b; Model 3).

The interaction effects between lack of social capital and economic hardships on health outcomes, after adjustments for age, are presented in Table 3 a & b. The results show clear interactive effects on health of exposure to both social capital and economic hardships simultaneously, with the exception of the combination of low social participation-economic hardships on musculoskeletal disorders where we found no sign of interaction. The results for men indicated, for example, that if exposed only to low social participation or economic hardships, the adjusted odds ratios of poor self-rated health were 1.94 (95% CI 1.8–2.1) and 2.8 (95% CI 2.5–3.1), respectively. However, if exposed to low social participation and economic hardships simultaneously, the adjusted odds ratios were as high as 5.0 (4.4–5.8). The synergy index between low social participation and economic hardships was 1.5 (95% CI 1.2–1.8), indicating an interaction effect on health (Table 3a). The corresponding figures for women were 2.3 (95% CI 2.2–2.5) and 2.7 (95% CI 2.5–2.9), respectively. If women were exposed to low social participation and economic hardships simultaneously, the adjusted odds ratios were 5.1 (4.5–5.7) with a synergy index of 1.4 (95% CI 1.2–1.6), indicating synergy (Table 3b).

Discussion

The present study reveals three main findings; 1) low social capital and 2) low economic capital at individual level are independently associated with poor health outcomes, and 3) combined they seem to contribute to an increased burden of poor health.

The first main finding, concerning associations between a combined economic hardships measure and health has not been widely examined in previous studies. Most of the previous studies have analysed one or several economic hardships variables separately, e.g., low income (Everson, Maty, Lynch, & Kaplan, 2002; Harper et al., 2002; Kaplan, Shema, & Leite, 2008; Lynch, Kaplan, Cohen, Tuomilehto, & Salonen, 1996) and self-reported financial difficulties (Laaksonen et al., 2010; Wildman, 2003), or combined

Table 3a

Interaction effects (SI, age adjusted odds ratios) between economic hardships and social capital variables on health problems (the Swedish National Public Health Survey 2009), men.

	SRH (self-rated health)		Psychological distress (GHQ-12)		Musculoskeletal disorders	
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
Men (N = 23,153)						
Social capital –low social participation	Presence of Economic hardships		Presence of Economic hardships		Presence of Economic hardships	
	Yes	No	Yes	No	Yes	No
Yes	5.04 (4.36–5.81)	1.94 (1.79–2.09)	4.54 (3.92–5.26)	1.46 (1.31–1.62)	2.39 (2.09–2.74)	1.48 (1.38–1.60)
No	2.78 (2.49–3.10)	1.00 (reference)	3.07 (2.74–3.45)	1.00 (reference)	2.08 (1.87–2.31)	1.00 (reference)
S (Synergy index) (95% CI)	1.49 (1.21–1.83)		1.39 (1.12–1.75)		0.89 (0.68–1.17)	
Social capital –low interpersonal trust	Presence of Economic hardships		Presence of Economic hardships		Presence of Economic hardships	
	Yes	No	Yes	No	Yes	No
Yes	5.41 (4.74–6.17)	1.95 (1.81–2.12)	5.81 (5.10–6.63)	1.92 (1.74–2.11)	3.10 (2.73–3.52)	1.61 (1.50–1.74)
No	2.64 (2.35–2.97)	1.00 (reference)	2.84 (2.50–3.24)	1.00 (reference)	1.81 (1.62–2.02)	1.00 (reference)
S (Synergy index) (95% CI)	1.70 (1.39–2.06)		1.74 (1.43–2.13)		1.47 (1.16–1.87)	
Social capital –low political/inst. trust	Presence of Economic hardships		Presence of Economic hardships		Presence of Economic hardships	
	Yes	No	Yes	No	Yes	No
Yes	3.97 (3.54–4.46)	1.25 (1.17–1.33)	3.30 (2.92–3.73)	1.04 (0.95–1.13)	2.81 (2.52–3.15)	1.40 (1.32–1.48)
No	2.05 (1.71–2.47)	1.00 (reference)	2.48 (2.04–3.01)	1.00 (reference)	1.57 (1.32–1.87)	1.00 (reference)
S (Synergy index) (95% CI)	2.29 (1.68–3.16)		1.51 (1.07–2.14)		1.88 (1.35–2.62)	

them into deprivation or socioeconomic disadvantage indices together with a range of other 'welfare problems' (Laaksonen et al., 2007; Ringback Weitoft & Rosen, 2005; Zimmerman & Katon, 2005).

The second main finding of independent associations between social capital (low interpersonal (horizontal) trust and low political/institutional (vertical) trust in parliament) and health (all health measures) reconfirms the results from some previous studies which have found associations between trust (both interpersonal and institutional) and measures of mental and physical health, and also between social participation and health at the individual level (Giordano & Lindstrom, 2010; Nieminen et al., 2010). However, the results for the structural indicator of social capital, i.e., social participation, were more inconclusive and only significantly associated with poor self-rated health for women and poor self-rated health and psychological distress for men.

Our third main finding reveals an interaction effect between economic hardships and low social capital (all variables) combined, both for women and for men. Thus, as hypothesized, besides independent effects on health between low social capital and low financial/economic capital, we also found interaction effects, i.e., if combined the two are associated with a higher risk of poor health than if considered alone.

Table 3b

Interaction effects (SI, age adjusted odds ratios) between economic hardships and social capital variables on health problems (the Swedish National Public Health Survey 2009), women.

	SRH (self-rated health)		Psychological distress (GHQ-12)		Musculoskeletal disorders	
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
Women (N = 28,261)						
Social capital –low social participation	Presence of Economic hardships		Presence of Economic hardships		Presence of Economic hardships	
	Yes	No	Yes	No	Yes	No
Yes	5.09 (4.51–5.74)	2.34 (2.16–2.52)	3.31 (2.94–3.73)	1.60 (1.48–1.72)	2.53 (2.24–2.86)	1.35 (1.25–1.45)
No	2.68 (2.47–2.91)	1.00 (reference)	2.23 (2.04–2.42)	1.00 (reference)	1.91 (1.77–2.07)	1.00 (reference)
S (Synergy index) (95% CI)	1.36 (1.15–1.60)		1.43 (1.17–1.76)		1.22 (0.96–1.55)	
Social capital –low interpersonal trust	Presence of Economic hardships		Presence of Economic hardships		Presence of Economic hardships	
	Yes	No	Yes	No	Yes	No
Yes	5.72 (5.15–6.35)	2.13 (1.98–2.29)	4.44 (4.01–4.91)	1.98 (1.84–2.15)	3.07 (2.77–3.41)	1.70 (1.59–1.82)
No	2.46 (2.25–2.68)	1.00 (reference)	2.07 (1.89–2.28)	1.00 (reference)	1.80 (1.66–1.96)	1.00 (reference)
S (Synergy index) (95% CI)	1.85 (1.57–2.12)		1.67 (1.42–1.96)		1.38 (1.14–1.66)	
Social capital –low political/inst. trust	Presence of Economic hardships		Presence of Economic hardships		Presence of Economic hardships	
	Yes	No	Yes	No	Yes	No
Yes	3.08 (2.79–3.39)	1.08 (1.02–1.14)	2.41 (2.18–2.66)	1.13 (1.06–1.21)	2.42 (2.20–2.67)	1.31 (1.24–1.38)
No	1.95 (1.70–2.24)	1.00 (reference)	1.94 (1.69–2.26)	1.00 (reference)	1.43 (1.26–1.63)	1.00 (reference)
S (Synergy index) (95% CI)	2.01 (1.51–2.69)		1.32 (1.00–1.78)		1.91 (1.41–2.59)	

This issue has not been widely examined in previous studies. Among the scarce evidence so far, even though the indicators of social capital and poverty/economic hardships differ from ours, our results are in accordance with the study by Sun and colleagues who found a synergy effect between individual level social capital (low neighbourhood social cohesion) and poverty (subgroup living on minimum living allowance supplied by the local communities) in rural China (Sun et al., 2009).

The synergy effects found in the present study and the study by Sun et al. indicate that social capital and economic determinants should not be considered as exclusive and separate in relation to health. The pathways in which a combination of lack of social and economic capital might have aggravating effects on health are several. As discussed in earlier sections, a lack of social and economic capital might have both direct effects on health, e.g., pure material factors and via psychosocial pathways, and more indirectly via social support mechanisms.

More importantly, the results from this study, where we have included several dimensions of social capital and economic hardships, indicate that these causal mechanisms most probably interact with each other creating the synergistic health effects observed. A lack of economic and social capital combined can thus be considered as a lack of capabilities in several dimensions (Sen,

1992, 1999), or as marginalisation or discrimination factors (Evans, Whitehead, Diderichsen, Bhuiya, & Wirth, 2001; Sun et al., 2009), creating a spiral of cumulative disadvantage which, over time, constrain the life of the individual. Ultimately this results in exclusion and contributes to poor health outcomes.

These results have several implications. First, they suggest that the concept of social capital might be useful besides economic capital for policies aimed at reducing health inequalities. Cattell (2001, p. 1512) has, for instance, suggested that the concept of social capital “used in combination with ‘social exclusion’, particularly if the latter is separated from its stigmatising ‘underclass’ and ‘concentrated poverty’ heritage, can be enlightening”. The World Bank has emphasised social capital as a potential contributor to poverty reduction and sustainable development. Second, this also suggests that policy strategies are needed which address both economic and social capital simultaneously at structural level, e.g., by improving economic conditions and by encouraging social connectivity and social cohesion, and thus minimizing the extent to which individuals perceive themselves as excluded in several dimensions of society.

Gender differences

As it has been suggested that the possession of economic or social capital may not be equally beneficial for men and women, we specifically aimed to examine gender-specific patterns of associations of economic and social capital with health outcomes. While we observed that a slightly larger (and significant) proportion of women than men suffered from economic hardships and health problems, very small (and insignificant) gender differences for prevalence of the attributes of social capital were found (*p*-values not shown in table). In addition, the results of the multivariate regression analyses and interaction analyses revealed very small gender differences, where the associations between social capital and health, economic hardships and health all seemed to be of almost the same magnitude for both genders.

This finding is in accordance with a study of middle-aged Finnish and British employees that only found small gender differences between economic hardships (financial stress) and common mental disorders (psychological distress, GHQ-12) (Laaksonen et al., 2007). In contrast, some previous studies have found significantly higher risks for psychological distress in relation to indicators of economic hardships for women than for men (Lorant et al., 2007a; Ringback Weitof & Rosen, 2005).

Our findings concerning the association between the social capital attributes and health is also partly supported by previous studies that have found that the association between individual level social capital and self-rated health (Eriksson, Dahlgren, Janlert, Weinehall, & Emmelin, 2010) and self-reported psychological health (Lindstrom & Mohseni, 2009) were of the same magnitude for both genders. However, other previous studies have indicated that effects of social capital at area level may differ by gender (Kavanagh, Bentley, Turrell, Broom, & Subramanian, 2006; Nyqvist, Finnas, Jakobsson, & Koskinen, 2008; Stafford, Cummins, Macintyre, Ellaway, & Marmot, 2005). From a public health policy perspective, there is thus a need to analyse gender differences in more detail.

Strengths and limitations

First, even though we have the advantage of relying on a large dataset representing the general population in Sweden, the data are cross sectional, a fact that does not allow us to infer causality. A number of previous longitudinal studies have, however, concluded that the main direction of causation runs from income and material

standards or from economic difficulties/financial stress to health (Eaton, Muntaner, Bovasso, & Smith, 2001; Lorant, Croux et al., 2007, 2003; Skapinakis, Weich, Lewis, Singleton, & Araya, 2006), and some recent results have also linked social capital to mortality (Dalgard & Lund, 1998; Hyyppa et al., 2007; Sundquist, Lindstrom, Malmstrom, Johansson, & Sundquist, 2004) even though the results, especially concerning mental health, are somewhat limited and contradictory (De Silva, McKenzie, Harpham, & Huttly, 2005; Pevalin & Rose, 2003).

Even so, there is still a possibility of reverse causality, e.g., healthier respondents are most likely to be able to work more and earn more money, and probably also find it easier to participate in society. A sick respondent, in contrast, might have less financial resources to pay for medical care, or might feel socially isolated because the disease constrains from participation in societal activities. However, the control for long-term illness did not attenuate the association between our explanatory measures and health, which indicates that there may be a pathway from social capital to health as well as from economic hardships to health.

Second, we need to disentangle the role of social and economic capital from other factors, e.g., social and material circumstances like education and occupation, determining health at individual and societal level. However, adjustments for age, individual level socioeconomic indicators including education, occupation and employment status and other sociodemographic variables did not affect the investigated relationships.

Still, other individual psychological factors, which we were not able to assess in this survey, may have contributed to the observed associations. Macinko and Starfield (2001) have, for instance, suggested that individual level attitudes, like interpersonal and institutional trust, can be considered as psychological constructs and thus also as aspects of personality. Personality traits such as negative affectivity have been suggested to influence the disposition to respond negatively in surveys (Watson, 1988). However, the previously mentioned study by Laaksonen et al. (2007) did not find that a personality trait such as negative affectivity influenced the observed associations between socioeconomic circumstances and common mental disorders.

Third, in a cross-sectional study like ours, it is not possible to capture the induction time from economic hardships to health or from social capital to health, since the information on both exposures and outcomes were simultaneously collected.

Fourth, misclassification of our explanatory variables also needs consideration. When it comes to the economic hardships measure we rely on register data for assessment of low income, which has the advantage of giving reliable data. However, it is still possible that our results might at least partly be caused by measurement errors of income or misclassifications of low income. As all other predictor variables are self-reported we also have the possibility of reporting bias to consider. Nevertheless, they are all commonly used measures worldwide showing clear associations with health outcomes and mortality (e.g. Dalgard & Lund, 1998; Hyyppa et al., 2007; Sundquist et al., 2004).

Fifth, even though the health outcomes are selected based on relevance for morbidity of major causes of death and longevity and have been validated in a number of settings (Burstrom & Fredlund, 2001; Fogel et al., 2006; Solomon et al., 2003) they are limited by use of a general household questionnaire rather than a standardised clinical interview.

Sixth, it is possible that non responders differ from responders. The non-response rate of 46.2% is problematic, but could still be considered acceptable given the current response rates in questionnaire surveys in western countries. However, missing data were completed by the use of weighting procedures based on related answers from other completed questions, and by the use of

weighting procedures based on calibration method developed by Statistics Sweden (Lundström & Särndal, 2001; Statistiska centralbyrån, 2009). Furthermore, a study investigating non-response bias in previous years of the survey did not indicate any statistically significant differences in response pattern (both dependent and independent variables) between the respondents and the non-respondents (Boström, 2009). In addition, previous international studies have indicated that even though the prevalences of poor health outcomes may be affected by the non-response, investigated associations are not (Lemmens, Tan, & Knibbe, 1988; Martikainen, Laaksonen, Pihla, & Lallukka, 2007; Van Loon, Tjihuis, Picavet, Surtees, & Ormel, 2003). In the case of selection bias previous studies (Lorant, Demarest, Miermans, & Van Oyen, 2007) indicate that we would have a tendency to underestimate the strength of the associations.

Finally, due to lack of data the changing patterns of social capital, economic hardships and health from childhood into adulthood could not be captured. Further studies need to consider the impact of social and financial circumstances throughout the entire life span.

Conclusion

We conclude that both low social capital and low economic capital at the individual level are independently associated with poor health outcomes, but when combined they seem to contribute to an increased burden of poor health. Policies that are aimed at reducing social inequalities in health should consider both social and economic capital.

Appendix. Supplementary data

Supplementary data related to this article can be found online at doi:10.1016/j.socscimed.2011.11.026.

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