Social capital and self-rated health – a study of temporal (causal) relationships

Giordano, Giuseppe Nicola; Björk, Jonas; Lindström, Martin

Published in:
Social Science and Medicine

DOI:
10.1016/j.socscimed.2012.03.011

2012

Citation for published version (APA):
Social capital and self-rated health – A study of temporal (causal) relationships

Giuseppe Nicola Giordano\textsuperscript{a,b,*}, Jonas Björk\textsuperscript{c}, Martin Lindström\textsuperscript{a,b}

\textsuperscript{a}Department of Clinical Sciences, Faculty of Medicine, Lund University, CRC, Building 28, Floor 12, Entrance 72, Malmö University Hospital, 204 02 Malmö, Sweden
\textsuperscript{b}Centre for Economic Demography (CED), Lund University, Sweden
\textsuperscript{c}R&D-Centre Skåne, Skåne University Hospital, Lund, Sweden

ABSTRACT

Despite the vast amount of research over the past fifteen years, there is still lively debate surrounding the role of social capital on individual health outcomes. This seems to stem from a lack of consistency regarding the definition, measurement and plausible theories linking this contextual phenomenon to health. We have further identified a knowledge gap within this field—a distinct lack of research investigating temporal relationships between social capital and health outcomes. To remedy this shortfall, we use four waves of the British Household Panel Survey to follow the same individuals (N = 8114) between years 2000 and 2007. We investigate temporal relationships and association between our outcome variable self-rated health (SRH) and time-lagged explanatory variables, including three individual-level social capital proxies and other well-known health determinants. Our results suggest that levels of the social capital proxy ‘generalised trust’ at time point (t - 1) are positively associated with SRH at subsequent time point (t), even after taking into consideration levels of other well-known health determinants (such as smoking status) at time point (t - 1). That we investigate temporal relationships at four separate occasions over the seven-year period lends considerable weight to our results and the argument that generalised trust is an independent predictor of individual health. However, lack of consensus across a variety of disciplines as to what generalised trust is believed to measure creates ambiguity when attempting to identify possible pathways from higher trust to better health.

© 2012 Elsevier Ltd. All rights reserved.

Introduction

Since Durkheim’s seminal work over a century ago (Durkheim, 1897, 1951), research has repeatedly shown that individuals with higher levels of social integration, social networks and social support have better health (for examples see: Berkman & Syme, 1979; House, Landis, & Umberson, 1988; Lasker, Egolf, & Wolf, 1994; Pennix et al., 1997). However, following the introduction of ‘social capital’ to the field of public health (Kawachi, Kennedy, & Glass, 1999; Kawachi, Kennedy, Lochner, & Prothow-Stith, 1997), the debate has continued regarding this contextual phenomenon and how it also independently influences health outcomes (Hawe & Shiell, 2000; Pearce & Davey Smith, 2003; Szreter & Woolcock, 2004).

From social capital literature and research, we have identified three main areas of contention: how one defines (and conceptualizes) social capital, how one measures social capital, and how social capital is theorized to influence health. These issues seem inter-connected, as one’s definition of social capital will surely influence how one measures and theorizes the effects of social capital on individual health outcomes.

There is no single accepted definition of social capital, so it is not surprising that there are differences in opinion regarding its conceptualization. Of the contemporary authors in this field, Robert Putnam (1993, p.167), defines social capital as ‘…features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions.’ With his definition, Putnam places social capital firmly at the societal-level. However, Pierre Bourdieu also conceptualized social capital at the individual-level by defining it as ‘…the sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network’ (Bourdieu & Wacquant, 1992, p.119).

Another key social capital theorist, James Coleman (1990, p.302) defines social capital as ‘…a variety of different entities [that] facilitate certain actions of individuals who are within the
structure’, the family playing a vital role in his theories; and finally 
Portes (1998 p.6) defines social capital as ‘...the ability of actors to 
secure benefits by virtue of membership in social networks or other 
social structures’, stressing the individual-level properties of this 
phenomenon.

The differences above clearly highlight the lack of consensus 
between theorists regarding the conceptualisation and ownership 
of social capital, which leads to our second area of contention: how 
one measures social capital and its effects on health, at the indi-
vidual or the collective level (Macinko & Starfield, 2001). This 
problem is further confounded by the fact that social capital is often 
considered a contextual phenomenon (Berkman & Kawachi, 2000) 
that cannot be directly observed or easily quantified. As a result 
(and irrespective of ‘conceptualisation’ issues) the vast majority of 
social capital research relies on individual-level ‘proxy’ measures. 
Researchers’ choice of proxy often reflects the social capital defi-
nition being tested; for example, if investigating Putnam’s or 
Coleman’s social capital theory, one would use proxies such as 
generalised (horizontal) and vertical (institutional) trust, and social 
and civic participation (for examples see: Coleman, 1988; Hyypää & 
Mäki, 2001; Lindström, 2004; Putnam, 1993, 2000; Subramanian, 
Kim, & Kawachi, 2002; Veenstra, 2000).

Researchers wanting to investigate ‘group’ effects of social 
capital on individual health may further aggregate individual-level 
proxies to a context of interest. However, the process of aggregation 
is not without its own issues, as any assumption made about an 
individual based solely on a group mean value may be inherently 
biased (commonly known as ‘ecological fallacy’). Furthermore, 
most multilevel social capital studies have demonstrated that only 
0–4% of total variation in individual health is attributable to 
commonly used aggregates, such as community, state or county 
contexts (for examples see: Fujisawa, Hamano, & Takegawa, 2009; 
Lindström, Moghaddassi, & Merlo, 2004; Poortinga, 2006; 
Snelgrove, Pikhart, & Stafford, 2009).

Conversely, social capital studies maintaining analyses at the 
individual-level still may face criticism if they do not consider any 
potential contextual effects. This criticism may be unfounded, 
however, as one recent multilevel study (simultaneously investi-
gating individual-, household- and community-level contexts) 
demonstrates that it is individual-level social capital proxies 
that influence individual health the greatest (Giordano, Olhsson, & 
Lindström, 2011).

The third area of contention (how social capital influences 
health) has generated lively debate over recent years, as the rele-
vance of social capital on health outcomes has often been contested 
by proponents stressing the importance of access to material 
resources and public welfare policy (Muntaner, 2004; Pearce & 
Davey Smith, 2003). Furthermore, certain social capital proxies 
(i.e. ‘social networks’ or ‘social participation’) could easily be 
perceived as potential sources of social support, a well-known 
determinant of individual health (Berkman & Syme, 1979). To 
address these arguments comprehensively within empirical social 
capital research, one must consider differing measures of socio-
economic status (SES) such as income, education and employ-
ment status, along with well-known measures of social support 
whenever possible. As there is also an increasing literature base 
suggesting a distinct lack of correlation between social capital 
proxies, in turn hinting at several pathways from social capital to 
health (Giordano & Lindström, 2010; Lindström, 2004; Nummela, 
Sulander, Rahkonen, Karisto, & Utela, 2008; Stolle, 2001), it also 
seems prudent to simultaneously test multiple social capital 
proxies, if data allows.

We have further identified an apparent shortfall in global social 
capital research, one that specifically addresses the issue of causality. 
To clarify: there are nine criteria required to help establish a causal 
relationship between exposure and disease, including strength, 
plausibility, and consistency. However, temporal relationship is 
considered the only ‘essential criterion’; i.e. if exposure A is theo-
rized to cause disease B, then A must always precede B (Goodman & 
Phillips, 2005). In other words, longitudinal data are needed to test 
causality. This notion is also supported by methodological consid-
erations concerning causal mechanisms within the social sciences 
(Hedström & Vlikoski, 2010). However, during the near exponential 
rise in papers researching social capital and health over the past 
fifteen years, the vast majority of studies has been cross-sectional in 
design (Islam, Merlo, Kawachi, Lindström, & Gerdtham, 2006) and 
are therefore unable to test temporal relationships. Of the longitu-
dinal studies within the field, a PUBMED search reveals that only one 
study, investigating association between ‘psychological wellbeing’ 
and social capital (Giordano & Lindström, 2011), incorporates the 
three (or more) time points required to correctly test temporal 
relationships (Singer & Willet, 2003 p.9). Our study will attempt to 
address this knowledge gap in social capital research by using the 
same individuals’ responses taken at four different time points 
between the years 2000 and 2007.

The aim of this longitudinal study is to investigate temporal 
relationships between self-rated health (SRH) and lagged measures 
of individual-level social capital, social support and SES. As our 
longitudinal data cannot be aggregated, we intend to employ individual 
measures of generalised trust, social participation and contact 
with neighbours as social capital proxies in our study; the 
choice of proxy being determined in part by data availability and 
also our acceptance of Putnam’s social capital definitions. We 
hesitantly that levels of social capital at time (t – 1) are positively 
associated with SRH status at subsequent time point (t), even after 
adjusting for other well-known health determinants at time (t – 1).

Materials and methods

Data collection

The British Household Panel Survey (BHPS) is a longitudinal 
survey of randomly selected private households conducted by the 
UK’s Economic and Social Research Centre. Since 1991, individuals 
within selected households have been interviewed annually with 
a view to identifying social and economic changes within the 
British population. The original 1991 cohort sample was randomly 
selected by using a two stage cluster design, resulting in a total of 
8166 private postal addresses around the UK. From these addresses 
10,264 individual interviews were completed in 1991, demonstrat-
ing a participation rate of 95%. Full details of the selection 
process, weighting and future participation rates can be found on-
line in the BHPS user manual (Taylor, Brice, Buck, & Prentice-Lane, 
2010).

The raw data that have been used for this panel study come from 
the BHPS individual-level responses in years 2000, 2003, 2005 and 
2007. The same individuals (N = 8114) were followed across this 
seven-year time frame; participation rate for year 2000 (as 
compared to year 1999) was 93.6%, and, compared to the original 
1991 cohort, was 62.0%.

The Research Centre fully adopted the Ethical Guidelines of the 
Social Research Association; informed consent was obtained from 
all participants and strict confidentiality protocols were adhered to 
throughout data collection and processing procedures.

Dependent variable

The dependent variable in this study is self-rated health (SRH), 
considered a valid predictor of morbidity and future mortality (Idler 
& Benyamini, 1997; Lopez, 2004). The same individuals were asked:
‘Compared to people your own age, would you say that your health has on the whole been: excellent, good, fair, poor or very poor?’ As is standard with the global SRH item, this five-point scale was recoded into the dichotomous variable ‘good’ (excellent, good) and ‘poor’ (fair, poor, very poor) health.

**Explanatory variables**

**Social capital variables**

Generalised (horizontal) trust was assessed by asking people: ‘Would you say that most people can be trusted, or that you can trust them only a little, or that you cannot trust them at all?’ This variable was dichotomised, with only those respondents stating that most people could be trusted being labelled ‘can trust’; all negative responses (including ‘it depends’) were labelled ‘can’t trust’ (Uslaner, 2002).

Social participation was measured by asking respondents questions about being active members of listed voluntary community groups or any sports, hobby or leisure group activity found locally (see Appendix A for full list). Only those who answered positively to any of these were judged to participate, with all others being labelled ‘No participation’.

We also considered frequency of talking to neighbours as a proxy for social capital (Putnam, 2000, p.105–108). Possible responses were: ‘Most days, once or twice a week, once or twice a month, less than once a month, or never’. Those answering ‘most days’ or ‘once or twice a week’ were assigned the label ‘One or more times per week’; the rest were assigned the label ‘less often’.

**Socio-economic status variables**

Social class was determined by the respondents’ most recent occupation, derived from the Registrar General’s Social Classification of occupations. The usual six categories (see Appendix A) were dichotomised into ‘higher’ (1–3a) and ‘lower’ (3b–6) social class. Those who had never been employed were labelled ‘never worked’.

Highest achieved education level was categorised as ‘Undergraduate or higher’, ‘Year 13’ and ‘Year 11’ or ‘No formal qualifications’.

‘Household income’ was weighted according to size by summing the income of all household members and dividing this sum by the square root of the household size (Burkhauser, Smeeding, & Merz, 1996). This item was maintained as a continuous variable (per £1000 increase) and was an expression of total income, net of any taxation.

**Social support variables**

Respondents were asked if they were ‘married, separated, divorced, widowed or never married’. These five options were recoded into the dichotomous variable ‘married’ and ‘not married’ (separated, divorced, widowed or never married). A further variable ‘Lives alone’ (‘yes’ or ‘no’) was also used to try to capture more information about those individuals who co-habited.

We also considered frequency of meeting with friends or family as a proxy for social support. Possible responses were: ‘Most days, once or twice a week, once or twice a month, less than once a month, or never’. Those answering ‘most days’ or ‘once or twice a week’ were assigned the label ‘one or more times per week’; the rest were assigned the label ‘less often’.

**Confounders**

Age, gender, smoking status and time were considered confounders in this study, age being stratified into quintiles (see Tables 1 and 2). Time (corresponding to the waves of interviews in years 2000, 2003, 2005 and 2007) was also included as a continuous covariate to adjust for potential trends in SRH and explanatory variables across time. Smoking status was categorised as ‘smoker’ and ‘non-smoker’ according to respondents’ answer to the question ‘Do you smoke cigarettes?’

All explanatory variables (except gender) were lagged at time 

\( t − 1 \) in reference to SRH at time \( t \). It was presumed that the presence of social capital, being younger, being married or cohabiting, being a non-smoker, attaining higher education and household income, having greater social support, and being of higher social class at time \( t − 1 \) were associated with good SRH at time \( t \).

**Statistical analyses**

All data were stratified by baseline (year 2000) SRH to create two distinct ‘health’ cohorts: ‘Good health at baseline’ (GHB) and ‘Poor health at baseline’ (PHB). After this initial disaggregation, the two ‘health’ cohorts were modelled as separate entities: Model 1 dealt solely with individuals from the GHB cohort (\( N = 5689 \)); the outcome of interest in Model 1 was change from ‘GHB’ (0) to ‘poor’ SRH (1) from year 2000—2007. Model 2 dealt solely with individuals from the PHB cohort (\( N = 2425 \)); the outcome of interest in Model 2 was change from ‘PHB’ (0) to ‘good’ SRH (1) from year 2000—2007.

In order to investigate temporal relationships between exposure and outcome, all explanatory variables (except gender) were lagged at time \( t − 1 \) in reference to SRH at time \( t \). To clarify, when SRH in 2003 was the outcome, only explanatory variables from year 2000 were utilised; when SRH in 2005 was the outcome, only explanatory variables from 2003 were utilised; and when SRH in 2007 was the outcome, only explanatory variables from 2005 were utilised.

Disaggregation by baseline SRH meant we could attribute any association found between our lagged explanatory variables to change from baseline health status. Without disaggregation, we could only describe association between lagged explanatory variables and SRH as trends across the time frame of our study.

Our hypothesis, as stated in the introduction, is that social capital at \( t − 1 \) is positively associated with SRH at time \( t \); however, other temporal pathways may co-exist, confound each other, or even interact with each other. For example: SRH at time \( t \) could theoretically influence one’s ability to maintain social networks at time \( t \) and/or at \( t + 1 \). To address this concern, we also performed sensitivity testing. We ran all explanatory variables from time \( t \), alongside all lagged \( t − 1 \) exploratory variables, the outcome being SRH at time \( t \). If association still held at time \( t − 1 \) when we considered social capital (and all other explanatory variables) at time \( t − 1 \) and time \( t \) simultaneously, this would strengthen our hypothesis that prior levels in social capital are positively associated with subsequent SRH.

For all analyses we used logistic regression models with random effects, as SRH was expected to be more similar within the same individual over time than between different individuals. The model allowed a random intercept for each individual and we obtained standard errors that were adjusted for the temporal correlation of SRH within the same individual across the time frame of our study. The equations for logistic regression models with random effects are as follows:

\[
\logit(Y_{ij}) = \beta_0 + \beta X_{i-1j} + \mu_{ij}
\]

\[
\beta_{ij} = \beta_0 + \mu_{ij}
\]

where \( i = \text{time}, j = \text{individual}, Y_{ij} \) is the outcome variable, \( \mu_{ij} \) is the random intercepts (assumed to be independently normally distributed with a common variance), \( X_{i-1j} \) is a vector of lagged explanatory variables, \( \beta_0 \) is the fixed overall intercept, and \( \beta \) the corresponding vector of coefficients.

All explanatory variables were utilised in our two multiple logistic regression models. Model 1 investigated change from GHB
Table 1a
Frequencies of all considered explanatory variables expressed as integers and percentages (%) of \(N_T = 8114\) stratified by baseline self-rated health (SRH) in year 2000.

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Baseline self-rated health</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good SRH ((N = 5689))</td>
<td>Poor SRH ((N = 2425))</td>
<td>Total ((N_T = 8114))</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>16–34</td>
<td>35–44</td>
<td>45–54</td>
<td>55–64</td>
</tr>
<tr>
<td></td>
<td>1817 (32%)</td>
<td>1311 (23%)</td>
<td>1660 (19%)</td>
<td>740 (13%)</td>
</tr>
<tr>
<td></td>
<td>5600 (25%)</td>
<td>426 (18%)</td>
<td>472 (18%)</td>
<td>432 (13%)</td>
</tr>
<tr>
<td></td>
<td>2417 (30%)</td>
<td>1737 (21%)</td>
<td>1532 (19%)</td>
<td>1172 (14%)</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2600 (46%)</td>
<td>3089 (54%)</td>
<td>5689 (100%)</td>
<td>1003 (41%)</td>
</tr>
<tr>
<td></td>
<td>1003 (41%)</td>
<td>1422 (59%)</td>
<td>2425 (100%)</td>
<td>3603 (44%)</td>
</tr>
<tr>
<td>Generalised trust</td>
<td>Yes, can trust others</td>
<td>2396 (43%)</td>
<td>1311 (33%)</td>
<td>3293 (58%)</td>
</tr>
<tr>
<td></td>
<td>726 (18%)</td>
<td>426 (18%)</td>
<td>1696 (30%)</td>
<td>1696 (30%)</td>
</tr>
<tr>
<td></td>
<td>3125 (39%)</td>
<td>3125 (39%)</td>
<td>4989 (62%)</td>
<td>4989 (62%)</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Social Participation:</td>
<td>Zero participation</td>
<td>3220 (57%)</td>
<td>1583 (33%)</td>
<td>4803 (59%)</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Active participation</td>
<td>2469 (43%)</td>
<td>842 (19%)</td>
<td>3311 (41%)</td>
</tr>
<tr>
<td></td>
<td>842 (19%)</td>
<td>842 (19%)</td>
<td>1532 (19%)</td>
<td>1532 (19%)</td>
</tr>
<tr>
<td></td>
<td>3311 (41%)</td>
<td>3311 (41%)</td>
<td>4989 (62%)</td>
<td>4989 (62%)</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Frequency of talking</td>
<td>One or more times/week</td>
<td>4410 (78%)</td>
<td>1876 (77%)</td>
<td>6286 (78%)</td>
</tr>
<tr>
<td></td>
<td>78%</td>
<td>78%</td>
<td>78%</td>
<td>78%</td>
</tr>
<tr>
<td></td>
<td>Not that often</td>
<td>1279 (23%)</td>
<td>549 (23%)</td>
<td>1828 (23%)</td>
</tr>
<tr>
<td></td>
<td>23%</td>
<td>23%</td>
<td>23%</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Frequency of meeting</td>
<td>One or more times/week</td>
<td>4872 (86%)</td>
<td>2081 (86%)</td>
<td>6953 (86%)</td>
</tr>
<tr>
<td></td>
<td>86%</td>
<td>86%</td>
<td>86%</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td>Not that often</td>
<td>817 (14%)</td>
<td>344 (14%)</td>
<td>1161 (14%)</td>
</tr>
<tr>
<td></td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>3370 (59%)</td>
<td>1411 (59%)</td>
<td>4781 (59%)</td>
</tr>
<tr>
<td></td>
<td>59%</td>
<td>59%</td>
<td>59%</td>
<td>59%</td>
</tr>
<tr>
<td></td>
<td>Not married</td>
<td>2319 (41%)</td>
<td>1014 (41%)</td>
<td>3333 (41%)</td>
</tr>
<tr>
<td></td>
<td>41%</td>
<td>41%</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Lives alone</td>
<td>Yes</td>
<td>686 (12%)</td>
<td>398 (12%)</td>
<td>1084 (13%)</td>
</tr>
<tr>
<td></td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5003 (88%)</td>
<td>2027 (84%)</td>
<td>7030 (87%)</td>
</tr>
<tr>
<td></td>
<td>88%</td>
<td>84%</td>
<td>87%</td>
<td>87%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Education achieveda</td>
<td>Undergraduate or higher</td>
<td>2253 (40%)</td>
<td>895 (37%)</td>
<td>3148 (39%)</td>
</tr>
<tr>
<td></td>
<td>40%</td>
<td>37%</td>
<td>39%</td>
<td>39%</td>
</tr>
<tr>
<td></td>
<td>Year 13</td>
<td>1654 (29%)</td>
<td>765 (32%)</td>
<td>2419 (30%)</td>
</tr>
<tr>
<td></td>
<td>29%</td>
<td>32%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Year 11</td>
<td>1008 (18%)</td>
<td>461 (18%)</td>
<td>1469 (18%)</td>
</tr>
<tr>
<td></td>
<td>18%</td>
<td>18%</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>No qualifications</td>
<td>734 (13%)</td>
<td>287 (12%)</td>
<td>1021 (13%)</td>
</tr>
<tr>
<td></td>
<td>13%</td>
<td>12%</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Social class</td>
<td>High</td>
<td>3339 (61%)</td>
<td>1166 (51%)</td>
<td>4505 (58%)</td>
</tr>
<tr>
<td></td>
<td>61%</td>
<td>51%</td>
<td>58%</td>
<td>58%</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>2105 (39%)</td>
<td>1111 (49%)</td>
<td>3216 (42%)</td>
</tr>
<tr>
<td></td>
<td>39%</td>
<td>49%</td>
<td>42%</td>
<td>42%</td>
</tr>
<tr>
<td></td>
<td>Never worked</td>
<td>245 (5%)</td>
<td>148 (5%)</td>
<td>393 (5%)</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5689 (100%)</td>
<td>2425 (100%)</td>
<td>8114 (100%)</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Please cite this article in press as: Giordano, G. N., et al., Social capital and self-rated health – A study of temporal (causal) relationships, Social Science & Medicine (2012), doi:10.1016/j.socscimed.2012.03.011
(0) to ‘poor’ SRH (1) between 2000 and any of the years 2003, 2005 or 2007; Model 2 investigated change from PHB (0) to ‘good’ SRH (1) between 2000 and any of the years 2003, 2005 or 2007. All analyses were conducted using GLLAMM version 2.3.15 (Rabe-Hesketh, Skrondal, & Pickles, 2005), within the statistical software package STATA 11.2 (StataCorp, 2009).

Results

Table 1a is descriptive, showing frequencies and total percentages of all considered explanatory variables, stratified by self-rated health in year 2000 (baseline). Table 1b is also descriptive, showing the transition of self-rated health over time in each baseline cohort.

The results of multiple logistic regression analyses containing all considered explanatory variables are presented in Table 2 as odds ratios (ORs) with 95% confidence intervals (CI). The results of our sensitivity tests are presented in Table 3, also as ORs with 95% CI.

Model 1: multiple regression analysis — ‘GHB’ cohort

The outcome of interest in Model 1 was change from ‘Good Health at Baseline’ (0) to ‘poor’ SRH (1) between 2000 and 2007. As shown in Table 2 (left hand column), of the social capital variables, low levels of trust and talking less with neighbours preceded a change from GHB to poor SRH over time (OR = 1.35 and 1.18, respectively). Of the SES variables, those with low social class or those who had never worked at time (t−1) had increased risk of poor SRH at time (t) (OR = 1.25). A prior increase in household income at time (t−1) was associated with good SRH at time (t); though significant, the value was close to the reference value of 1.0.

None of the social support variables at (t−1) maintained association with poor SRH at time (t). Of the confounders, smoking at (t−1) and being of older age were associated with poor SRH at time (t).

Model 2: multiple regression analysis — ‘PHB’ cohort

The outcome of interest in Model 2 was change from ‘Poor Health at Baseline’ (0) to ‘good’ (1) SRH between 2000 and 2007. As shown in Table 2 (right hand column), of the social capital variables, high levels of trust and participation and talking more often with neighbours at time (t−1) preceded good SRH at time (t) (OR = 1.31, 1.19, and 1.33 respectively).

Of the SES variables, those with higher social class at time (t−1) had good SRH at time (t) (OR = 1.24). Those who had never worked at time (t−1) were likely to remain of poor SRH (OR = 0.61). A prior increase in household income at time (t−1) was associated with good SRH at time (t); though significant, the value was close to the reference value of 1.0.

Of the confounders, being a non-smoker, being male, and being of younger age at time (t−1) were associated with good SRH at time (t).

Sensitivity testing

We tested our hypothesis that social capital at time (t−1) is positively associated with SRH at time (t) by running all explanatory variables at time (t) alongside all lagged (t−1) explanatory variables simultaneously against SRH at time (t). Sensitivity tests were performed for Models 1 and 2 separately. As shown in Table 3 (left hand column) from the GHB cohort, the only lagged (t−1) social capital variable that maintains association with poor SRH at time (t) is lack of trust (OR = 1.25). In the right hand column of Table 3 (from the PHB cohort), association remains between good SRH at time (t) and the lagged (t−1) social capital variables ‘trust’ (OR = 1.25) and ‘talks with neighbours’ (OR = 1.28). Association between active social participation at (t−1) and good SRH at time (t) was attenuated after adjusting for participation at time (t).

Please cite this article in press as: Giordano, G. N., et al., Social capital and self-rated health – A study of temporal (causal) relationships, Social Science & Medicine (2012), doi:10.1016/j.socscimed.2012.03.011
Table 2
Odds ratios (ORs) with 95% confidence intervals (95% CI) of having ‘good’ or ‘poor’ self-rated health at time (t) from baseline (Year 2000) health status according to multiple logistic regression analysis of lagged (t – 1) explanatory variables in social capital, social support, socio-economic status and confounders (Nt = 8113).

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Change in self-rated health status from baseline (2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1 (N = 5688) ORs (95% CI)</td>
</tr>
<tr>
<td>Social capital variables</td>
<td>Good health at baseline cohort – ORs (95% CI)</td>
</tr>
<tr>
<td>Generalised trust</td>
<td>1.00</td>
</tr>
<tr>
<td>Trusts others</td>
<td>1.35 (1.19–1.53)***</td>
</tr>
<tr>
<td>Can’t trust others</td>
<td>1.12 (1.01–1.26)</td>
</tr>
<tr>
<td>Social participation:</td>
<td>1.00</td>
</tr>
<tr>
<td>Active in local groups</td>
<td>1.05 (0.93–1.18)</td>
</tr>
<tr>
<td>No participation</td>
<td>1.05 (0.89–1.18)</td>
</tr>
<tr>
<td>Frequency of talking</td>
<td>1.00</td>
</tr>
<tr>
<td>with neighbours</td>
<td>1.18 (1.02–1.36)*</td>
</tr>
<tr>
<td>1+ times/wk</td>
<td>1.00</td>
</tr>
<tr>
<td>Less than this</td>
<td>1.19 (0.96–1.48)</td>
</tr>
<tr>
<td>Social support variables</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>1.00</td>
</tr>
<tr>
<td>Married</td>
<td>1.00</td>
</tr>
<tr>
<td>Divorced</td>
<td>1.00 (0.85–1.19)</td>
</tr>
<tr>
<td>Living alone</td>
<td>1.00</td>
</tr>
<tr>
<td>Lives with others</td>
<td>1.00</td>
</tr>
<tr>
<td>Lives alone</td>
<td>1.19 (0.96–1.48)</td>
</tr>
<tr>
<td>Frequency of meeting</td>
<td>1.00</td>
</tr>
<tr>
<td>with friends or family</td>
<td>1.00</td>
</tr>
<tr>
<td>1+ times/wk</td>
<td>0.91 (0.77–1.08)</td>
</tr>
<tr>
<td>Less than this</td>
<td>1.00</td>
</tr>
<tr>
<td>Socio-economic variables</td>
<td></td>
</tr>
<tr>
<td>Household income/£1000</td>
<td>0.99 (0.98–0.99)***</td>
</tr>
<tr>
<td>Continuous</td>
<td>1.00</td>
</tr>
<tr>
<td>High SC</td>
<td>1.40 (1.22–1.61)**</td>
</tr>
<tr>
<td>Low SC</td>
<td>1.53 (1.13–2.07)**</td>
</tr>
<tr>
<td>Never worked</td>
<td>1.00</td>
</tr>
<tr>
<td>Education achieved</td>
<td>1.00</td>
</tr>
<tr>
<td>Undergraduate +</td>
<td>1.06 (0.88–1.26)</td>
</tr>
<tr>
<td>Year 13</td>
<td>1.01 (0.86–1.19)</td>
</tr>
<tr>
<td>Year 11</td>
<td>1.01 (0.84–1.79)</td>
</tr>
<tr>
<td>No qualifications</td>
<td>1.00</td>
</tr>
<tr>
<td>Confounders</td>
<td>1.00</td>
</tr>
<tr>
<td>Age (years)</td>
<td>1.00</td>
</tr>
<tr>
<td>16–34</td>
<td>1.06</td>
</tr>
<tr>
<td>35–44</td>
<td>1.12 (0.88–1.42)</td>
</tr>
<tr>
<td>45–54</td>
<td>1.25 (0.98–1.60)</td>
</tr>
<tr>
<td>55–64</td>
<td>1.30 (0.99–1.68)</td>
</tr>
<tr>
<td>65+</td>
<td>1.84 (1.43–2.37)**</td>
</tr>
<tr>
<td>Gender</td>
<td>1.00</td>
</tr>
<tr>
<td>Male</td>
<td>1.00</td>
</tr>
<tr>
<td>Female</td>
<td>1.04 (0.91–1.23)</td>
</tr>
<tr>
<td>Smoking status</td>
<td>1.00</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>1.68 (1.44–1.97)**</td>
</tr>
<tr>
<td>Smoker</td>
<td>1.17 (1.10–1.24)**</td>
</tr>
</tbody>
</table>

*a* 0.05 significance.
** 0.01 significance.
*** 0.001 significance.
*a* Missing 1.
*b* Reference group.

### Discussion

The aim of this longitudinal study is to research temporal relationships and association between lagged health determinants (including three social capital proxies) at time point (t – 1) and our dependent variable self-rated health (SRH) at subsequent time point (t). The dual ‘health’ cohort design of the study (see ‘Materials and methods’ section) further allows causal inference to be made from association between lagged explanatory variables and changes from baseline health status over time. All three measures of social capital maintain their positive association with SRH in multiple regression models when tested simultaneously alongside other well-known health determinants. Temporal relationships and association imply that prior levels in either of these social capital measures seem to independently predict future SRH status, i.e. social capital at time point (t – 1) is positively associated with health status at subsequent time point (t), even after taking into consideration levels of other well-known health determinants at time point (t – 1).

Of our social capital proxies, frequency of talking with neighbours maintains association with SRH in both models (see Table 2).

Though relationships with one’s neighbours may be considered a form of ‘bonding’ social capital (Szreter & Woolcock, 2004), it is also feasible that this source of social capital could become a source of social support, particularly if neighbours become good friends over time (Coleman, 1990, p.178–180). Social participation is only associated with good SRH in Model 2 (see Table 2, right hand column). This result implies that active participation precedes good SRH over time. However, our sensitivity tests (see Table 3) hint that it is most likely that good SRH at time (t) influences active participation at time (t). Generalised trust is positively associated with SRH in both Models (see Table 2), i.e. lack of trust at time (t – 1) precedes poor SRH at time (t) in Model one; conversely, an ability to trust at time (t – 1) precedes good SRH at time (t) in Model two. This positive association remains after performing our sensitivity test (see Table 3). According to our results, the positive effect of generalized trust at time (t – 1) on SRH at time (t) is one third the strength of not smoking at time (t – 1).

It is important to appreciate that generalised trust, along with most other explanatory variables in this study, is time-dependent, i.e. one’s trust levels may have a different value at any given time.
Table 3

Causal pathway sensitivity testing: odds ratios (ORs) with 95% confidence intervals (95% CI) of having ‘good’ or ‘poor’ self-rated health at time (t) according to multiple logistic regression analysis of lagged (t – 1) and non-lagged (t) social capital variables, along with all lagged and non-lagged explanatory variables (Note: only social capital variables shown below).

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Change in self-rated health status from baseline (2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1 (N = 5688)</td>
</tr>
<tr>
<td></td>
<td>Good health at baseline cohort – ORs (95% CI) of having PH over time</td>
</tr>
<tr>
<td>Social participation: Lagged (t – 1)</td>
<td>Active participation</td>
</tr>
<tr>
<td></td>
<td>No participation</td>
</tr>
<tr>
<td>Social participation: Non-lagged (t)</td>
<td>Active participation</td>
</tr>
<tr>
<td></td>
<td>No participation</td>
</tr>
<tr>
<td>Generalised trust: Lagged (t – 1)</td>
<td>Trusts others</td>
</tr>
<tr>
<td></td>
<td>Can’t trust others</td>
</tr>
<tr>
<td>Generalised trust: Non-lagged (t)</td>
<td>Trusts others</td>
</tr>
<tr>
<td></td>
<td>Can’t trust others</td>
</tr>
<tr>
<td>Talks with neighbours: Lagged (t – 1)</td>
<td>1 +/week</td>
</tr>
<tr>
<td></td>
<td>Less than this</td>
</tr>
<tr>
<td>Talks with neighbours: Non-lagged (t)</td>
<td>1 +/week</td>
</tr>
<tr>
<td></td>
<td>Less than this</td>
</tr>
</tbody>
</table>


*0.05 significance.
**0.01 significance.
***0.001 significance.
PH – Poor SRH.
GH – Good SRH.

Measures of trust in this study therefore consider not just those individuals who maintain the same trust levels over time, but also those whose trust levels vary over the period of study. That trust is measured at three lagged time points at (t – 1) in relation to the outcome SRH at time (t) adds considerable weight to the assumption that generalised trust is an independent predictor of individual health. Our study is not alone in showing association between generalised trust and SRH (for examples see Giordano & Lindström, 2010; Hyypää, Mäki, Impivaara, & Aromaa, 2007; Kawachi et al., 1999, 1997) but this study is the first of its kind to empirically confirm any temporal relationships, and hence infer causality.

Though ‘generalised trust’ has been identified and subsequently used as a proxy for social capital in empirical research for over twenty years (Coleman, 1988, 1990; Giordano & Lindström, 2011; Kawachi et al., 1997, 1999; Lindström, 2004; Putnam, 1993, 2000; Veenstra, 2000), there is surprisingly little discussion regarding what else ‘trust’ is hypothesised to measure, outside this specific field. To address this issue, we pose (and attempt to answer) three pertinent questions:

1) Why is generalised trust a proxy for social capital?

The concept of trust is debated across a variety of disciplines, from social science, philosophy, economics, political science and public health. There is consensus, however, that different forms of trust exist: generalised (also known as ‘horizontal’) trust is the form specifically reserved for strangers (vs. particularized trust, the form reserved for known individuals or groups). Early social capital literature stresses the importance of both these trust variants to facilitate actions between individuals or groups (Coleman, 1988) i.e. without either form of trust there can be no social capital. Over time, however, generalised trust seems to have become the preferred social capital proxy. This is most likely due to the works of Robert Putnam (1993, 1995, 2000), and the assumption that individuals are all similarly influenced by the presence (or lack) of social capital (Coleman, 1990; Kawachi et al., 1997). On the surface this makes sense, as social capital has been described as a public good (Berkman & Kawachi, 2000, p.177) and by definition infers unconditional positive externalities (unintended benefits) to all. However, cross-level interactions have shown that this may be an oversimplification, as the health of individuals who do not share the social ‘norms’ (i.e. trust) of the community in which they reside, may be adversely affected (Subramanian et al., 2002). This apparent paradox suggests that joint particularized and generalised trust measures could provide a more robust social capital proxy in future research.

2) What else could ‘generalised trust’ measure?

There is contention across disciplines regarding the answer to this question and social capital researchers should carefully consider the implications. From an economic point of view, generalised trust is often considered a summary measure of individual experiences, good and bad, the assumption being that generalised trust levels can vary over time (Glaeser, Laibson, Scheinkman, & Souther, 2000). Though this opinion can also be found in political science, others within the field consider that generalised trust is determined in early life, levels being resistant to change irrespective of later-life experiences (Putnam, 2000; Uslaner, 2002). Our longitudinal data reveal that just over half of our sample (~55%) maintains the same trust levels over the seven-year study period, whereas ~45% of individuals vary their trust across the same time frame. We therefore can offer only some support for Uslaner’s concept of ‘moralistic’ (stable) trust; furthermore, Putnam’s belief that ‘...all of the decline in social trust since the 1960s is attributable to generational succession’ may be inadequate, as it does not explain individual fluctuations in trust over time, as seen in our data (Putnam, 2000, p.140).

Others within political science consider levels of generalised trust to reflect the function of State institutions (Levi, 1998). However, as empirical evidence shows only weak correlation between vertical trust (trust in institutions) and generalised trust (Rothstein, 2005; Uslaner, 2003) perhaps a more refined hypothesis is required. One such refinement is the theory that higher levels of generalised trust reflect State policies implemented to reduce inequalities, rather than State institutions themselves (Rothstein & Stolle, 2008; Uslaner, 2008).
Putnam implies that generalised trust is created as a by-product of increasing numbers of individuals interacting with each other via membership of community voluntary groups and local organisations (Putnam, 1995). That trust levels — in the USA at least — have declined over the same period that memberships in such local groups have declined is, for the most part, the backbone to Putnam’s recent social capital theories (Putnam, 2000). However, it is noteworthy that perceptions of inequality in America have also increased over a similar time frame; could it be that State policy, not declining voluntary group membership, has inadvertently contributed to the decline in generalised trust in the USA (Uslaner, 2002)?

3) What are possible mechanisms linking trust levels to health?

Mechanisms linking trust to health outcomes must depend on what trust is deemed to measure (see #2 above). If Putnam’s ideas are followed, trust is a by-product of increased social participation; therefore, logic dictates that trust is just one step along the pathway from participation to health. As to how participation influences health could therefore be via social support mechanisms, examples of which include instrumental, emotional and financial support. Our results reveal that high levels in social participation precede good SRH, lending partial weight to this hypothesis (though attenuated in our sensitivity test — see Table 3). That low levels of participation do not precede poor SRH in this study could imply that only longer term reduction in social participation leads to a decline in social support and worse health. Conversely, it has been argued that trust is in fact a prerequisite to participation (Rothstein & Stolle, 2003). If this is the case then it is trust, not participation, at the start of the causal pathway to health.

If higher trust levels are a reflection of efficient State institutions (Levi, 1998), it could be theorised that improved access to resources such as education, healthcare, rule of law, etc. is the real link from trust to health. However, that our data come from the UK, where access to such resources could be considered relatively homogeneous (compared to low- or middle-income countries) implies other mechanisms may also be at work.

If trust levels are considered a measure of egalitarian State policy designed to redistribute wealth and reduce inequality (Rothstein & Stolle, 2008; Uslaner, 2008), then maybe the pathway from trust to health is via psychosocial pathways. As described by Giordano et al. (2010), the authors employ Wilkinson’s (1996) theories as to how psychosocial pathways are a plausible mechanism from trust to health outcomes. Long term exposure to high levels of chronic stressors (considered by the authors as an indicator of low generalised trust levels) can, via the hypothalamic–pituitary–adrenal axis, lead to increased levels of blood cortisol, which in turn may lead to diseases such as depression and cardio-vascular disease (Shively, Musselman, & Willard, 2009; Watson & Mackin, 2006). It is feasible that egalitarian State policy could influence health outcomes directly, by addressing the negative effects of social stratification on individual health and indirectly, via the reduction of perceived chronic stressors with the creation of higher generalised trust levels.

Strengths and weaknesses

A major strength of this study is the fact that it is longitudinal, tracking the same individuals (N = 8114) at four points in time over seven years. The unique design captures association between all lagged (t – 1) explanatory variables and changes from baseline SRH at time (t), allowing us to infer causality by temporal relationships (Goodman & Phillips, 2005). To our knowledge, this is the first time that this has been attempted within the field of social capital. Disaggregation by baseline SRH also enables us to assess association between social capital and health in two large independent cohorts within the same study. Our findings are strengthened by the fact that we see similar patterns (albeit with some differences) for these two cohorts. The fact that the data were obtained via interview rather than relying on postal questionnaires contributed to the very high participation rate of around 90%, year on year (Taylor et al., 2010). By lagging (t – 1) all explanatory variables, including three different individual-level indicators of social capital, along with multiple SES, social support variables and confounders, we ensured that well-known health determinants were also included in the analyses.

A major limitation of this study is that the BHPS sample was originally selected to reflect the UK population as a whole and deliberately avoided oversampling of smaller sized communities, i.e., data are not particularly valuable when investigating ethnic diversity or urban vs. rural populations. Furthermore, our longitudinal data were unsuitable to perform any meaningful contextual analysis at the household- or community-level. Disaggregation of SRH in year 2000 could introduce bias (classification of exposure) at baseline; one way to reduce this potential bias could be to combine SRH responses from 2000 and 2003, however, this would leave just two further points in time to address issues of temporal relationships. As SRH is considered a valid and reliable indicator of morbidity and future mortality (Idler & Benyamini, 1997; Lopez, 2004), we feel that a single baseline measurement is sufficient. By year 2000, only 62.0% of the original cohort members were able to answer the questions posed (Taylor et al., 2010). This would have introduced further selection bias into this study.

Marital status was reduced to the dichotomous ‘married’ and ‘not married’; though this method of reduction has been previously validated (Affi, Cox, & Enns, 2006), it may hide more complex pathways regarding cohabitation, common in society today. The ‘lives alone’ variable was included in an attempt to recapture this detail.

Although temporal relationships are considered ‘essential’ in establishing causality, it is an oversimplification to assume that causality is proven solely based upon association shown in our results. To address this concern, we performed sensitivity testing — see ‘Statistical analyses’ and ‘Results’ sections for more detail. That association between trust at time (t – 1) and SRH at time (t) remained even after considering trust at time (t) serves to strengthen (in part) our hypothesis that levels of social capital at time point A are positively associated with SRH at time point B.

Conclusions

Our longitudinal study is the first of its kind to investigate temporal relationships between individual-level social capital proxies and self-rated health. It appears from our results that generalised trust can be considered an independent predictor of future health status. However, lack of consensus across a variety of disciplines as to what generalised trust could measure creates ambiguity as to which mechanisms link higher trust levels to better health. That ‘generalised’ trust is only weakly correlated with ‘vertical’ trust (in State institutions) and social participation implies that higher trust levels could reflect egalitarian State policy not State institutions, per se. It is feasible that such policies could influence health outcomes directly, through the redistribution of wealth and reduction of inequalities, and indirectly via the creation of higher levels of generalised trust.

Acknowledgements

The data used in this study were made available through the UK Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex (now

Please cite this article in press as: Giordano, G. N., et al., Social capital and self-rated health — A study of temporal (causal) relationships, Social Science & Medicine xxx (2012) 1–9
incorporated within the Institute for Social and Economic Research). Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here.

This study was supported by the Swedish Research Council (Vetenskapsrådet) (K2008-70X01-3), the Swedish Research Council Linnaeus Centre for Economic Demography (VR 79), the Research Funds of Malmö University Hospital (ALF MM 2011/1816) and the Strategic Research Network “Epidemiology for Health”, EpiHealth, at the Lund and Uppsala Universities, Sweden. We would also like to acknowledge Professor Tommy Bengtsson (Lund University) for his insightful comments regarding our methodology.

Appendix A

To determine social participation levels, respondents were asked if they were active members of any local group or organisation listed below:

- Political party, trade union, environmental group, parents'/school association, tenants'/residents' group or neighbourhood watch, church organisation, voluntary service group, pensioners group/organisation, social club/working men's club, sports club or Women's Institute.

The six occupation categories, as per the Registrar General's Social Classification of occupations are: i) Professional, ii) Managerial/Technical, iii) Skilled (non-manual), iv) Skilled (manual), iv) Partly Skilled and v) Unskilled.

References


StataCorp. (2009). Stata statistical software. College Station, TX: StataCorp LP.


Please cite this article in press as: Giordano, G. N., et al. Social capital and self-rated health – A Study of temporal (causal) relationships, Social Science & Medicine (2012), doi:10.1016/j.socscimed.2012.03.011