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The diversity in associations between community social capital and health per health outcome, population group and location studied

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Background Literature on the effect of community social capital on health is inconsistent and could be related to differences in social capital measures, health outcomes, population groups and locations studied. Therefore this study examines the diversity in associations between community social capital and health by investigating different diseases, populations groups and locations.

Methods Mortality records and individual data on sex, age, marital status, ethnic origin and place of residence were available for 6 years (1995–2000). Neighbourhood data, i.e. community social capital, socio-economic level and urbanicity, were linked through postcode information. Community social capital was indicated by measures of community interaction, belongingness, satisfaction and involvement. Variations in all-cause and cause-specific mortality across low and high social capital neighbourhoods were estimated through Poisson regression. In addition, analyses were stratified according to population group and to urbanization level.

Results In the total population, community social capital was not related to all-cause mortality (RR = 1.00; CI: 0.99–1.01). However, residents of high social capital neighbourhoods had lower mortality risks for cancer [especially lung cancer (RR = 0.92; CI: 0.89–0.96)] and for suicide (RR = 0.90; CI: 0.83–0.98). Slightly lower mortality risks were also found for men (RR = 0.98; CI: 0.97–0.99), married individuals (RR = 0.96; CI: 0.94–0.97) and for residents living in socially strong neighbourhoods located in large cities (RR = 0.95; CI: 0.91–0.99).

Conclusions The association between community social capital and health differs per health outcome, study population and location studied. This underlines the need to take such diversity into account when aiming to conceptualize the relation between community social capital and health.

Keywords Community social capital, mortality, population group, urbanization, neighbourhood, The Netherlands

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Introduction

A positive association has been reported between community social capital and health,[1–11] whereas others have found no such association,[1,6,7,12–17] This contradiction might be related to the different definitions used to embody the concept of social capital.[18–20] The definition most often used in public health is that of Putnam, in which social capital is defined as those features of social structures (such as levels of interpersonal trust and norms of reciprocity and mutual aid), which act as resources for individuals and facilitate collective action.[21] The way in which community social capital might be related to health is still debated. However, at least three plausible pathways are suggested: (i) through health-related behaviours, (ii) through access to services and amenities and (iii) through psychosocial processes.[19]

Another explanation for the contrasting results regarding social capital might be related to differences in health outcome, study population or the setting of the performed studies. First, living in a strong social community might affect only certain health outcomes or diseases.[19] One of the pathways between community social capital and health specifies health-related behaviour as a mediator. Since unhealthy behaviour is related to certain diseases, one would expect stronger associations with these diseases. Second, living in a high social capital neighbourhood may be more beneficial for certain groups of people.[22,23] Differences in the amount of time spent in the neighbourhood, or in the appreciation of living in a strong social community, might elicit a series of health effects.[24,25] Finally, the location of the study might also affect the association between community social capital and health.[19] For example, higher levels of social capital are observed in rural than in urban areas.[26,27] Since the average level of social capital is higher in rural areas, the relation between social capital and health might be less strong. Whereas the concept of social capital and its pathways to health are strongly debated, less attention is paid to the possible diversity in associations between community social capital and health.

Therefore, the present study focuses on the diversity in associations between community social capital and health with regard to different diseases, population groups and locations. First, we determined the relationship between community social capital and all-cause and cause-specific mortality using (nationwide) data on individuals and data on socio-economic level, urbanicity and community social capital of neighbourhoods. To embody the concept of community social capital, several dimensions were combined e.g. measures of community interaction, belongingness, satisfaction and involvement. Then we examined the association between community social capital and mortality among different population groups and at different levels of urbanization.

Methods

Data

Data were available at the individual level (including information on demographics and mortality) and on the neighbourhood level (including information on community social capital, socio-economic level and level of urbanization). Individual and neighbourhood data were linked by postcode information.

Individual data

Mortality records and demographic data for the years 1995 through 2000 were provided by Statistics Netherlands (CBS) and linked by personal identification number. During this 6 year period, persons could enter (through birth or immigration) or leave the study (by death or emigration). All persons who died during the study period were registered, irrespective of whether the death occurred in The Netherlands or abroad.

The primary cause of death was classified according to the ICD-9 (1995) and ICD-10 (1996–2000). The following causes of death were distinguished: (i) all-cause mortality, (ii) cancer mortality, in particular lung cancer and breast cancer, (iii) cardiovascular disease mortality, in particular ischaemic and cerebrovascular diseases and (iv) external causes, in particular suicide and road traffic accidents.

Demographic information on sex, age, marital status (never married, married, divorced and widowed) and ethnic origin (Dutch, Turkish, Moroccan, Antillean, Surinamese and other) of each individual was available. Five year age categories were used, except for the age groups 0- to 1-year old and 95 years and older. The standard definition of CBS was used to define ethnic origin,[28] i.e. a person was considered to be of non-Western origin if at least one parent or the person in question was born in a non-Western country or continent, i.e. Turkey, Africa, Latin America or Asia. In families from mixed origin the country of birth of the mother prevailed.

Neighbourhood data

Neighbourhoods were chosen as the geographical unit of analyses because neighbourhoods are small and the boundaries are based on topography or socio-economic similarities of residents. In 1995, The Netherlands consisted of 10 381 neighbourhoods with on average 1486 residents and an area surface of 3.4 km^2. All neighbourhood data were provided by CBS.

Community social capital data originated from the Housing Demand Survey (WBO) of 1998. This national survey was carried out by The Netherlands Ministry of Housing, Spatial Planning and Environment in a two-step procedure. First, one or more municipalities were selected out of each COROP area (a large geographical division in The Netherlands). Then, persons aged 18 years and older living in the selected municipalities were drawn at random. The total response rate

across all municipalities was 51%. The data were collected by means of telephone interviews, face-to-face interviews or internet questionnaires. Information was available for 117 569 individuals, i.e. 0.76% of the Dutch population. We identified 13 items, which represented dimensions that could be linked to the definition of social capital as stated by Putnam[21] (Table 1). These items represented themes such as community interaction, belongingness, satisfaction and involvement. The 13 items were used to create a single component to indicate community social capital through an unrotated principal component analysis with correlation matrix. This single component had an eigenvalue of 6.95 and explained 54% of the variation between the items. All 13 items were moderate to highly correlated with the calculated component (Table 1). In addition, a reliability test was performed to examine whether the 13 items reflected one single dimension, i.e. community social capital. A Cronbach's alpha of 0.60 was found, indicating an acceptable reliability of the calculated social capital measure. Subsequently, neighbourhood social capital was calculated as the mean score of all interviewed neighbourhood residents. The neighbourhood social capital score had a mean of 0 and a standard deviation of 0.43.

Socio-economic status (SES) is an important confounder in the relationship between community social capital and mortality; therefore, appropriate adjustments should be made during analyses. In The Netherlands, there is no national registry for the individual SES. Therefore, the neighbourhood socio-economic level, which can be used as a proxy for individual SES,[29] was used. Neighbourhood socio-economic level was indicated by the percentage of neighbourhood inhabitants with a low income; this is an income below the 40% level of the national income distribution (<(€12 025). More detailed measures on neighbourhood income were available, but the percentage of low-income inhabitants was selected because this explained most of the geographical variation in mortality across neighbourhoods in The Netherlands (14%). We selected only one variable to indicate the socio-economic level of the neighbourhood, rather than any combination of the six available income variables, since such a combination did not substantially improve the explanation of the geographical variation in health outcomes (20%). No information was available on the mean educational or occupational level of the area residents. It has been suggested that education or occupation may be less appropriate measures than income to indicate area socio-economic level.[30–32]

The neighbourhoods were divided into three levels of urbanization. The highest level included neighbourhoods located in the four largest cities in The Netherlands (Amsterdam, Rotterdam, The Hague and Utrecht); this category included 148 neighbourhoods with 1 235 960 residents. Neighbourhoods

Table 1 Mean and SD on items representing community social capital and their relation with the calculated social capital score at the individual level

Statement	Response options	Mean (SD)	Correlation[a]
I talk a lot to my next-door neighbours	(1) Totally agree; (2) agree; (3) equal; (4) don't agree; (5) don't agree at all	2.64 (0.39)	0.646
I talk a lot to neighbours other than my next-door neighbours	Idem	2.93 (0.39)	0.635
In this neighbourhood people treat each other with respect	Idem	2.08 (0.29)	0.790
People hardly know each other in this neighbourhood	Idem	3.67 (0.45)	−0.720
I feel attached to my neighbourhood	Idem	2.52 (0.45)	0.742
I feel at home in my neighbourhood	Idem	1.93 (0.31)	0.807
I feel at ease with the people in my neighbourhood	Idem	2.18 (0.33)	0.844
I live in a neighbourhood with a low level of solidarity	Idem	3.55 (0.39)	−0.723
I'm satisfied with the population composition of this neighbourhood	Idem	2.08 (0.31)	0.727
I'm satisfied with my living environment	Idem	1.82 (0.35)	0.792
The buildings in this neighbourhood are attractive	Idem	2.15 (0.40)	0.734
It is unpleasant to live in this neighbourhood	Idem	4.30 (0.29)	−0.695
To what extent are you involved with the liveability of your neighbourhood?	(1) High involvement; (2) limited involvement; (3) not involved	2.15 (0.28)	0.612

[a]Pearson's correlation coefficient.

included in the medium category were located in one of the smaller cities (including Almelo, Arnhem, Breda, Deventer, Eindhoven, Enschede, Groningen, Helmond, Hengelo, 's-Hertogenbosch, Leeuwarden, Maastricht, Nijmegen, Tilburg and Zwolle); this level included 421 neighbourhoods with 1 359 500 residents. The remaining neighbourhoods were categorized in the lowest urbanization level and included 2938 neighbourhoods with 8 442 180 residents.

Information on neighbourhood socio-economic level and level of urbanization for the year 1995 was used because mortality records were available from this year onwards.

Neighbourhoods with less than five observations for the 1998 WBO survey (6863 neighbourhoods) were excluded from analyses because social capital scores based on such a small sample are less reliable. An additional 11 neighbourhoods were excluded because of missing data on neighbourhood socio-economic level. Analyses were performed on the remaining 3507 neighbourhoods (33.78% of all neighbourhoods in The Netherlands) with 11 037 640 residents (71.56% of all Dutch citizens) of which 91 656 were interviewed (77.96% of all interviewed individuals in the WBO survey). Mostly rural neighbourhoods with few residents were excluded from our analyses. Rural areas generally have a lower mortality rate[33–37] and a higher level of social capital,[26,27] thus excluding these areas might have led to underestimation of the association between community social capital and mortality. The 3507 neighbourhoods were ranked according to their community social capital score and divided into five categories with 20% of the study population in each category.

Analyses

All-cause mortality

Poisson regression models were used to calculate relative all-cause mortality risks for each social capital category, with the lowest social capital category as reference. These analyses were adjusted for population composition by including the logarithm of the expected number of deaths in a neighbourhood as offset variable. The logarithm of the expected number of deaths is the usual offset, because the outcome, i.e. the number of observed deaths (dependent variable), is logged in a Poisson model. The expected number of deaths in a neighbourhood was the sum of the expected number of deaths of each of the 336 population groups based on sex, age, marital status and ethnic origin (Dutch, Turkish, Moroccan, Antillean, Surinamese and other) in one neighbourhood. The expected number of deaths per population group was calculated by multiplying the mortality risk of each population group, based on Poisson regression of the total Dutch population, by the number of people in each population group. Additionally, the regression models to estimate relative mortality risks per social capital category were adjusted for neighbourhood socio-economic and urbanization level.

Cause-specific mortality, population group and urbanization level

Similar to all-cause mortality, Poisson regression analyses were performed to estimate the association between community social capital and specific causes of death and community social capital and all-cause mortality among the population groups and the urbanization levels. The regression analyses were stratified according to the population groups (male or female; non-married or married; Western or non-Western ethnic origin) and urbanization levels (high, medium and low).

Results

Neighbourhoods with a high level of community social capital had a higher percentage of residents who were married, aged 45 years and older and of Western origin (Table 2), and fewer residents with a low income and of lower age. There were also fewer deaths in this type of neighbourhood.

After adjusting for population composition, lower mortality risks were found in high social capital

Table 2 Neighbourhood mortality, demographics and socio-economic characteristics per community social capital category

Neighbourhoods	Low social capital $N = 583$	II $N = 584$	III $N = 608$	IV $N = 697$	High social capital $N = 1035$
Mean number of deaths per neighbourhood	180.42	188.78	186.33	159.83	112.41
Demographic characteristics					
25- to 45-year olds (%)	34.65	32.40	31.03	30.57	29.57
45- to 65-year olds (%)	21.12	23.40	24.38	24.41	25.62
65 years and older (%)	11.76	13.35	13.97	13.75	14.06
Married individuals (%)	37.72	43.77	46.13	47.42	48.94
Western individuals (%)	70.25	82.08	85.31	87.66	89.35
Socio-economic characteristics					
Inhabitants with a low income (%)	42.84	39.23	37.75	37.58	37.70

neighbourhoods (Table 3). When socio-economic level and urbanicity of the neighbourhood were taken into account, mortality risks in neighbourhoods in the highest social capital category were similar to those found in the lowest social capital category. After adjustment for population composition, neighbourhood socio-economic level and urbanicity, the slightly lower mortality risks remained for the intermediate social capital category.

Although no association was found between community social capital and all-cause mortality, social capital was associated with both lower and higher mortality risks for specific causes of death (Table 4). The lowest mortality risks for cancer and lung cancer were observed among residents living in neighbourhoods with the highest social capital levels. A pattern similar to that for all-cause mortality was found for death due to external causes and suicide. Residents living in strong social neighbourhoods had a higher risk for mortality from cerebrovascular heart disease. No associations were found between community social capital and mortality caused by breast cancer, cardiovascular diseases, ischaemic heart disease and road traffic accidents.

Table 5 presents data on all-cause mortality risks per social capital category for different population groups and urbanization levels. Slightly lower mortality risks were found across the social capital categories for residents who are male, married and of Western origin; only in the highest social capital category, residents of Western origin showed no increased risk. Somewhat higher mortality risks were observed in the highest social capital neighbourhoods (but not in the three intermediate categories) for women, non-married residents and residents of non-Western origin.

In urban areas, residents living in socially strong neighbourhoods had a lower mortality risk than those in socially weak neighbourhoods. The opposite was found for residents of neighbourhoods in the medium urbanization level, with slightly elevated mortality risks among residents of high social capital neighbourhoods. In the lowest urbanization level, no higher or lower mortality risks were found for residents living in strong or weak social neighbourhoods.

Discussion

Key findings

This study found a great diversity in associations between social capital and health when different diseases, population groups and locations were taken into consideration. However, most of the observed

Table 3 All-cause mortality risks per community social capital category

Control variables	Low social capital RR	II RR (CI)	III RR (CI)	IV RR (CI)	High social capital RR (CI)
Age and gender	1.00	0.93 (0.92–0.94)	0.90 (0.89–0.90)	0.89 (0.88–0.90)	0.91 (0.90–0.92)
+ Marital status and ethnicity	1.00	0.94 (0.94–0.95)	0.92 (0.91–0.93)	0.92 (0.91–0.92)	0.94 (0.93–0.95)
+ SES	1.00	0.98 (0.97–0.99)	0.98 (0.97–0.99)	0.99 (0.98–0.99)	1.01 (1.00–1.02)
+ Urbanicity	1.00	0.98 (0.97–0.99)	0.98 (0.97–0.99)	0.98 (0.97–0.99)	1.00 (0.99–1.01)

SES, neighbourhood socio-economic level.

Table 4 All-cause and cause-specific mortality risks per community social capital category

Mortality	Low social capital RR	II RR (CI)	III RR (CI)	IV RR (CI)	High social capital RR (CI)
All-cause	1.00	0.98 (0.97–0.99)	0.98 (0.97–0.99)	0.98 (0.97–0.99)	1.00 (0.99–1.01)
Cancer	1.00	0.98 (0.96–0.99)	0.98 (0.97–1.00)	0.97 (0.95–0.99)	0.97 (0.95–0.98)
Lung	1.00	0.96 (0.93–0.99)	0.92 (0.89–0.96)	0.92 (0.89–0.95)	0.92 (0.89–0.96)
Breast	1.00	0.99 (0.94–1.04)	1.03 (0.98–1.09)	0.98 (0.93–1.04)	0.99 (0.94–1.05)
Cardiovascular disease	1.00	1.01 (1.00–1.02)	1.00 (0.98–1.01)	1.00 (0.99–1.02)	1.02 (1.00–1.03)
Ischaemic	1.00	1.01 (0.98–1.03)	0.99 (0.97–1.01)	1.00 (0.98–1.02)	1.00 (0.98–1.03)
Cerebrovascular	1.00	1.05 (1.02–1.08)	1.03 (1.00–1.06)	1.03 (1.00–1.06)	1.09 (1.06–1.12)
External causes	1.00	0.93 (0.89–0.98)	0.91 (0.87–0.95)	0.92 (0.88–0.97)	0.97 (0.93–1.02)
Suicide	1.00	0.91 (0.84–0.99)	0.88 (0.81–0.96)	0.90 (0.83–0.97)	0.90 (0.83–0.98)
Traffic accidents	1.00	0.97 (0.92–1.02)	0.95 (0.90–1.01)	0.97 (0.91–1.03)	1.04 (0.98–1.10)

RR = relative risk adjusted for sex, age, marital status and ethnic origin at the individual level, and socio-economic level and urbanicity at the neighbourhood level.
CI = confidence interval adjusted for sex, age, marital status and ethnic origin at the individual level, and socio-economic level and urbanicity at the neighbourhood level.

Table 5 All-cause mortality risks per community social capital category for different population groups and urbanization levels

All-cause mortality	Low social capital RR	II RR (CI)	III RR (CI)	IV RR (CI)	High social capital RR (CI)
Population group					
Men	1.00	0.98 (0.97–0.99)	0.97 (0.96–0.98)	0.97 (0.96–0.98)	0.98 (0.97–0.99)
Women	1.00	0.98 (0.97–0.99)	0.99 (0.98–1.00)	0.99 (0.98–1.00)	1.03 (1.01–1.04)
Non–married	1.00	1.01 (0.98–1.03)	1.00 (0.98–1.03)	1.02 (0.99–1.04)	1.05 (1.02–1.08)
Married	1.00	0.96 (0.95–0.97)	0.95 (0.94–0.96)	0.95 (0.93–0.96)	0.96 (0.94–0.97)
Western ethnic origin	1.00	0.97 (0.97–0.98)	0.97 (0.96–0.98)	0.97 (0.97–0.98)	1.00 (0.99–1.01)
Non-Western ethnic origin	1.00	1.01 (0.99–1.04)	1.03 (1.00–1.05)	1.02 (0.99–1.05)	1.05 (1.02–1.08)
Urbanization level					
High	1.00	0.93 (0.91–0.95)	0.96 (0.94–0.98)	0.91 (0.88–0.93)	0.95 (0.91–0.99)
Medium	1.00	0.95 (0.93–0.97)	1.01 (0.99–1.04)	1.04 (1.01–1.06)	1.04 (1.01–1.07)
Low	1.00	1.00 (0.99–1.01)	0.98 (0.97–0.99)	0.99 (0.98–1.01)	1.01 (1.00–1.02)

RR = relative risk adjusted for sex, age, marital status and ethnic origin at the individual level, and socio-economic level and urbanicity at the neighbourhood level.
CI = confidence interval adjusted for sex, age, marital status and ethnic origin at the individual level, and socio-economic level and urbanicity at the neighbourhood level.
Non married = never married not living together, never married living together, divorced and widowed.
Relative Risk per urbanization level not adjusted for urbanicity at neighbourhood level.

associations between community social capital and mortality were weak, with relative risks ranging from 0.92 to 1.09 for the different causes of death, from 0.96 to 1.05 for the different demographic groups and from 0.95 to 1.04 for the different urbanization levels. No association was found between community social capital and all-cause mortality when taking the total Dutch population into consideration. However, living in a strong social neighbourhood was related to a lower mortality risk for cancer (especially lung cancer), and for external causes (especially suicide). Men, married individuals and residents of urban areas living in a socially strong neighbourhood had a slightly lower mortality risk than those living in a socially weak neighbourhood.

Evaluation of data and methods

Some methodological limitations of the present study need to be addressed.

First, the clustering of individuals within neighbourhoods and the spatial clustering of neighbourhoods was disregarded. Residents living in the same neighbourhood tend to be more comparable in terms of demographic and socio-economic characteristics as opposed to residents of other neighbourhoods. More appropriate statistical methods (such as multilevel analysis) would take this clustering of individuals into account, leading to better estimates of contextual influences.[38,39] In addition, geographically adjoining neighbourhoods are comparable in terms of contextual variables, which might also influence associations found in the present study.[40–42] Unfortunately, we were unable to adjust for clustering between individuals and neighbourhoods because the data set was too large to perform such analyses within the CBS infrastructure. Indirect standardized mortality rates were used to account for clustering between individuals within neighbourhoods. The spatial correlation between adjoining neighbourhoods in community social capital seemed minimal when neighbourhoods were mapped across The Netherlands (map not shown). However, disregarding the clustering of individuals within neighbourhoods and the spatial clustering between neighbourhoods could have led to overestimation of the significance levels of the observed associations; however, we believe that such an overestimation will be minimal.

Second, the concept of social capital remains debatable and various definitions are used to embody this concept.[18–20] We used the definition of Putnam[21] and created an index containing several social capital items; however, some aspects of community social capital were not included because data were not available. Nevertheless, we believe that including more items would not have substantially changed the geographical variation in community social capital.

Third, community social capital was based on the perceptions of a sample of neighbourhood residents; this sample was sometimes as small as five persons (neighbourhoods with fewer respondents were excluded from our analysis). This minimum number might be too low and too unreliable to indicate neighbourhood social capital. Therefore, we evaluated to what extent our results would differ if a higher cut-off limit, i.e. 20 respondents per neighbourhood, had been used to include the neighbourhoods. Had we

used the later cut-off point, the final study sample would have included 1002 neighbourhoods with 4 481 960 residents. Most of the studied associations did not reach statistical significance, but did give an indication that supported our main findings. For example, slightly lower all-cause mortality risks (RR = 0.98; CI: 0.96–0.99) and lower risks for ischaemic heart disease mortality (RR = 0.95; CI: 0.92–0.99) were found among residents living in the highest social capital category. Comparable associations were observed for the different population groups, except that women, non-married residents and residents of non-Western origin showed no elevated mortality risks in the highest social capital category. No associations were found between community social capital and mortality in any of the three urbanization levels.

Finally, the variation in our community social capital measure was small (Table 1) and might be responsible for the weak association found between community social capital and mortality. Other studies reported a greater variation in their social capital measure[1,5,6,16] but comparison is difficult because different constructs are used to embody community social capital.[18–20]

Comparison to previous studies

In the present study, no association was found between community social capital and all-cause mortality. Although some earlier studies also reported no association,[12,14,17] others found a lower mortality risk in strong social communities.[3,7] Although the association between community social capital and mortality proved to be weak, it might be stronger for less extreme health outcomes, such as self-perceived health. Most studies,[2,4–6,8,10] but not all,[6,15,16] found that living in a strong social community was related to better self-perceived health.

Very few studies have examined the relation between community social capital and health for certain population groups. One study found that living in religiously affiliated communities in Israel decreased mortality risks and that these risks were lower for men than for women.[3] A study examining the influence of community social capital on survival after hospitalization among the elderly found no evidence for any interactions between social capital and sex or between social capital and ethnicity.[11] A study performed in the Helsinki metropolitan area found that community social capital was related to lower mortality rates among the younger age groups but not among the elderly.[7]

In the present study, the association between community social capital and mortality varied slightly depending on the urbanization level. To our knowledge, only one other study stratified their study sample into various urbanization levels but found no association between community social capital and self-perceived health in rural or in urban areas.[26]

Explanations for the results

No association was found between community social capital and all-cause mortality for the total Dutch population. An explanation for this might be that, in The Netherlands, community social capital is a less important determinant of health compared with the social environments created in other places (e.g. work, school or sports club). Compared with contacts with friends or relatives, contacts with neighbours are often seen as 'weaker' social ties[25] and have less impact on health than the 'stronger' social ties.[43]

Living in a high social capital neighbourhood was most clearly related to a lower mortality risk among men and married persons. Different levels of appreciation of living in a strong social community[9,26] might explain the observed differences in associations between the married and non-married groups. The higher risk for mortality in strong social neighbourhoods for women and for residents of non-Western origin might be related to processes of social pressure and social control, which might prohibit these groups from making the optimal choice for their own well-being.[13]

Ethnic heterogeneity within the neighbourhood might also influence the relation between social capital and mortality. Studies on racial residential segregation in the USA reported worse health outcomes among residents of racially segregated areas.[44–46] However, compared with the USA, ethnic heterogeneity within Dutch neighbourhoods is less dramatic with only 15% of the neighbourhoods containing >20% migrants. In additional analyses, in which neighbourhoods were stratified according to the percentage of migrants, no substantial differences emerged for the relation between social capital and mortality between neighbourhoods with a low or high percentage of migrants.

Lung cancer mortality risk was decreased among residents living in high social capital neighbourhoods. Informal social control and social pressure from neighbours might prevent smoking and thereby reduce lung cancer rates. In additional analyses, the role of smoking was assessed by examining smoking percentages across the social capital categories, using data from the WBO survey. From the highest to the lowest social capital category the percentages of smokers were 29, 30, 31, 33 and 38% (P-value for trend <0.001), which supported the role of smoking.

Finally, selective migration processes might contribute to the observed associations between community social capital and mortality as observed in the different population groups and locations. Healthier individuals are more likely to move towards the 'more attractive' areas such as high social capital neighbourhoods while unhealthier individuals stay behind in the 'less attractive' areas such as low social capital neighbourhoods. In The Netherlands only weak associations were found between self-perceived health and migration to deprived or less deprived

areas.[47] Selective migration processes are also related to personal characteristics such as age and marital status[48–50] and the resulting health differences across neighbourhoods might therefore be larger for certain population groups. However, the effect of selective migration processes on the relationship between community social capital and health has not yet been fully investigated.

Conclusions

This study found that the association between community social capital and health differs according to the cause of death, population group and location studied; however, most of the associations found were weak. The range of health effects found in previous research on social capital might be explained, in part, by the differences in health outcomes, populations or locations studied. Comparisons of different health outcomes, population groups and locations might help to further elucidate the relation between community social capital and health.

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KEY MESSAGES

- The association between community social capital and health differs according to health outcome, study population and location studied.
- Community social capital is not related to all-cause mortality; however, lower mortality risks for cancer and suicide are found in socially strong compared with socially weak neighbourhoods.
- The beneficial health effect of living in a high social capital neighbourhood applies particularly to men, married individuals and to residents in urban areas.
- Future research should incorporate different health outcomes, population groups and locations to better conceptualize the relation between community social capital and health.

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