

A systematic review of social capital and chronic non-communicable diseases

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Summary Nowadays, chronic non-communicable diseases have become a significant social problem of healthcare which threatens human health along with their rapid progress of morbidity and mortality. How to develop potential, intangible resources to compensate for insufficient physical resources is urgent. By analyzing literature reporting the association between social capital and chronic non-communicable diseases systematically, evidence was found for a positive association between social capital and chronic non-communicable disease prevention and control. The social capital theory may provide a new idea to solve the problem.

Keywords: Social capital, chronic non-communicable diseases, systematic review

1. Introduction

Chronic non-communicable diseases (NCDs), also known as chronic diseases, are a series of diseases which don't pass from person to person. They are of long duration and generally have slow progression (1). The four main types of NCDs are cardiovascular diseases (CVD), cancers, chronic respiratory diseases (COPD), and diabetes, which make the largest contribution to morbidity and mortality of NCDs (2). Along with the rapid development of social economy, lifestyle changes, urbanization speeding up and population aging, NCDs constitute the largest burden of morbidity and mortality (3), especially in low and middle income countries (LMICs) (4). NCDs pose a heavy financial burden on many affected residents, which impose insurmountable barriers to access essential healthcare for the poor (5). How to effectively prevent and control NCDs is no longer a simple health problem, but a social problem. Addressing primary prevention and equity of health systems by national NCD policies needs a long time to wait in most LMICs.

How to develop potential, intangible resources to compensate for insufficient physical resources is urgent.

With growing recognition of the social determinants of health, social capital is an increasingly important construct in healthcare (6). Social capital theory originated from the interdisciplinary union of sociology and economics, activated in every field of social development. There are many definitions of social capital according to systematic review. Bourdier seemed to be the first to dedicate an entire work to the concept, while further refinements came from Coleman, Putnam, Leonardi, Nanetti, Portes and others (7). The most accessible definition of social capital used in healthcare originated with Putnam (8).

According to Putnam, social capital is defined as "features of social organization, such as trust, norms and networks, which can improve the efficacy of society by facilitating coordinated actions" (9). The concept represents the resources available to members of tightly knit communities, and tends to emphasize social capital as a group attribute or contextual concept (10), which may work on individual health by contextual influence. The contextual level can be further divided into 4 analytic levels: the "macro" level (social, political and economic context), the "meso" level (neighborhood or community), individual-level behaviors, and individual-level attitudes (7). The former 2 levels can be summarized as the ecological level, and the latter as individual level. Meanwhile, the concept of social capital can be defined as the "network" theory,

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and is equal to resources which may be acquired through individual's social networks (6). This resource concept also can be summarized as individual level.

There are enough consensuses to draw some important generalizations about the nature of social capital (10). The behavioral manifestations of civic engagement or members participation can be classified as structural social capital, and those subjective attitudes (interpersonal trust and norms of reciprocity) as cognitive social capital (11). Social capital also can be broken down into bonding, bridging, and linking social capital by the interpersonal relationship between different social identity (12). Bonding social capital represents the strong ties between homogeneous groups, such as family and company. In contrast, bridging social capital represents the weak ties between heterogeneous groups, differing by age, ethnic group, class, etc. Linking social capital refers to norms of respect and trusting relationships across power or authority gradients in society (13). No matter how to classify, social capital has still been measured via individual cognition and behavior in the health field.

In this paper, we present a systematic review of the quantitative studies that have investigated the association between social capital and NCDs (the four main types), and explore the role of social capital in NCD prevention and control.

2. Methods

2.1. Literature search

In order to identify all quantitative studies investigating the association between social capital and NCDs published up to 1 July 2014, a review protocol was developed. 6 electronic databases (PubMed, Biosis Previews, EBSCO, ELSEVIER ScienceDirect, Wiley Online Library, SCIE, JCR) in our school library were searched using Medical Subject Headings ("Chronic Disease" or Cancer or Diabetes or "Cardiovascular Diseases" or COPD) and keywords "Social Capital". The search strategy is shown in Supplementary Data. First, duplicated studies were excluded. Second, the abstracts of all studies were reviewed, and those against inclusion criteria were removed. The inclusion criteria were as follows: studies were included if they had a NCDs outcome, but excluded if NCDs were confounding factors. Studies were included if they measured social capital, and analyzed the association between social capital and NCDs. The references of included studies were identified in the same way.

2.2. Data extraction and analysis

The full texts of included studies were reviewed. The data of setting, study design, population, sample size, social capital measurement, health outcomes, validity

and results of each study was extracted. Effect estimates were extracted separately and later classified by the four types of NCDs and two types (structural/cognitive) and two levels (ecological/individual) of social capital. Because differences in the measurement of social capital and NCDs made meta-analysis impossible, we adopted the method of grouping results developed by Ramirez *et al.* (14). The association between social capital and NCDs of each included study was classified into one of three categories as follows: an inverse association between social capital and NCDs significant at the 5% level (high levels of social capital associated with lower risk of NCDs), no association between social capital and NCDs not statistically significant at the 5% level, and a positive association between social capital and NCDs significant at the 5% level (high levels of social capital associated with higher risk of NCDs). The combined association between social capital and the risk of NCDs was evaluated after the number of included studies in each category was counted. Each study was evaluated using a 9 point validity checklist covering problems (8).

3. Results

3.1. Studies selection

Figure 1 shows the procedure of studies selection. Totally 316 studies from 6 databases were searched, 87 studies were excluded as duplicates. After reviewing the abstract of the rest of the studies, only 15 studies met inclusion criteria. Two studies were identified through reference searching, making a total of 17 studies in this review.

3.2. Characteristics of the included studies

Characteristics of included studies measuring NCDs and social capital are shown in Table 1. Only 1 study

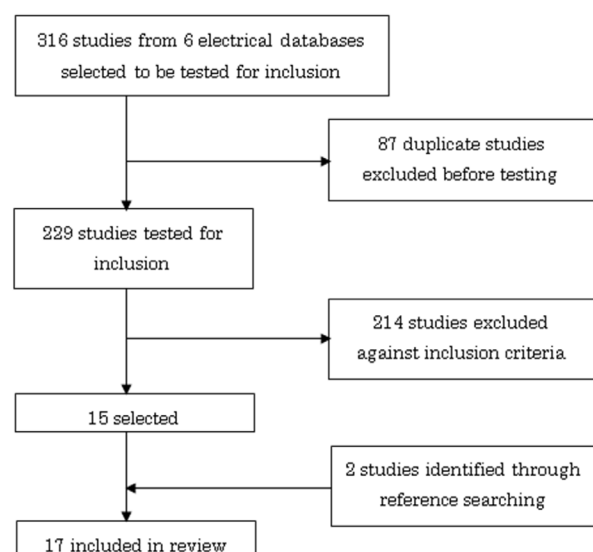


Figure 1. Procedure of studies selection.

Table 1. Characteristics of the 17 studies measuring NCDs and social capital

Reference	Setting	Study design	Population	Sample size	Social capital measure	NCDs measure	Validity
Kawachi <i>et al.</i> , 1997 (15)	USA 39 states	Cross-sectional ecologic study	18+ years	7654	trust, fairness, help group membership aggregated to state level	Age-adjusted mortality rates of CVD and cancer	1, 3, 5
Lynch <i>et al.</i> , 2001 (16)	16 OECD countries	Cross-national study	All years	N.S.	trust belonging to organizations, volunteering aggregated to countries level	Mortality rates of CVD, cancer, diabetes, COPD	1, 3, 5, 7
Lochner <i>et al.</i> , 2003 (17)	USA, Chicago	Cross-sectional study	45-64 years in 342 neighborhood	N.S.	reciprocity, trust civic participation aggregated to neighborhood-level	Mortality rates of CVD and cancer	1, 3, 5
Franzini <i>et al.</i> , 2003 (18)	USA, Texas	Cross-level analyses	25+ years	50268	homeownership, crime index county level	Years of potential life lost to cardiovascular disease	1, 2, 3, 4
Veenstra <i>et al.</i> , 2005 (19)	Canada, Hamilton	Cross-sectional study	Adult	1504	involvement individual level	The number of chronic conditions	2, 3, 5, 8, 9
Ahern <i>et al.</i> , 2005 (20)	USA	Cross-sectional study	25+ years	769	reciprocity, trust at collective level amount of social support, quality of individual level	Diabetes	1, 3, 4, 6, 8
Ali <i>et al.</i> , 2006 (21)	Southern Sweden, Scania	Prospective cohort study	18-80 years	13322	trust, social participation the combination of C and S individual level	The incidence of CVD	3, 6
Holtergrave <i>et al.</i> , 2006 (22)	USA, 48 states	Cross-sectional study	18+ years	Nearly 500000	a combination of 14 variables aggregated to state level	Percentage of diabetes	1, 2, 3
Sundquist <i>et al.</i> , 2006 (23)	Sweden	Prospective cohort study	45-74 years	2805679	proportions of individuals voting in local government elections at neighborhood level	Incidence of CVD	1, 2, 3
Hyypya <i>et al.</i> , 2007 (24)	Finland	Prospective cohort study	30-99 years	7217	interpersonal trust, residential stability, leisure participation individual level	CVD mortality	1, 3, 4
Scheffler <i>et al.</i> , 2008 (25)	USA, Northern California	Retrospective cohort study	30-85 years hospitalized for acute coronary syndrome	34752 residents in 35 counties	the Petris Social Capital Index (PSCI) county level	Recurrence of acute coronary syndrome	1, 2, 3
Islam <i>et al.</i> , 2008 (26)	Sweden	Retrospective cohort study	20-84 years	94537	election participation rate crime rate municipal level	Cancer and CVD mortality	1, 2, 3

Key to methodological limitations: Measurement of social capital: 1, secondary analysis of survey questions to measure social capital; 2, combined all aspects of social capital into one score, or only measured one aspect of social capital; 3, didn't mention the validity of social capital measurement; 4, can't represent respondents' views of their community. Methodological limitations: 5, tested the relationship between social capital and NCDs not a stated objective of the study; 6, response rate less than 60%. Features of analysis limitations: 7, lacked control for confounding by socioeconomic status; 8, used only single level modeling while hierarchical data structure (individual and contextual level variables) existed; 9, contextual level disorder, violence or psychological resources adjusted for.

(To continue)

Table 1. Characteristics of the 17 studies measuring NCDs and social capital (Continued)

Reference	Setting	Study design	Population	Sample size	Social capital measure	NCDs measure	Validity
Long <i>et al.</i> , 2010 (27)	USA, Philadelphia, 69 neighborhoods	Cross-sectional study	29+ years Black veterans with diabetes	294	COMM, HELP, IMPROVE, BELONG, TRUST, PARTICIP aggregated to neighborhood level	HbA1c level	1, 3
Farajzadegan <i>et al.</i> , 2013 (28)	Iran, Isfahan	Cross-sectional study	30+ years Patients with type 2 diabetes	120	trust and solidarity, collective action and cooperation, information and communication, social cohesion and inclusion, empowerment and political action, groups and networks individual level	HbA1c level	3, 4
Muenig <i>et al.</i> , 2013 (29)	USA	Retrospective cohort study	18-65 years	12626, 12625, 12626, 3480, 12630	visit friends or relatives, visit neighbors, attend church, attend meetings, belong to clubs individual level	CVD mortality	1, 2, 3, 4, 5
Riumallo-Herr <i>et al.</i> , 2014 (30)	Chile	Cross-sectional study	30+ years	4956	social support, generalized trust, neighborhood trust individual level	Diabetes	2, 3, 4
Sundquist <i>et al.</i> , 2014 (31)	Sweden	Prospective cohort study	65+ years	1517336	rate of voting in local government elections neighborhood level	Mortality of CVD, Cancer, COPD and diabetes	1, 2, 3

Key to methodological limitations: Measurement of social capital: 1, secondary analysis of survey questions to measure social capital; 2, combined all aspects of social capital into one score, or only measured one aspect of social capital; 3, didn't mention the validity of social capital measurement; 4, can't represent respondents' views of their community. Methodological limitations: 5, tested the relationship between social capital and NCDs not a stated objective of the study; 6, response rate less than 60%; Features of analysis limitations: 7, lacked control for confounding by socioeconomic status; 8, used only single level modeling while hierarchical data structure (individual and contextual level variables) existed; 9, contextual level disorder, violence or psychological resources adjusted for.

was set in LMIC according to the World Bank database, the majority of the studies were set in European and American countries, and nearly one half of the studies were set in USA. Seven studies used cohort study, and 10 used cross-sectional study. Sixteen studies chose adults as respondents, and 1 all years. Two studies didn't show sample size as they used secondary statistic data at the ecological level. Compared to ordinary data, sample size of studies referred to respondents with NCDs was much less.

Even though measurement of social capital was diverse, they can be concluded as cognitive and structural social capital. Variables of individual cognition can be summarized as cognitive social capital, like trust, fairness, help, support and reciprocity *et al.* Other variables of individual behavior can be summarized as structural social capital, like membership, participation, voting or election, homeownership and crime rate *et al.* Ten studies measured social capital at the ecological level, and 6 at the individual level, and 1 at both levels. The way to measure social capital was usually by questionnaire.

Seven studies used mortality as health outcomes, and 8 used morbidity, and 2 used glycosylated hemoglobin (HbA1c) level. Eleven studies examined CVD, 7 studies examined diabetes, 5 studies examined cancer, and 2 studies examined COPD. Eight studies used ICD-9 or ICD-10 to classify NCDs, and the remainder used clinic diagnosis.

Table 1 shows the methodological validity of each study. All included studies had a number of methodological limitations. No information in validity of social capital measurement was the common problem in each study. Thirteen studies were secondary analyses of survey data not specifically designed to measure social capital, 8 studies only measured one aspect of social capital or combined different aspects of social capital into one score, 5 studies included problem 4 and 5, and other limitations were in the minority. The sample sizes were not summarized in the late analysis as 2 studies did not mention their sample size.

3.3. The association between social capital and NCDs

The results of included studies are extracted and summarized in Table 2. There was a little evidence of an inverse association between social capital (cognitive/structural) and cardiovascular diseases, with 9 of 15 effected estimates reporting high levels of social capital associated with lower risk level of cardiovascular diseases. Four of 6 effected estimates showed a significant inverse association between cognitive social capital and diabetes, while 1 study reported a significant positive association, and the association between structural social capital and diabetes was inclined to have no association, while 1 reported a significant inverse association. The association between cognitive

Table 2. Summary of data on the association between social capital (cognitive/structural) and NCDs

Items	Number of effect estimates			
	Number of effect estimates	Inverse association	No association	Positive association
Cognitive social capital				
CVD	5	3	2	0
Diabetes	6	4	1	1
Cancer	3	1	2	0
COPD	1	0	1	0
Total	15	8	6	1
Structural social capital				
CVD	10	6	4	0
Diabetes	3	1	2	0
Cancer	5	3	2	0
COPD	2	1	1	0
Total	20	11	9	0

Combined social capital and the number of chronic conditions not included.

Table 3. Summary of data on the association between social capital (individual/ecological level) and NCDs

Items	Number of effect estimates			
	Number of effect estimates	Inverse association	No association	Positive association
Individual level				
CVD	3	2	1	0
Diabetes	4	3	0	1
Cancer	0	0	0	0
COPD	0	0	0	0
Total	7	5	1	1
Ecological level				
CVD	8	7	1	0
Diabetes	4	3	1	0
Cancer	5	3	2	0
COPD	2	1	1	0
Total	19	14	5	0

social capital and cancer was a little inclined to have no association, and structural social capital to have an inverse association. The association between social capital (cognitive/structural) and COPD was inclined to have no association.

The results of included studies summarized in Table 3 according to individual and ecological levels of social capital, and most of the effected estimates were at the ecological level. While at the individual level, there was a little evidence of inverse associations between social capital and NCDs (CVD and diabetes), and studies which referred to cancer and COPD were not found. While at the ecological level, there was strong evidence of an inverse association between social capital and CVD, and a little evidence of inverse associations with diabetes and cancer, and no association with COPD.

4. Discussion

In this review, most studies are from Occident in 17 included articles, while in LMIC these kinds of studies are rare (15-31), so the effect of social capital on NCDs in these countries is not known. Social capital was

measured by individual cognition and behavior, and the ecological data were aggregated from the individual level, and there is no effective method to measure social capital precisely and directly at present. As affected by individual subject and object factors, the included studies had more or less methodological limitations, and there is a need to pay attention in future research.

According to Table 2, cognitive social capital was inclined to be inversely associated with CVD and diabetes, and structural social capital was inclined to be inversely associated with CVD and cancer. When classified at individual and ecological levels, social capital was strong evidence of an inverse association with NCDs. The quantitative studies of social capital and NCDs are few, on the other hand, as the set of included studies, residents may have high level of healthcare, and the effect of social capital may not emerge in some NCDs. The more healthy people are more likely to join in leisure participation or organizations (32). These biases may influence the association between structural social capital and NCDs.

Social capital is the product of human socialization, some research have even regarded it as a public

commodity (33,34). Investment in social capital is the result of conscious or unconscious human investment strategy, and aimed at minimizing survival risk. Even though causal mechanisms through which social capital could affect NCDs were unclear. The mechanisms that social capital exerts a contextual effect on human health may conclude diffusing the knowledge of health promotion, keeping healthy behavior by informal social control, access to healthcare services and amenities, and receiving emotional or material support and mutual respect based on social network and participation (11). The higher the stocks of social capital the higher appearance to health achievement of a given area (35). Local residents could increase exposure to health messages, influence health promotion by informal social control, and eventually result in public health outcomes (36). Strengthening the stocks of social capital in communities may provide an important buffer for reducing socioeconomic disparities and affording a relatively equal healthcare system, especially in LMIC.

This review was subject to a number of limitations. First, 6 electronic databases were searched, other published studies which followed our criterion in unselected databases may not be included. Still there might be unpublished studies by research groups who have not published material about social capital and NCDs and may be under-represented. All included studies in English, and language bias may be overlooked. Second, differences in the measurement of social capital and NCDs made formal meta-analysis impossible. Each effected estimate was not given a weight to all included studies and that equivalent effect of each study was summarized in this review.

In conclusion, evidence was found for a positive association between social capital and NCD prevention and control despite various measurements. The social capital theory may provide a new idea to solve the shortage problem of physical resources in NCD prevention and control, especially in LMIC. Further study is urgently required to explore the effect of social capital in NCD prevention, control and management in LMIC.

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