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You have to be there to enjoy it? Neighbourhood social capital and health

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ABSTRACT

Background: Several studies have shown the positive effect of neighbourhood social capital on health. Existing research, however, has hitherto not studied whether the duration and intensity of exposure to neighbourhood social capital conditions and its effect on health. The aim of this study was to examine whether neighbourhood social capital affects individual's health immediately and equally. Methods: We used two waves of the Dutch cross-sectional 'Housing and Living Survey'. One (from 2009) as individual data (n = 65 990), and the other (from 2006) to estimate with econometric measurements a social capital measure for 3001 Dutch neighbourhoods. We assessed by means of multilevel regression models the combined effect of exposure and amount of neighbourhood social capital on self-rated health. Results: Duration of exposure, measured by the length of stay in the same neighbourhood is not linearly associated with individual health. Health of people who live up to 6 years or >22 years in the same neighbourhood is not affected by neighbourhood social capital. People with young children in the household or elderly were assumed to be more intensively exposed. However, exposure intensity was only found to have an effect for households with young children. Conclusions: Duration and intensity of exposure to neighbourhood social capital, a social aspect of the environment, matters for people's health. Interventions focusing on the health of people with young children may want to stimulate the creation of neighbourhood social capital.

INTRODUCTION

In disciplines such as public health, epidemiology or toxicology, the length of time and intensity of the connection between an environment and individuals is important and is studied in terms of 'exposure'. Although exposure studies usually focus on environmental hazards, the concept of exposure is neutral in principle. Exposure refers to the 'connection between place and bodies'¹ and is not restricted to negative outcomes. The idea of exposure is innovative in research on social indicators on the neighbourhood (contextual) level.² In the words of Berkman, 'Epidemiologists have studied tobacco exposure so well for so long, we have good understanding of the differential impacts that exposures have on specific disease outcomes. Unfortunately, data on social exposure is much more limited'.³

A possible social environmental indicator that is important for health might be 'social capital'.⁴ In Coleman's formulation, social capital is the resource that 'inheres in the structure of relations between actors'.⁵ Contextual social capital must be distinguished from individual-level social capital (i.e. social networks of ties to specific others), although it is rooted in social relations. Neighbourhood social capital can be defined as the access to resources that are generated by relationships between people in a friendly, well-connected, tightly knit and cohesive community. Contextual social capital theory, based on Coleman⁶ and Putnam⁷, suggests that neighbourhood social capital affects all members of the neighbourhood.

A systematic literature review summed up the evidence on 'social capital and physical health'⁸ while differentiating between individual and contextual social capital. This review examined 32 studies. Although individual-level social capital demonstrated a strong positive relationship with self-rated health, findings on social capital on the contextual-level were mixed and at different area-levels. A growing body of literature concerns neighbourhood level. Results show that people who live in neighbourhoods with more social capital are healthier.⁹⁻¹²

So far, studies on social capital implicitly assume that the effect occurs immediately. However, commonly assumed causal pathways between neighbourhood social capital and health, such as norms of health-related behaviour,¹³⁻¹⁵ psychosocial mechanisms¹² and access to neighbourhood care facilities¹⁶ have in common that people are more affected if they are exposed to the same neighbourhood for some time. Health-related norms take time to be internalized, psychosocial mechanisms affect health through long-term increased levels of stress hormones, and access to care facilities takes time to translate to better health.

In most Western countries, people spend a significant amount of their time outside their neighbourhood due to work or educational demands. Therefore, the effects of neighbourhood social capital may be underestimated when analysing the entire population. Since detailed information on exposure is lacking in most secondary data, we test the intensity of exposure by assuming that social life is more locally oriented for elderly people and for members of households with young children. Elderly people above pension age are likely to spend a larger portion of their time in and around the house. In the Netherlands, people with young children are locally

oriented because young children's playgrounds and elementary schools are in the immediate vicinity of their parents' home (on average, <1 km—independent whether it is an urban or rural neighbourhood).¹⁷ In comparison with other European countries, the Netherlands has a very high population density, namely, on average, 491 inhabitants per square kilometre in 2010 (www.statline.cbs.nl).

This study contributes to existing literature by combining the social science idea of social capital with the environmental studies' concept of exposure to reach a better understanding of the conditions in which neighbourhood social capital is associated with health. We differentiate exposure into the duration of residence (length of exposure) in the same neighbourhood and the time people can be assumed to spend in their neighbourhood (intensity of exposure). This study addresses the following research questions:

- (i) Does the effect of neighbourhood social capital on health increase linearly with the number of years people live in the same neighbourhood? If not, what is the relationship?
- (ii) Is the effect of neighbourhood social capital stronger for people who can be assumed to spend more of their time in the neighborhood?

METHODS

Individual-level data from the cross-sectional 'Housing and Living Survey 2009' (WoON 2009), were collected under the responsibility of the Dutch Ministry of Housing, Spatial Planning and Environment (VROM). The data include information on 65 990 individuals (response rate = 59%) age ≥ 18 years. For our study, we chose small areas that were relevant for social interaction between neighbours.¹² A neighbourhood was defined by its 4-digit postal code. Certainly, inhabitants would not think in terms of 4-digit postal code areas when they think of their neighbourhood¹⁸, however, to test our hypotheses we needed stable and comparable units. In the Netherlands, these areas include approximately 4000 people, on average. Since we included all inhabited postal code areas, some neighbourhoods were densely populated city neighbourhoods with people living within walking distance of each other, whereas others were rural villages. WoON 2009 comprised 3393 unique neighbourhoods. We could not use 178 neighbourhoods of WoON 2009 because these have not been covered by WoON 2006, which was another data set used. We lost further neighbourhoods because of non-complete data. Finally, individuals in this study lived in 3001 neighbourhoods, constituting 75% of all Dutch neighbourhoods.

Variables

The 'dependent variable' was self-rated health. Self-rated health is well established as an indicator of morbidity¹⁹ and a predictor of mortality.²⁰ It was measured by the answer to the question, 'In general, is your health...?' on a 5-point scale ranging

from ‘very bad’ to ‘very good’. Consistent with previous research on neighbourhood social capital and health, the variable was dichotomized because its distribution is highly skewed (80.1% had good or very good health).

The ‘core independent variable’ was neighbourhood social capital, constructed on the basis of individual responses from the data set WoON 2006 (response rate = 56%). We used an earlier wave of the WoON data set because the questions about self-rated health and the perception of neighbourhood social capital were in that case not answered by the same people and the exposure variable was measured before the outcome variable. For each neighbourhood, 18.7 inhabitants, on average, answered the three neighbourhood social capital questions on contact among neighbours. Items inquired into the following areas: (i) whether people in the neighbourhood know each other; (ii) whether neighbours are nice to each other; and (iii) whether there is a friendly and sociable atmosphere in the neighbourhood. Response categories ranged from ‘totally don’t agree’ (1) to ‘totally agree’ (5). To aggregate the individual information to the neighbourhood level, we used econometrics measurements^{21,22} as already done in earlier work⁹ through multilevel analysis. This approach accounts for the nesting of social capital items within individuals and includes the neighbourhood level in the analysis, resulting in a three-level model (neighbourhoods, individuals and the items measuring social capital). We adjusted for eight individual characteristics that may influence the perception of neighbourhood social capital: sex, age, education, income, employment status, home ownership, self-rated health and years of residence. By doing so, we removed the possible effects of differences in socio-demographic composition of neighbourhood populations on the perception of social capital of the neighbourhood. We had not included migration status because most of the Dutch neighbourhoods have no or a very low percentage of non-Western and in sensitivity analyses, we did not find differences between migrants and natives in their response to the social capital questions. The econometric model accounts for differences in the numbers of respondents per neighbourhood by shrinking deviating neighbourhoods with smaller numbers of respondents to the general average.²³ The residuals of the neighbourhood social capital measurement (i.e. the part that cannot be attributed to individual response patterns) constitutes the new social capital measurement. Positive values indicate higher than average levels of neighbourhood social capital (reliability based on Hox²³: 0.702). To control for the possibility that neighbourhood social capital may have changed between 2006 and 2009, we calculated a change score. We calculated neighbourhood social capital for 2009 in precisely the same way as for 2006 (reliability based on Hox²³: 0.633), and we computed the change score by subtracting 2006 neighbourhood social capital from 2009 neighbourhood social capital. A higher positive value of the change score indicates improvement, and a negative change score indicates a decline in neighbourhood social capital. Two-thirds of the neighbourhoods did not change, remaining within 1 SD around the mean of the change score.

For ‘duration of residence’, we used the number of years the respondents said they lived at the same address, or the former address, if it was in the same neighbourhood (here, neighbourhood was defined subjectively). The variable was used as a metric, as well as a categorical variable in the multilevel analyses, as explained in the ‘Results’ section.

Due to the lack of actual time-diary measures in our data set, we used proxy measures to assess the ‘intensity of exposure’ to neighbourhood social capital. First, we distinguish between elderly (≥ 65 years) and younger people, with the assumption that elderly people have more exposure to neighbourhood social capital. Second, we distinguish between people who live in households with children aged < 12 years and those without. We chose this age because these children are still in primary school, which is usually close to their homes.

We used ‘individual control variables’ that have been shown to be important in the analysis of health or that are usually controlled for.²⁴ Exact description of control variables is given in the Supplementary data.

Modelling strategy

The data were analysed using multilevel logistic regression analyses with the statistical software package MLwiN 2.21 (using second order PQL estimation). The regression coefficients are presented as Odds ratios. We first estimated a null model to estimate the neighbourhood variance in self-rated health in an unadjusted model. The research questions assume an interaction between exposure and neighbourhood social capital. We separately modelled the cross-level interactions of neighbourhood social capital and duration of residence, elderly and households with small children. For duration of residence, two models were estimated: first, with duration of residence as a continuous variable and second with duration in categories. Additionally, for figure 1, people were selected into three duration groups and several multilevel analyses were performed. A significant cross-level interaction of intensity of exposure is illustrated in the figure 2.

[FIGURE 1 AND FIGURE 2]

RESULTS

Table 1 presents a descriptive overview of the individual-level variables and the bivariate relationship with self-rated health. To test the interaction of duration of residence (as a metric variable) and neighbourhood social capital, we performed a multilevel logistic regression analysis. The interaction was not significant; thus, an additional year of residence does not imply a greater effect of neighbourhood social capital on self-rated health. Nevertheless, the effect of neighbourhood social capital on health might be affected non-linearly by duration of residence. Therefore, a multilevel analysis of the interaction of duration squared and neighbourhood social capital was performed. As a result, we collapsed the respondents into three categories: short duration (0–6 years), long duration (7–22 years), and very long duration (≥ 23 years). Table 2, Model 1 shows significant interaction effects between categorized duration and neighbourhood social capital. We have visualized these interactions in figure 1. To do so, we have split our data set into three subsets (short ($n = 22\ 661$), long ($n = 28\ 375$), and very long duration ($n = 14\ 954$) of residence. Neighbourhood social capital was collapsed into three equally sized categories (-0.9 to $-0.2192 = 1$, -0.2193 to $-0.169 = 2$, -0.170 to $0.8 = 3$). We performed nine logistic multilevel regression analyses. The first analyses of the short duration group

tested whether low neighbourhood social capital has a significant effect on health (reference groups were the people with a higher level of neighbourhood social capital). Figure 1 shows the results of this analysis in the upper line. Independent of the level of neighbourhood social capital, the health of people with a short duration was not affected by neighbourhood social capital. The opposite was the case for the long duration group of people: average and high level of neighbourhood social capital is positively associated with health and a low level negatively. An average level of neighbourhood social capital is positively significant for the long duration group, whereas a low or very high social capital is not.

[TABLE 1 AND TABLE 2]

Table 2 presents the analyses to test the interaction between neighbourhood social capital and duration of residence (Model 1) and intensity of exposure (Models 2 and 3) on self-rated health—while using all possible cases. Both neighbourhood social capital and an increase in neighbourhood social capital in the previous 3 years are positively associated with self-rated health. Model 1 in table 2 tests whether a short, long or very long duration of residence in combination with neighbourhood social capital is significantly associated with health. High neighbourhood social capital in combination with short or very long durations of residence have a significant and negative association with health compared with the reference category, which combines high neighbourhood social capital and long duration. Thus, people residing in the same neighbourhood between 7 and 22 years have a stronger association between health and neighbourhood social capital than people who have lived for a shorter or longer period in the same neighbourhood. This result remained also when the increase in neighbourhood social capital in the previous 3 years was not part of Model 1.

Table 2, Model 2 shows that the effect of neighbourhood social capital is not stronger for elderly people than for younger people; the interaction was not significant. Table 2, Model 3 shows a much stronger association between health and neighbourhood social capital for members of households with young children than for the reference group. This interaction is presented in figure 2, which shows that the health of members of households with children <12 years is better, in general, than the health of the other respondents. Furthermore, the positive effect of neighbourhood social capital on health is stronger for respondents with young children.

DISCUSSION

This study is the first to analyse the effect of the length and intensity of exposure to neighbourhood social capital. Most interesting, a minimum duration of exposure is needed. The positive effect is visible after people live in the same neighbourhood for >6 years and disappears if people live in the same neighbourhood >22 years. The effect of neighbourhood social capital might also depend on the intensity of exposure, but our results are mixed. One category of the population that can be assumed to have more exposure to neighbourhood social capital is the elderly. However, their assumed higher intensity of exposure was not substantiated by a

stronger effect of neighbourhood social capital. For adults with small children, we found that self-rated health was more strongly affected by neighbourhood social capital compared with all other adults.

Our study confirmed previous studies that found a positive effect of social capital on health.⁹⁻¹² So far, exposure is a subject that has been neglected in neighbourhood health studies.²⁵ At best, duration of residence has been used as a control variable.²⁴ Although evidence on duration of exposure in neighbourhood research has been lacking, evidence about the influence of exposure to 'country' (as another social environment) exists in the field of immigrant health research. With a longer duration of residence, immigrants internalize the norms of the host country, with effects on health behaviour and health outcomes (e.g. an increase of BMI in the USA).^{26,27} Shared norms might function as a pathway between neighbourhood social capital and health, and should be studied in more detail in future research.

Two study limitations need to be discussed. First, our study has a cross-sectional design. Life course information, especially information on neighbourhood social capital during childhood, might be of interest because childhood experiences are known to influence adults' lives.^{3,28} Second, to test the intensity of exposure, future research should employ time use data.²⁹ We could only assume that elderly people or people with young children spend more time (and thus are more intensively exposed) in their neighbourhoods. However, variations in the intensity of exposure might be underestimated by the categories that we compared. We have tested sensitivity analysis with elderly defined as ≥ 67 years and found also no significant interaction with neighbourhood social capital. Elderly people might have heterogeneous and changing social lifestyles,³⁰ and they might not have a smaller geographical radius of activities than younger people as we had assumed. Unfortunately, it was not possible to use employment as measure of exposure (full-time worker vs. rest) because we did not know 'where' people work. It might be that people work in their own neighbourhood, full-time. Our study should be regarded as a first step towards further studies on intensity exposure and neighbourhood social capital.

Next to the new idea of bringing exposure into social capital research, an advantage of this study over the existing literature is its sophisticated measurement of neighbourhood social capital using an econometric method²¹ instead of simple aggregation. Correlations of the two different methods for aggregating individual perception to the neighbourhood level were not extremely high (0.808), indicating the adequacy of the econometric method.

The results of our study suggest that neighbourhood social capital has health implications especially for particular groups of people. The finding that newcomers are not and long-time residents are almost not affected by neighbourhood social capital is potentially important for health interventions that are applied at neighbourhood level and that aim to improve health through addressing neighbourhood social capital. Additionally, increasing the level of social capital in a neighbourhood is probably not a good strategy to improve older peoples' health. However, interventions focusing on the health of people with young children may want to stimulate the creation of neighbourhood social capital.

Supplementary data

Supplementary data are available at *EURPUB* online.

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KEY POINTS

- This is the first study to analyse the duration and intensity of exposure to neighbourhood social capital.
- People residing in the same neighbourhood between 7 and 22 years have a stronger association between health and neighbourhood social capital than people who have lived there for a shorter or longer period.
- Policies directed to an increase in neighbourhood social capital will not be equally effective for all groups of residents.
- Social capital in a neighbourhood is in particular beneficial for people with young children, whom we assumed to be more intensively exposed.

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FIGURES AND TABLES

Figure 1 Neighbourhood social capital dummies on individual health of people with a short, long or very long duration of residence. Black line: range of confidence intervals; squares in light grey: a low level of neighbourhood social capital and short duration; squares in medium grey: an average level of neighbourhood social capital and short duration; squares in dark grey: a high level of neighbourhood social capital and short duration; circles in light grey: a low level of neighbourhood social capital and long duration; circles in medium grey: a low level of neighbourhood social capital and long duration; circles in dark grey: a low level of neighbourhood social capital and long duration; triangles in light grey: a low level of neighbourhood social capital and very long duration; triangles in medium grey: a low level of neighbourhood social capital and very long duration; triangles in dark grey: a low level of neighbourhood social capital and very long duration

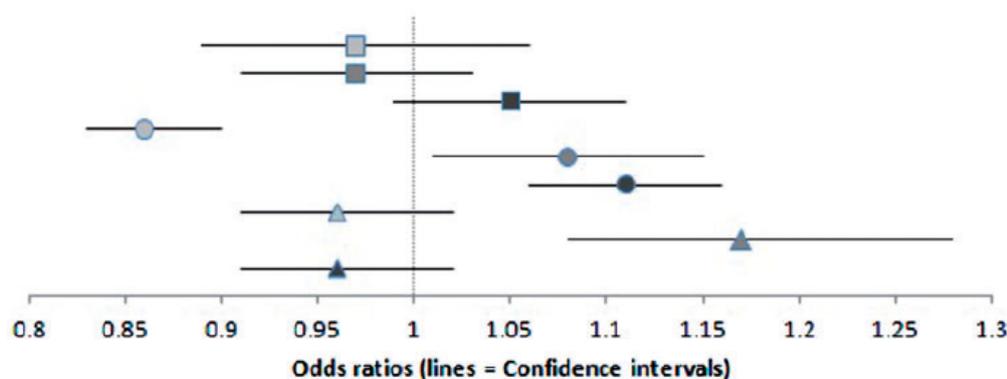


Figure 2 Interaction of neighbourhood social capital and intensity of exposure on self-rated health (based on table 2, Model 3). Black line: households with young children; dashes: households with no young children

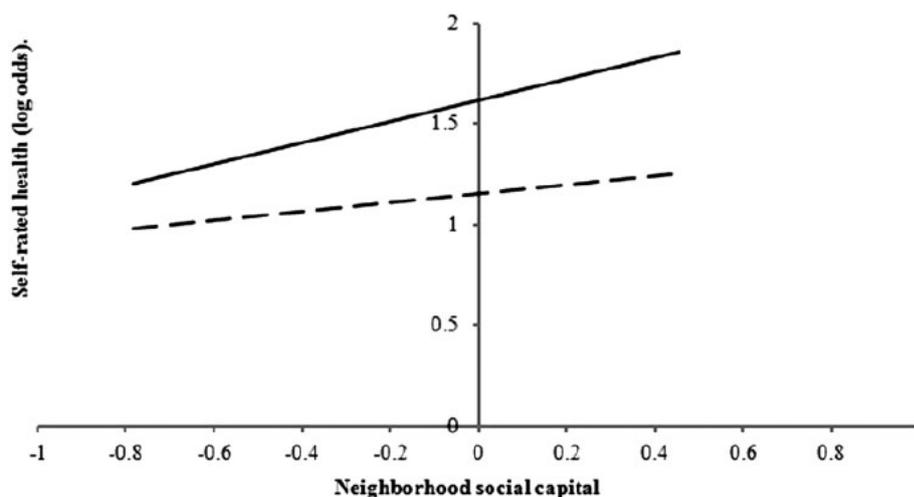


Table 1 Descriptive statistics

	Range	Mean (SD)	Proportion ^a (%)	Proportion in good or very good health ^b (%)
Individual-level variables (n = 65 990)				
Self-rated health				
Not good			21.5	
Good or very good			78.5	
Sex				
Man			43.9	81.7
Woman			56.1	76.0
Age ^c , continuous variable, centred	-33.11 to 55.89	0 (16.73)		
Ethnic background				
Native Dutch			81.8	79.8
Second generation Western			5.3	79.4
Second generation non-Western			1.5	85.7
First generation Western			3.6	73.6
First generation non-Western			7.8	64.8
Education				
Primary education			9.1	51.4
Junior secondary vocational education			14.4	67.4
Junior general secondary education			13.5	75.1
Senior general secondary education, university preparatory education and senior secondary vocational education			33.0	83.3
University degree or other forms of higher education			30.0	88.4
Employment (days)				
Not employed			41.5	62.2
<2.5			5.3	90.5
2.5-3.9			7.6	90.6
≥4			35.6	90.0
Number of days unknown			10.1	89.7
Income categories (€)				
Negative income			0.2	88.2
1-299			0.7	89.2
300-599			1.7	86.2
600-899			5.0	61.2
900-1199			11.7	58.6
1200-1499			14.2	70.9
1500-1799			15.0	78.2
1800-2099			13.8	82.5
2100-2399			11.1	84.5
2400-2699			8.0	87.4
≥2700			18.6	89.9
Ownership				
Owner			56.6	86.9
Renter			43.4	67.5
Measurements of exposure duration				
Duration of residence (metric)	0 to 92	14.6 (12.81)		
Duration of residence (years)				
0-6			34.3	84.3
7-22			43.0	77.4
≥23			22.7	71.8
Measurement of exposure intensity				
Children <12 years in the household				
Yes			19.4	89.7
No			80.6	75.8
Age				
Elderly (>65 years)			23.4	62.6
Younger (<65 years)			76.6	83.4
Neighbourhood variables (n = 3001)				
Neighbourhood social capital	-0.78 to 0.46	0.00 (0.18)		
Neighbourhood social capital change score	-0.52 to 0.60	0.00 (0.14)		
Percentage of residents in highest income quintile	0 to 42.86	14.23 (4.94)		
Urban density of municipality	1 to 5	2.67 (1.35)		
State of maintenance of the houses	1 to 5	4.01 (0.43)		

a Column = 100%. Example: 78.5% of all respondents report good or very good health

b Row = 100%. Example: 76.0% of all women report good or very good health and 81.7% of men. Besides the score indicating the neighbourhood social capital change, all variables are highly and significantly associated with health in a single-variable logistic regression analyses (individual health as dependent variable)

c Health and age were linearly associated (R^2 : 0.070, η^2 : 0.075)

Table 2 Multilevel logistic regression models of self-rated health controlling for individual- and neighbourhood-level variables—testing exposure to neighbourhood social capital (Odds ratios, 95% confidence interval in parentheses)

	Duration of residence		Intensity of exposure	
	Model 1	Model 2	Model 2	Model 3
Intercept	***1.750	***2.018		***1.754
Individual level ($n_i = 65990$)				
Gender				
Women	0.90 (0.88–0.92)	0.93 (0.91–0.95)		0.89 (0.89–0.89)
Age (continuous variable, centred)	0.98 (0.98–0.98)			0.98 (0.96–1.00)
Ethnic background (Reference = Dutch)				
Second-generation Western	0.93 (0.88–0.97)	0.95 (0.91–1.00)		0.93 (0.92–0.93)
Second-generation non-Western	0.85 (0.77–0.94)	1.20 (1.09–1.33)		0.84 (0.80–0.88)
First-generation Western	0.79 (0.75–0.84)	0.78 (0.74–0.82)		0.79 (0.71–0.87)
First-generation non-Western	0.55 (0.53–0.58)	0.64 (0.62–0.67)		0.52 (0.49–0.54)
Education (Reference = senior general secondary education, university preparatory education, and senior secondary vocational education)				
Primary education	0.64 (0.62–0.66)	0.54 (0.52–0.56)		0.64 (0.49–0.84)
Junior secondary vocational education	0.75 (0.72–0.77)	0.68 (0.66–0.70)		0.74 (0.72–0.77)
Junior general secondary education	1.02 (0.99–1.05)	0.93 (0.90–0.96)		1.02 (0.99–1.05)
University degree or other forms of higher education	1.24 (1.20–1.28)	1.21 (1.17–1.25)		1.24 (1.20–1.29)
Employment (days) (Reference = ≥ 4 days)				
Not employed	0.37 (0.36–0.39)	0.00 (0.00–0.00)		0.38 (0.36–0.39)
<2.5	1.02 (0.96–1.09)	1.02 (0.95–1.08)		1.00 (0.97–1.03)
2.5–3.9	0.98 (0.93–1.04)	0.96 (0.91–1.02)		0.92 (0.87–0.99)
Number of days unknown	0.97 (0.92–1.01)	0.93 (0.89–0.98)		0.94 (0.89–1.00)
Income (€) (Reference = 1800–2099 €)				
Negative income	1.65 (1.25–2.16)	1.83 (1.39–2.40)		1.65 (1.59–1.72)
1–299	1.53 (1.31–1.78)	2.41 (2.07–2.82)		1.71 (1.63–1.79)
300–599	1.33 (1.20–1.47)	1.93 (1.75–2.13)		1.44 (1.23–1.68)
600–899	0.62 (0.58–0.65)	0.77 (0.73–0.81)		0.62 (0.56–0.68)
900–1199	0.70 (0.68–0.73)	0.72 (0.69–0.75)		0.69 (0.65–0.73)
1200–1499	0.88 (0.85–0.92)	0.90 (0.86–0.93)		0.87 (0.84–0.91)
1500–1799	0.94 (0.90–0.98)	0.95 (0.91–0.99)		0.93 (0.89–0.97)
2100–2399	1.0 (0.95–1.04)	0.98 (0.94–1.03)		1.00 (0.96–1.04)
2400–2699	1.15 (1.09–1.21)	1.13 (1.07–1.19)		1.17 (1.12–1.23)
≥ 2700	1.30 (1.25–1.36)	1.26 (1.20–1.31)		1.34 (1.27–1.41)
Ownership (Reference = Renter)				
Owner	1.76 (1.71–1.80)	1.82 (1.78–1.87)		1.68 (1.61–1.75)
Neighbourhood level ($n_j = 3001$)				
Highest income quintile	1.01 (1.01–1.01)	1.01 (1.00–1.01)		1.01 (0.98–1.03)
Urban density of municipality	1.03 (1.02–1.04)	1.03 (1.01–1.04)		1.03 (1.03–1.03)
State of maintenance of the houses	1.04 (1.00–1.09)	1.02 (0.98–1.07)		1.03 (1.02–1.05)
Main effects and interaction				
Neighbourhood social capital	1.74 (1.55–1.95)	1.30 (1.17–1.44)		1.25 (1.20–1.31)
Change of neighbourhood social capital	1.61 (1.46–1.77)	1.52 (1.38–1.67)		1.55 (1.40–1.71)
Duration (metric)		1.00 (1.00–1.00)		1.00 (1.00–1.01)
Duration categories (years) (Reference 7–22 years)				
0–6	1.09 (1.06–1.13)			
≥ 23	1.14 (1.11–1.18)			
Neighbourhood social capital *0–6 years	0.57 (0.50–0.64)			
Neighbourhood social capital * ≥ 23 years	0.69 (0.61–0.78)			
Elderly (Reference = <65 years of age)				
≥ 65		0.99 (0.96–1.02)		
Neighbourhood social capital *elderly		1.02 (0.91–1.13)		
Young children family member				1.59 (1.59–1.59)
Neighbourhood social capital *Young children family member				1.36 (1.30–1.42)
Variance neighbourhood level (SE)	**0.018	***0.019		***0.019

n_j = neighbourhood; n_i = individuals

* $P \leq 0.05$, ** $P \leq 0.01$, *** $P \leq 0.001$

Intra-class correlation in all models = 0.5% and Wald test (R^2) = 0.26.

The neighbourhood level variance in self-rated health in the null model was 0.127 (SE 0.011).

Some 85% of this variation was explained by individual and neighbourhood variables in Models 1–3.