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ORIGINAL INVESTIGATION

Measuring aspects of social capital in a gerontological perspective

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Abstract Within the last 10 years, there has been a growing interest in the importance of social capital and older people. The aims of the study are to advance measurements of aspects of social capital based on bonding, bridging and linking that can be used to study the impact of the local community on community-dwelling older populations and to study the distribution of these three measurements of social capital in 34 municipalities. Data are from a Danish prospective cohort study on preventive home visits among 4,034 old people 75+ in 34 municipalities in Denmark. The measurements of aspects of social capital at community level are based on theory of bonding, bridging and linking social capital. It has been possible to analyse variations in the three measurements of social capital in the 34 municipalities and to characterize different municipalities according to high versus low social capital. There are interesting patterns in distribution of the three measurements. The two extreme groups of municipalities (high and low social capital) differ with regard to demography, social and structural conditions in the municipalities. We believe that the proposed measures of social capital will be relevant in future studies of social capital and health in older populations, since they are theoretically based and cover different aspects of social capital related to older people and their local community.

Keywords Social capital · Older people · Bonding · Bridging · Linking · Social inequalities

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Introduction

Within the last 10 years, there has been a growing interest in the importance of social capital for older people. They may be more influenced by the environment of their residential area, since they may spend more time at home, rely more on local resources to achieve a better quality of life and may be more emotionally attached to their communities (Wen et al. 2005). Social capital is one suggestion for explaining the 'place effects'. Macintyre and colleagues have suggested a conceptual framework of what constitutes a healthy neighbourhood. They point at a sociocultural feature of a neighbourhood, which includes the political, economic, ethnic and religious history of a community: norms and values, the degree of community integration, levels of crime, incivilities and other threats to personal safety, and networks of community support (Macintyre et al. 2002).

Other disciplines within gerontology are concerned with the place where older people live and the impact on older peoples' everyday life. For instance, there are similarities

between environmental gerontology and social capital theories. But where environmental gerontology has focus on the interaction between place, architecture and planning professions based on theories from psychology and geography (Kendig 2003; Scheidt and Windley 2006; Wahl and Oswald 2010), social capital has focus on different networks in the local community and the interactions between individuals in these networks. In environmental gerontology, the predominant theories used derive from psychology and geography, whereas the concept of social capital origins from sociological and political science theories. Theoretically, social capital has been defined at both individual level and system level. But where social capital at individual level reflects resources for the individual in the social network, social capital at system level or contextual level is relationally anchored resources, which have impact on the quality and ability of the system in the community.

During the last two decades, several theories of social capital have been adduced. One of the most well known is the theory by Robert Putnam. He 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" (Putnam 1993, p 167). Social capital is taking place in different networks in the local community. Group members in a network share norms, values and expectancies. A third component of social capital includes sanctions—punishments and rewards—that help to maintain the norms and network. Putnam distinguishes between bonding and bridging. Bonding social capital refers to trusting and co-operative relations between members of a network who see themselves as being similar in terms of their shared social identity (Szreter and Woolcock 2004) and is characterized by strong ties and close social relations. Bridging is opposite to bonding and comprises relations of respect and mutuality between people who know that they are not alike in some sociodemographic sense (social identity, age, ethnic group, etc.) (Szreter and Woolcock 2004). Further, Szreter and Woolcock (2004) introduced the concept of linking, which has the governance aspect of social capital and can be defined as norms of respect and networks trusting relationships between people who are interacting across explicit, formal or institutionalized power or authority gradients in society.

In studies in older adults, social capital has been measured in many ways. Different kinds of contextual or compositional measurements have been used, as well as participation in elections, crime rates, sociodemographic characteristics, different kinds of measurements related to the neighbourhood characteristics, and measures of social relations at the individual level (Bowling et al. 2002; Young et al. 2004; Locher et al. 2005; Stafford et al. 2005; Cagney 2006; Wight et al. 2006; Bowling and Stafford 2007; Kondo et al. 2007; Islam et al. 2008; Nummela et al. 2008; Subramanian et al. 2008). Previous studies are characterized by using broad age groups (from young to old people) in the same study (Hyyppä et al. 2007; Cagney and Wen 2008; Engström et al. 2008). Further, the studies do not reflect common definitions of social capital, and often they only measure few aspects of social capital or they combine different aspects of social capital into one score (De Silva 2006; Harpham 2008).

Although previous measures do include different aspects of social capital, we find it relevant and necessary to propose measures of social capital that is theoretically based. Along this line, the concepts of bonding, bridging and linking could be a useful base for developing good measures of social capital. This will help elucidate how different aspects of social capital influence older peoples' everyday life and if some aspects of social capital are more important than others in this matter.

The aims of the study are to advance measurements of aspects of social capital based on bonding, bridging and linking that can be used to study the impact of the local community on community-dwelling older populations and to study the distribution of these measurements of bonding, bridging and linking in the 34 municipalities. The measurements will be at contextual level, and data will be either compositional from aggregated data or direct contextual data.

Materials and methods

The study is based on secondary analyses from the Danish Intervention Study of Preventive Home Visits (DIPHV), a population-based prospective controlled study in 34 Danish municipalities on the effects of an educational intervention of home visitors (for details see Vass et al. 2002). Data are derived from a questionnaire study among old individuals living in the 34 municipalities, from interviews with the chairmen of the senior citizens councils in the municipalities and from Statistics Denmark. By using three different data sources from the DIPHV, it is possible to provide operationalizations of all three aspects of social capital.

Municipalities

In 1998, it was made compulsory by law that the municipalities in Denmark should offer all citizens aged 75 years and older two annual preventive home visits. The home visits should be offered to the citizens regardless of their frailty status. According to the law, the main purpose of the visits was to support personal resources and networking and offer social support, thereby preserving functional ability (Vass et al. 2002). Study municipalities were

included if they offered preventive home visits as prescribed by law, were able to facilitate fair or good rehabilitation and if GPs were able to participate by contract. In 1998, when the study started, there were 14 counties and 275 municipalities in Denmark. In the four chosen counties, 50 of 81 municipalities met the inclusion criteria and were invited; 34 municipalities agreed to participate.

A large proportion of the municipalities wanted to participate in the study to facilitate the implementation of the national legislation. The main reason for declining to participate in the study was that the head of the home visitation scheme did not accept the risk of becoming a control municipality. Other municipality home visitation heads did not want to be restricted to the study intervention way of performing the home visits and therefore declined participation. Finally, some municipalities did not yet fulfil the state law obligation from 1996 of offering the home visits, even though the recruitment took place in autumn 1998. Detailed information about the study design has been published elsewhere (Vass et al. 2002). No demographic differences were seen between the participating 34 and the remaining 16 eligible municipalities (Vass et al. 2004, 2005). The participating municipalities constituted a selected group, since they had to fulfil the demands of offering preventive home visits and be able to offer a certain level of rehabilitation to their older citizens.

Data on the municipalities came from two sources: interviews with municipality staff and Statistics Denmark. The voting rates at the election for senior councils in 1998 in each municipality have been collected by contacting the municipalities subsequently. Data about the municipalities' health and social expenses for people 65+ have been obtained from Statistics Denmark for the purpose of the present study.

Altogether, 5,788 non-institutionalized citizens living in the 34 municipalities born in 1918 (80-year cohort) or 1923/1924 (75-year cohort) were invited. Addresses were drawn from the Civil Registration Office. Written consent was obtained from 4,060 persons (participation rate 70.1%). Twenty-two persons died, and four were institutionalized before the intervention started ($n = 4{,}034$) (Vass et al. 2007). The participants answered a questionnaire at baseline, 1½-, 3- and 4½-year follow-up. In the present study, most data were from the baseline study and one question from the 3-year follow-up study.

Measures

The measures are based on contextual data directly collected from the municipalities and on compositional data, i.e. individual data from the questionnaire study aggregated to community level. The aim is to categorize the 34 municipalities into three groups reflecting the level of bonding, bridging and linking social capital. The search for variables that cover the three aspects of social capital is theoretically driven. An overview of the three measurements and their items can be seen in Fig. 1.

Bonding

Three aspects of social relations from the baseline questionnaire are used to create a measurement of bonding: social participation, social diversity and satisfaction with social relations. The questions about social relations in the questionnaire are aimed at the social relations with persons like themselves, and therefore, these items are used for the bonding measurement. They are measured at individual level and aggregated to community level. See Fig. 1 for further details on the questions. Social participation is often used as a measure of social capital (Putnam 2000; Lindström et al. 2002; Hyyppä et al. 2007), whereas the use of other aspects of social relations or combined measures of social relations have, to our knowledge, not earlier been included in measures of social capital. Cattel's (2001) study about the mediating role of social networks and social capital shows that some types of social networks facilitate social capital, while other types do not. It is plausible that a high level of diversity in social relations and high level of social participation in a municipality can indicate a civic engagement and mutual interest among people, which might lead to higher level of social capital. Further, it is possible that higher local social activity and engagement in the local community might affect the level of satisfaction with social relations. It is thus plausible according to the definition by Cattel (2001) that the proposed bonding measurement reflects a homogeneous network.

(1) Social participation was measured by three items (i) paying monthly (once or more) visits to others (1 = yes and 0 = no), (ii) receiving monthly (once or more) visits at home (1 = yes and 0 = no) and (iii) participating in monthly (once or more) social activities outside the home (1 = yes and 0 = no). Total range of the social participation range is 0–3. We defined persons with low social participation as persons belonging to the categories 0 (no in all three questions) and 1 (yes in only one of the three questions).

(2) Diversity in social relations was measured as number of categories with which the participants had personal contact at least once a month: children, grandchildren/great grandchildren, siblings, other relatives and friends/acquaintances (range 0–5). We defined persons with low social diversity as persons belonging to the categories 0 and 1 (none or only one type of monthly contact).

Social capital variables	Individual level			Municipality level	
	Items	**Contents**	**Range**	**Definition of "lowest" category**	**Forming the three main social capital variables**
Bonding	*Social participation*	How often do You participate in leisure activities outside Your home (teaching, lectures, association activities, clubs, church, cinema, theatre, museum)? *(Never; seldom, not every month; once or twice a month; several times a month; several times a week)*	0 (no social activities outside the home, visits in the home or visits outside the home within the last month) – 3 (both social activities outside the home, visits in the home and visits outside the home within the last month)	Municipalities where the participants are categorized with 0-1 (no or only one type of social participation during the last month) in the combined social participation variable	Bonding variable, based on the items: Social participation, social diversity, satisfaction with social relations : Low = Municipalities with 0-1 in two or all three items Medium = Municipalities with 0-1 in only one item High= Municipalities without 0-1 in any item
		Have you had anyone visit you in your home within the past month? *(No; yes, once or twice; yes, several times)*			
		Have you yourself visited others within the past month? *(No; yes, once or twice; yes, several times)*			
	Social diversity	Do You have grandchildren/ great-grandchildren, whom you have seen within the past month? *(No; yes, once or twice; yes, several times)*	Range 0 (0 = no contacts during the last month) – 5 (contact with all types in the social network at least monthly)	Municipalities where the participants are categorized with 0-1 (no or only monthly with one type in the network) in the combined social diversity variable	
		Do You have siblings, whom You have seen within the past month? *(No; yes, once or twice; yes, several times)*			
		Do You have other relatives, whom You have seen within the past month? *(No; yes, once or twice; yes, several times)*			
		Do You have friends and acquaintances, which You have seen within the past month? *(No; yes, once or twice; yes, several times)*			
	Satisfaction with social relations	How satisfied are you, all in all with the contacts you have with other people? *(Very satisfied; reasonably satisfied; neither satisfied nor dissatisfied; a little dissatisfied; very dissatisfied)*	Range 0 (0=Very satisfied) – 4 (4= very dissatisfied)	Municipalities where the participants are categorized with 2-4 (neither satisfied nor dissatisfied, a little dissatisfied, or very dissatisfied) in the combined satisfaction with social relations variable.	
Bridging	*Level of burglaries in the municipalities*	An average over five years (1998-2002) on reported incidents of burglaries per 1,000 inhabitants has been calculated for each municipality. The types of burglaries are, burglaries in banks, shops, houses, apartments, shopliftings, and other unspecified burglaries.	An average over five years (1998-2002) on reported incidents of burglaries per 1,000 inhabitants has been calculated for each municipality.	The 11 municipalities (lowest tertile) with the highest incidents of burglaries per 1,000 inhabitants.	Bridging variable, based on the items: Levels of burglaries and violence in the municipalities Low = Municipalities with both items in the lowest tertile Medium = Municipalities with one item in the lowest tertile High= Municipalities with no items in the lowest tertile
	Level of violence in the municipalities	An average over five years (1998-2002) of simple and more serious violence acts per 1,000 inhabitants has been calculated for each municipality.	An average over five years (1998-2002) of simple and more serious violence acts per 1,000 inhabitants has been calculated for each municipality.	The 11 municipalities (lowest tertile) with the highest incidents of violent acts per 1,000 inhabitants.	
Linking	*Expressed trust to home care*	"Do you trust the home care in your municipality" *(Yes/no)*	Range 0 (0=yes)-1 (1=no)	Municipalities where the participants are categorized with 1 (1= do not trust the home care in your municipality) variable	Linking variable based on the items: expressed trust to the home care, voting rate for senior council, staffing of preventive home visits, health and social expenses: Low= municipalities in the lowest tertiles in two or more items Medium=municipalities in the lowest tertiles in only one item High= municipalities with no items in the lowest tertile
	Voting rate for senior council in the municipalities	Voting rate for senior council in the municipalities from the election in 1998.	Percentage of the electors, who actually voted.	The 11 municipalities (lowest tertile) with the lowest voting rate at the senior council election in 1998.	
	Staffing of preventive home visits	Staffing of the preventive home visits	Full-time-job of preventive home visits per 100 persons 75+ in the municipality	The 11 municipalities (lowest tertile) with the lowest staffing of preventive home visits per 100 persons 75+	
	Health and social expenses for people 65+ in the municipalities	Health and social expenses, incl. expense for rehabilitation sheltered housing units, home care, prevention efforts, long-term care institutions, technical remedies.	Health and social expenses (net) per inhabitant 67+ in Danish Crowns (DKK).	The 11 municipalities (lowest tertile) with the lowest health and social expenses per inhabitant 67+.	

Fig. 1 Items and contents of the measurements of bonding, bridging and linking

(3) Satisfaction with social relations was measured by the question: all things considered, how satisfied or dissatisfied are you with the contacts you have to other people? With categories very satisfied versus fairly satisfied, neither satisfied nor dissatisfied, a little dissatisfied, very dissatisfied. We defined persons with low satisfaction with social relations as persons answering neither satisfied nor dissatisfied, a little dissatisfied, or very dissatisfied to the question.

A test–retest study of the included items of social relations showed that the agreement percents were between 72 and 100 and the kappa values between 0.501 and 1.0 for all items. Further, in-depth interviews demonstrated high face and content validity of the social relations measures used (Due et al. 1999).

In every item of social relations (social participation, social diversity and satisfaction with social relation), the municipalities were divided into tertiles by the proportion of the lowest category in every item. The lowest tertile for each item thus comprised the 11 municipalities with the lowest level of social relations in that item (see Fig. 1). Then, the items were combined into a variable of bonding with three categories: (1) high level of bonding, i.e. municipalities in the highest tertile in all of the three items of social relations, (2) medium level of bonding, i.e. municipalities in the lowest tertile in only one of the three items of social relations and (3) low level of bonding, i.e. municipalities in the lowest tertile in two or in all three items. The rationale for this categorization was an arbitrary choice that would give an appropriate distribution of the categories in the bonding measurement.

Bridging

Bridging was measured by levels of crime in the municipalities. There are several arguments for using crime rates as a bridging measurement. Neighbourhood crime has been found to be strongly predicted by collective efficacy, which is explained by the willingness of people to intervene for the good of the community and the linkage of mutual trust within a community (Sampson and Raudenbush 1997). Collective efficacy, which is closely related to social capital (Coleman 1990; Kawachi et al. 1999; Cohen et al. 2006), is defined as the norms and networks that enable collective action and coherence (e.g. between individuals across social identities like age, social status, ethnic group in a local community). In their study about crime, deprivation and social capital, Kawachi et al. (1999) conclude that crime is a mirror of the quality of the social environment. Further, crime rates are purely contextual and independent from data collected from a survey.

(1) Level of burglaries in the municipalities. An average over 5 years (1998–2002) on reported incidents of burglaries per 1,000 inhabitants was calculated for each municipality. The types of burglaries are burglaries in banks, shops, houses, apartments, shoplifting and other unspecified burglaries.
(2) Level of violence in the municipalities. An average over 5 years (1998–2002) of simple and more serious violence acts per 1,000 inhabitants was calculated for each municipality.

In both items on level of burglaries and level of violent acts, the municipalities were divided into tertiles. The lowest tertile in an item comprises the 11 municipalities with the highest incidents of crime. Hereafter, the two items were combined into a variable of aspects of bridging with three categories: (1) high level of bridging, i.e. municipalities with no items in the lowest tertile, (2) medium level of bridging, i.e. municipalities with one item in the lowest tertile and (3) low level of bridging, i.e. municipalities with both items in the lowest tertile. This sorting gives an appropriate distribution of the categories, but the underlying rationale is arbitrary.

Linking

Four different measures were used to measure linking. Two of the measurements had the individuals' perspective on the politicians and authorities and tried to capture the individuals' feeling of respect from the authorities and whether the individuals felt that they had influence on the politics concerning older people. The two measurements are expressed trust to the home care in the municipality and voting rate for senior council in the municipalities.

(1) Information about expressed trust to the home care by older people living in the municipality is from the questionnaire at 3-year follow-up. We defined people not having trust to the home care in the municipality as people, who answered "No" to the question. The measurement reflects the proportion of old people, who did not trust the home care. To our knowledge, the measurement of expressed trust to the home care has not earlier been used in measurements of social capital.
(2) Data on voting rate for senior council in the municipalities from the election in 1998 were received from subsequent telephone contact(s) with the municipalities. The voting rate for senior council in the municipalities can be interpreted as to what extent the older people in a municipality felt that they might have influence on the policies concerning old people's lives.

The other two measurements of linking concern the politicians' attitude towards the older people in the municipality. These two measurements are staffing of

preventive home visits, and the health and social expenses for people 65+ in the municipalities. The municipality budget was adopted by the politicians, and therefore, the measurements reflect how the politicians emphasize the conditions of the older people in the municipality.

(3) Data on staffing of preventive home visits in the municipalities were from interviews with municipality staff. The staffing of preventive home visits was calculated as staffing (full-time job) of preventive home visits per 100 persons 75+ in the municipality.
(4) The data on the municipalities' health and social expenses for people 67+ were obtained from Statistics Denmark. The measurement indicates health and social expenses (net) per inhabitant 67+ in Danish Crowns (DKK) (See Fig. 1 for further details).

The four items on trust to the home care, voting rate for senior councils, staffing of preventive home visits, and the health and social expenses for people 67+ in the municipalities were divided into tertiles. Hereafter, the four items were combined into a variable of aspects of linking with three categories: high level of social capital, i.e. municipalities with no items in the lowest tertiles, medium level of social capital, i.e. municipalities in the lowest tertiles in only one of the four items and low level of social capital, i.e. municipalities in the lowest tertiles in two or more. The rationale for the cut point is arbitrary.

Results

Findings regarding the bonding measurements are shown in Table 1 with the proportions of low levels of social participation, social diversity and satisfaction with social relations in each municipality. The proportions of low levels of social participation in the municipalities ranged from 5.9 to 21.4% with an average on 13.56%. The corresponding ranges for levels of low social diversity were 0–14.2% (average 6.18%) and for low satisfaction with social relations were 2.0–13.8% (average 7.04%). When these results were added into a combined measure of bonding, the result was that 13 municipalities had high bonding, 13 municipalities had medium bonding and eight municipalities had low social capital (Table 1).

The bridging measurements are shown in Table 2, reflecting the number of incidents of burglaries and number of incidents of violence acts per 1,000 inhabitants in average during 5 years in each municipality. The incidents of burglaries in the municipalities range 1.1–11.32 per 1,000 inhabitants with an average at 3.92. The incidents of violence acts in the municipalities ranged 0.37–2.29 per 1,000 inhabitants and average is 1.28. When the results were added into a combined measure of bridging, the result was that 20 municipalities had high bridging, six had medium and eight municipalities had low bridging (Table 2).

Table 3 depicts the linking measurements. It shows the distribution of voting rates in each municipality at the election of senior council in 1998, the proportion of those,

Table 1 Bonding measurements: the proportion of low level of social relations (social participation, social diversity and satisfaction with social relations) in the municipalities

Municipality	Social participation (%)	Social diversity (%)	Satisfaction with social relations (%)	Aspects of bonding variable (category)
1	11.0	1.7	3.4	High
2	**21.4**	**7.8**	**9.9**	Low
3	10.9	6.4	**10**	Medium
4	5.9	5.9	2.0	High
5	**16.5**	5.5	**12.2**	Low
6	10.4	**7.8**	7.8	Medium
7	**14.7**	**8.3**	7.5	Low
8	**14.7**	**9.3**	**10.1**	Low
9	**16.7**	5	**13.3**	Low
10	13.8	4.6	**13.8**	Medium
11	**14.9**	**8.6**	4.1	Low
12	13.3	6.4	**9.8**	Medium
13	10.4	4.2	4.2	High
14	14.1	**8.5**	4.0	Medium
15	12.8	5.1	5.1	High
16	**19.5**	6.8	7.7	Medium
17	13.7	6.9	6.5	High
18	11.9	6.0	3.8	High
19	**16.8**	**8.9**	**9.6**	Low
20	14.1	**8.7**	5.4	Medium
21	14.4	3.9	**9.7**	Medium
22	12.8	6.7	**9.7**	Medium
23	12.1	6.0	6.1	High
24	**19.1**	5.7	4.6	Medium
25	14.2	3.8	7.7	High
26	10.6	**14.2**	6.3	Medium
27	**16.9**	**12.3**	**9.2**	Low
28	8.9	0	5.5	High
29	9.8	2.1	5.6	High
30	8.3	2.1	4.2	High
31	**17.8**	2.5	7.7	Medium
32	14.3	2.7	3.6	High
33	13.3	**12.1**	4.8	Medium
34	10.9	4.1	4.8	High
Average	13.56	6.18	7.04	

Numbers in *bold* symbolizes if the municipality is among the lowest tertile in the item

Table 2 Bridging measurements: number incidents of burglaries and violence acts per 1,000 inhabitants average over 5 years

Municipality	Burglaries incidents of burglaries/ 1,000 inhabitants	Violence incidents of violence acts/ 1,000 inhabitants	Aspects of bridging variable (category)
1	2.43	0.66	High
2	**4.19**	**1.53**	Low
3	2.65	0.67	High
4	2.32	0.37	High
5	**4.2**	1.40	Medium
6	2.04	0.77	High
7	2.23	1.19	High
8	3.58	1.30	High
9	2.23	0.95	High
10	2.22	1.02	High
11	**4.29**	**1.53**	Low
12	4.09	**1.97**	Medium
13	3.77	1.14	High
14	**4.48**	**1.71**	Low
15	3.18	1.34	High
16	2.84	1.13	High
17	**11.32**	**1.57**	Low
18	3.07	1.26	High
19	**5.99**	**2.04**	Low
20	**4.97**	1.40	Medium
21	**8.71**	**1.51**	Low
22	**4.24**	1.36	Medium
23	**10.18**	**1.68**	Low
24	**4.70**	**2.29**	Low
25	2.85	0.84	High
26	2.45	0.87	High
27	2.43	1.28	High
28	1.1	0.78	High
29	3.96	**1.90**	Medium
30	1.57	0.72	High
31	2.76	**1.92**	Medium
32	2.12	1.14	High
33	1.73	0.83	High
34	2.01	1.3	High
Average	3.92	1.28	

Numbers in *bold* symbolizes if the municipality is among the lowest tertile in the item

who did not have trust in the home care in each municipality, the staffing of preventive home visits in each municipality, and the municipalities' health and social expenses for people 67 and older. The voting rates ranged from 3 to 76% in the election for the senior council in the municipalities in 1998 with an average at 42%. Between 2.78 and 28.17% did not trust the home care in the municipalities—the average is 13.11%. The staffing of the preventive home visits ranged from 0.78 to 11.3 per 100 people 75+, with an average at 4.31. Concerning the health and social expenses for people 67+ in the municipalities, the range was 26,848–44,056 DKK. Seven of the municipalities were high in linking, 15 municipalities were medium and 12 were low in linking (Table 3).

The distribution of the categories of the three combined social capital variables is shown in Table 4. Three of the municipalities had high levels of bonding, bridging and linking, and two of the municipalities had low levels of social capital in all three variables. Among the remaining municipalities, nine municipalities had high levels of social capital in two categories and 11 in only one. Further 11 municipalities were never high in social capital in any of the three variables of aspects of social capital, and 14 municipalities were never low in social capital in any of the three variables (they were either medium or high).

Five of the municipalities can be regarded as extremes, i.e. three of them (municipality 4, 15 and 30) had high levels in all three social capital variables and two (municipality 11 and 19) had low levels in all three social capital variables. The two extreme groups were compared in Table 5 on demography, structural conditions and employment in the municipalities. Data about these features are from Statistics Denmark, and they are not a part of the data used for the categorization in the bonding, bridging and linking measurements.

Compared to the three municipalities with high levels of social capital, the municipalities with low social capital had larger populations, lower proportions of children (0–17 years) and higher proportions of older people (65+). Furthermore, the two municipalities with low levels of social capital had higher rates of citizens from non-western countries, and higher rates of children living in a single parent household. The socioeconomic index reflects if a municipality has a higher or lower impact of expenses for social service compared to the average of municipalities in the whole country. The socioeconomic indices were higher in the two low social capital municipalities, indicating that these had a higher load of inhabitants, who needed social service. There were no clear differences between the two extreme groups concerning proportion of persons with no vocational education and proportion of unemployed.

In conclusion, there was a clear difference between municipalities with low and high levels of social capital in some perspectives—in others, the differences were less pronounced. The sociodemographic differences between municipalities in the extreme groups indicate that the municipalities with low social capital may be more disadvantaged.

Table 3 Linking measurements: the distribution of voting rate at election for elderly board, the proportion of the lowest level of trust in the home care, the staffing of preventive home visit, and health and social expenses in the municipalities

Municipality	Voting rate at election for elderly board % of people 60+ who voted	Trust in the home care %/ municipality points	Staffing of preventive home visits in the municipalities (1999) persons in full-time job per 100 persons 75+ /municipality points	Health and social expenses in the municipalities per person 67 + in Danish kroner/municipality points	Aspects of linking variable (category)
1	50	2.78	**1.88**	**30,514**	Low
2	46	**19.59**	11.3	34,395	Medium
3	50	9.09	3.94	33,461	High
4	45	10.00	10.8	44,056	High
5	51	**24.49**	4.56	39,847	Medium
6	63.2	7.41	**2.3**	36,749	Medium
7	**3**	12.00	3.41	41,571	Medium
8	**25**	12.00	3.92	36,343	Medium
9	**5**	16.67	4.5	38,117	Medium
10	–	9.33	4.57	36,341	High
11	**26**	15.58	**1.65**	39,823	Low
12	40	**20.69**	3.5	33,370	Medium
13	47.5	**28.17**	4.37	40,754,	Medium
14	62	**17.71**	5.69	**30,673**	Low
15	71	13.46	4.39	42,548	High
16	**25**	**25.76**	**2.35**	37,095	Low
17	5	14.89	**2.18**	32,767	Low
18	–	9.33	3.34	**28,149**	Medium
19	51	13.10	**2.45**	**27,736**	Low
20	25	**19.32**	**3.17**	35,194	Low
21	69	7.84	**0.78**	**31,100**	Low
22	62	**19.30**	4.21	**26,848**	Low
23	75	**17.46**	4.71	**32,318**	Low
24	52	16.95	4.34	**27,558**	Medium
25	61	6.56	4.78	**31,536**	Medium
26	60	8.70	**1.78**	32,576	Medium
27	51	7.14	5.52	37,397	High
28	**5**	3.23	5.63	32,838	Medium
29	76	**20.00**	4.73	35,394	Medium
30	63	2.94	9.71	37,163	High
31	51	2.99	4.47	**31,831**	Medium
32	**6**	4.29	**3.26**	**31,653**	Low
33	63	7.84	5.64	35,105	High
34	**30**	**25.8**	**2.56**	35,019	Low
Average	42	13.11	4.31	34,334	

Numbers in *bold* symbolizes if the municipality is among the lowest tertile in the item

Discussion

This study presents suggestions for the measurements of aspects of social capital based on bonding, bridging and linking that can be used in older populations. Further, this study has analysed variations in the measurements of bonding, bridging and linking in the 34 municipalities, and it has been possible to characterize different municipalities according to high versus low social capital. There are interesting patterns in distribution of the three measurements. The final categorization of the municipalities with regard to social capital into three very good municipalities, a large proportion of medium municipalities and two very poor municipalities, fits with the finding that the two extreme groups of municipalities also to some degree differ with regard to demography, social and structural conditions

Table 4 Distribution of aspects of bonding, bridging and linking variables

Municipality	Aspects of bonding variable (category)	Aspects of bridging variable (category)	Aspects of linking variable (category)
1	High	High	**Low**
2	**Low**	**Low**	Medium
3	Medium	High	High
4	High	High	High
5	**Low**	Medium	Medium
6	Medium	High	Medium
7	**Low**	High	Medium
8	**Low**	High	Medium
9	**Low**	High	Medium
10	Medium	High	Medium
11	**Low**	**Low**	**Low**
12	Medium	Medium	Medium
13	High	High	Medium
14	Medium	**Low**	**Low**
15	High	High	High
16	Medium	High	**Low**
17	High	**Low**	**Low**
18	High	High	**Low**
19	Low	**Low**	**Low**
20	Medium	Medium	**Low**
21	Medium	**Low**	**Low**
22	Medium	Medium	**Low**
23	High	**Low**	**Low**
24	Medium	**Low**	Medium
25	High	High	Medium
26	Medium	High	Medium
27	**Low**	High	High
28	High	High	Medium
29	High	Medium	Medium
30	High	High	High
31	Medium	Medium	Medium
32	High	High	**Low**
33	Medium	High	High
34	High	High	**Low**

Variable in *bold* symbolizes if the municipality is in lowest category in the variable

in the municipalities. In the literature, it has been adduced that social inequality is related to social capital (Kawachi 1999; Wilkinson 1997). Wilkinson and Pickett (2007) claim that income inequality in a country has influence on social cohesion—a concept similar to social capital. They hypothesize that large income inequality breaks down social structures. According to this hypothesis, it is surprising that we were able to find differences in aspects of social capital in an egalitarian country as Denmark. The proposed measurements contribute to the field of social capital and gerontology, because they at the same time are related to older people and cover different aspects of bonding, bridging and linking.

No other studies have included measures of social participation, social diversity and satisfaction with social relations aggregated to community level as a measure of bonding. In this study, social relations were used at community level. Other studies have used social participation as an indicator for social capital, but at the individual level (Lindström et al. 2002; Hyyppä et al. 2007).

It may be discussed if an aggregated measurement of social relations is a good measurement of bonding, because aggregated measurements may not reflect the views or characteristics of the whole community (van Deth 2002). So far we do not know how using an aggregated measurement of social relations will differ from using individually measured social relations. However, in our opinion, a municipality with a high level of good social relations may also be categorized as having high bonding. We therefore believe that the used measure of bonding might be a proper measure. In future developments of measures of bonding, we will still recommend to get information from questions to the people living in the community, but to add questions reflecting the help and mutual reciprocity in the local community. Further, we recommend to explore the level of bonding in a community by qualitative methods, e.g. by focus group interviewing.

Bridging is often measured as civic participation (Putnam 2000), generalized trust (Kawachi 1999; Putnam 2000) and crime (Kawachi et al. 1999). Among these measures, we only had available data on crime rates as a measure of bridging. The connection between social capital and crime is not really known and may have two or more pathways. A high level of crime may contribute to low levels of social capital, or it may be the other way around (Halpern 2005). It is plausible that the level of crime influences the local community or municipality, e.g. in feelings of safety, how people trust others and to what extent especially older people dare go around in the streets. So we believe it to be relevant to use crime rates as measurements of bridging social capital. Other studies have found relations between crime and social cohesion or social control, which are concepts similar to social capital (Sampson and Raudenbush 1997; Kawachi et al. 1999). In future studies, it would be relevant to measure bridging by questions on generalized trust, civic participation and maybe questions about the perception of other people with different sociodemographic background and how often people interact with people with another sociodemographic background. This could be supplemented with discursive analyses of local documents, e.g. local newspapers, statements from local organizations.

Table 5 Comparison of the five outlying municipalities on demography, structural conditions and employment

Demography					
Level of social capital	Municipality	Inhabitants (in 2002)	0–17 years % (in 2002)	17–64 years % (in 2002)	65+ years % (in 2002)
High	**4**	7.614	24.4	65.1	10.5
High	**15**	6.487	22.6	63.1	14.3
High	**30**	3.048	22.2	59.3	18.5
Low	**11**	19.718	20.2	62.9	16.9
Low	**19**	15.207	18.5	61	20.5
Average		16.243	21.4	62.8	15.8

Structural conditions					
Level of social capital	Municipality	Percentage with no vocational education (in 2002)	Citizens from non-western countries in 2002 (no. per 10,000 inhabitants)	Socioeconomic index in 1998	Children of solitary breadwinner in 2002 (per 100 children 0–17 years)
High	**4**	22.0	194	0.72	11.2
High	**15**	36.5	173	0.86	12.6
High	**30**	33.4	121	0.8	9.1
Low	**11**	37.1	302	1.2	18.1
Low	**19**	35.3	555	1.58	21.9
Average		32.2	32.2	0.95	14.2

Employment							
Level of social capital	Municipality	Unemployed, percentage of labour force, average over the year					
		All		Men		Women	
		1998 Total	2002 Total	1998 Total	2002 Total	1998 Total	2002 Total
High	**4**	4.45	2.95	3.58	3.13	5.30	2.78
High	**15**	6.23	4.98	4.55	4.13	8.28	6.00
High	**30**	5.50	5.65	3.30	4.93	8.25	3.85
Low	**11**	7.60	4.50	6.13	3.88	9.28	5.18
Low	**19**	10.65	7.93	10.10	7.75	11.35	8.15
Average		6.63	5.33	5.23	4.65	8.29	6.10

The numbers in *bold* is indicating that the value is over the average of all 34 municipalities

Information about trust to the home care, voting rates for senior councils in the municipalities, staffing of preventive home visits, and the municipalities' health and social expenses for older people 67+ was used as measurements of linking in the present study. A core part of the linking concept is the trust to governance authorities. One study measured institutional trust and found an effect on self-rated health (Mohseni and Lindström 2007). In that study, institutional trust was measured at individual level, and the suggested mechanisms were that if a person does not trust the health care system, he or she will hesitate to use it. In the present study, trust to the home care was defined at community level. This makes it possible to study the effect of trust to the home care beyond the mechanisms of health compliance of the individual. We did not find any other studies about trust to the home care as a measure of linking. Trust to the home care was measured by one single item question. In a future questionnaire, it would be relevant to include more items about trust to the home care, e.g. to differ between the trust to the person, who deliver the home care in the home, the authorities that approve the home help or the politicians who allocated resources to the home care. Again, an alternative could be a discursive qualitative approach analysing political documents, local newspapers etc.

Finally, it could be interesting to study the interaction between the environment (e.g. the build environment) and social capital. For instance, it is plausible that some environments invites to more crime more than others. The level of incivilities may have an influence on social capital, and street lightning may have an impact on the feeling of safety and trust.

The mechanisms behind electoral participation or election rate and social capital are double-edged. One can only speculate whether a high electoral participation rate reflects high or low social capital. Do persons vote because they are satisfied with their municipality and believe that they can have influence by voting, or do persons vote because they are dissatisfied with their municipality and vote in protest? Cattel (2001) found that political cynicism could be an indicator of low social capital. But any way, whether people are satisfied or not, they will probably vote if they are engaged in their local community.

We did not find studies, which have used municipality finances as a measurement of linking. The size of per capita expenses is of course dependent on other issues than political priorities, like for instance demographic composition, size of municipality, geographical settings. But the municipality finances are the best tangible and accessible information that can indicate politicians' attitude and respect of older people.

It is a limitation of the study that it is based on secondary analyses on data not collected with the purpose of measuring social capital. In future studies, it would be relevant to advance the measurements of social capital. However, the study did elute data that are relevant for measures of bonding, bridging and linking. In the science of social capital, there has been a demand for prospective studies with the measurements of social capital, which were focused on older people's community, and that had a distinction between bonding and bridging (Cagney and Wen 2008). We do think that the present study is one step in fulfilling these demands.

Four of the variables were created from aggregation of individual data from the questionnaires. It can be discussed if the distributions of the aggregated variables are representative for the rest of the populations in the municipalities. The participation rate in the questionnaire study was 70.2%, and as for the municipalities, the individual participants constitute a selected group (Vass et al. 2007). Aggregation of questionnaire data is probably the most practical way of getting contextual data about bonding and linking, even though anthropological methods might be able to contribute with more in-depth insight. Regarding the structure of the suggested measurements of social capital, this would be appropriate for future multilevel analyses on how bonding, bridging and linking are associated with future adverse health outcomes.

One of the purposes of the study was to categorize the 34 municipalities into low, medium and high levels of social capital. We chose to divide the municipalities into tertiles as a base for categorization. The problem is that in some items in some of the variables, there can be large differences between the top and bottom in one item. Future sensitivity analyses are needed when a health outcome will be included. These analyses will tell us, if other item cut points are appropriate.

Municipalities were not invited for the study if they did not fulfil the preventive home visits prescribed by law and if they were not able to facilitate fair or good rehabilitation for older people. The study municipalities may therefore be regarded as a selected group, which make the found differences in aspects of social capital between municipalities even more surprising.

We still do not know the impact of these differences on older peoples' everyday life and well-being, but in the future, it could be relevant taking social capital into account in future planning of housing and in the development of new prevention strategies for older people in the municipalities. The present study has described the development of a measure of social capital for use in older populations and has shown large variations in social capital in Danish municipalities. We believe that the developed measures of social capital will be relevant in future studies of social capital and health in older populations, since they are theoretically based and cover different aspects of social capital related to older people and their local community.

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