

Neighbourhood life and social capital: the implications for health

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Abstract

Social capital has been linked to health outcomes, though there are some inconsistencies in the research and the link is dependent on the measures of social capital and health used. In this paper, we argue that social capital is multifaceted and its relationship with health is complex. We explore the relationship between a number of elements of neighbourhood life and neighbourhood-based social capital, and health, using both qualitative and quantitative methods. The paper reports on a study of the Western suburbs of Adelaide and the analysis of 2400 questionnaires and 40 in-depth interviews. A partial least-square path analysis was undertaken with the questionnaire data. It considered the impact of perceptions of the physical environment, neighbourhood connections, neighbourhood trust, reciprocity, perceived safety and local civic action, and a number of demographic variables, on physical and mental health as measured by the SF-12. Of the neighbourhood-related variables, only perceived neighbourhood safety was related to physical health, with neighbourhood safety and neighbourhood connections related to mental health. Of the demographic variables, higher-income level and educational achievement were related to better physical and mental health. In addition, physical health was lower and mental health higher within older age groups. The inter-relationships between the neighbourhood variables and demographic differences in experience of neighbourhood were also examined. The thematic analysis of the interviews linked a number of social aspects of neighbourhood, the physical neighbourhood environment, perceptions of safety, civic activities and availability of local services, to health outcomes. The paper concludes that there is a need for more complex measures of social capital and that socio-economic factors are of relatively greater importance in determining health.

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Introduction

Trust, connection and reciprocity, the constructs underlying social capital, have been under increasing scrutiny as determinants of health. The picture of social capital emerging from the accumulating research is one of complexity in which socio-economic factors interact with the culture of local communities to determine levels

of both health and social capital. Our paper uses path analysis and in-depth face-to-face interview data to consider the effects of social capital on health within neighbourhoods in suburban Adelaide and explores the complex and multidimensional nature of social capital.

Social capital and health

Social capital, conceived at both the individual- and community level, has been linked with health, though the inconsistencies in conceptualising and measuring social capital make it difficult to assess this relationship (Hawe & Shiell, 2000; Macinko & Starfield, 2001). Two

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main schools of thought influence debates about social capital (Baum & Ziersch, 2003). Robert Putnam (1995) conceived of social capital as a community-level resource and a distinctly social feature that is reflected in the structure of social relationships and so is both a public good and an ecologic characteristic. He defined social capital as: 'features of social organisation such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit' (1995, p. 67). Pierre Bourdieu (1986), in contrast, focused on the resources that accrue to *individuals* as a result of their membership of social networks. He defined social capital as 'the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance and recognition' (p. 248). The comparative role of material factors and social capital in determining health outcomes has been extensively debated. Lynch, Due, Muntaner, and Smith (2000) maintain that the focus on social capital and health may, even if inadvertently, downplay the crucial importance of material factors on health inequities.

Social capital has been measured at the local, neighbourhood, state and even national level. Kawachi, Kennedy, Lochner, and Prothrow-Stith (1997), using General Social Survey data from 39 states in the USA, found that states with higher proportions of residents who believed that people could be trusted had lower age-adjusted rate of death from all causes. They also found that higher per capita density of membership in voluntary groups was related to lower mortality. Subramanian, Kawachi, and Kennedy (2001), also in the USA, using a single trust measure, found that the probability of self-reported poor health increased significantly from high to low 'social capital' states. Ellaway and Macintyre (1999) in Scotland reported that local association membership aggregated to neighbourhood area level was associated with health. In a qualitative study in the UK, Campbell and Wood (1999) found that areas with broader networks and higher civic engagement were those with better health outcomes.

Research has linked a number of individual-level social capital indicators with measures of health and wellbeing. For example, stronger social ties have been linked to lower levels of mortality (Berkman & Syme, 1979) and higher participation in social activities associated with better mental and physical health (Baum et al., 2000). Other research has linked civic participation and voluntary group membership to health (Joshi et al., 2000; Rietschlin, 1998). Larger network size has also been linked to positive health outcomes (see Taylor & Seeman, 1999 for a review). Other research has linked a mix of indicators of social capital to health outcomes. For example, connections with family and friends and participation in the local community (Gatrell et al., 2000) and number of friends willing to help, levels of

trust and membership in a religious association (Hyypä & Mäki, 2001) have been positively associated with self-reported general health. However, there are inconsistencies. For example, Ellaway and Macintyre (1999) found no relationship between involvement in a local association and self-rated individual health and Veenstra (2000) found few relationships between participation in voluntary associations and self-rated health. Baum et al. (2000) found no association between civic participation and mental or physical health.

There are a range of explanations for the positive influence that social capital can have on health; for example, that the presence of social capital can boost self esteem, provide social support, help people to access better resources, and act as a buffer against stressful life events (Campbell & Wood, 1999; Woolcock & Narayan, 2000).

Research and commentary on social capital supports the need to use complex measures and to examine it within a consideration of the impact of socio-economic factors such as educational level and income.

Neighbourhood life, individuals and social capital

Characteristics of neighbourhoods or locations, including social capital, have been linked to health outcomes (Curtis & Jones, 1998; Mohan & Mohan, 2002). A qualitative study by Cattell (2001) in the UK found that the history and culture of place affects the way in which people respond to their community and that areas with similar socio-economic status differed in levels of social capital. The focus of much of this work has been on community-level social capital where it is argued that *neighbourhoods* themselves have differing amounts of social capital. For example, areas have been found to differ in measures of social capital such as social networks that were in turn related to health (Gatrell et al., 2000). Neighbourhood-level measures of social capital have generally been constructed by aggregating individual responses to questionnaires to area-level measures of social capital.

We report on a study undertaken in the Western suburbs of Adelaide designed to contribute to the literature on the impact of neighbourhood on health and social capital. We asked people about their perceptions of neighbourhood, including elements of neighbourhood-based social capital (such as neighbourhood connections and trust, reciprocity and feelings of safety) and self-reported health. We consider the relationship between these perceptions of neighbourhood life, measures of social capital, and individual health. Qualitative and quantitative methods were used to provide a comprehensive analysis of complex relationships. We focus on residents' *perceptions* of their neighbourhood and the relationship with their health and as such do not compare areas on 'objective' measures. We draw on Bourdieu's conceptualisation of

social capital and measure neighbourhood-based social capital at the individual level and explore the impact of both material factors and social capital on health.

Method

Data collection

These data are part of a broader study, the Health Development and Social Capital Project (HDSCP), undertaken in the Western suburbs of Adelaide with data collection occurring in 1997 (Baum et al., 2000). The western region of Adelaide has a lower socio-economic status than Australia overall, but has pockets of advantages and disadvantages. It has higher than average concentration of migrants and people for whom English is not their first language, and has an older than Australian average population.

Two sources of data from HDSCP are relevant to this paper: a questionnaire and in-depth interviews.

Questionnaire

The questionnaire included items relating to a number of demographic variables (gender, age, education, income, housing tenancy and years at address), elements of neighbourhood (neighbourhood pollution), social capital (neighbourhood connections, neighbourhood trust, reciprocity, neighbourhood safety, local civic action) and health (SF-12 mental and physical health summary scores) (see Appendix 1). It was sent to 4000 residents, randomly selected from the electoral register. Non-respondents were sent up to three reminders. Replies were received from 64% of the original sample.

Samples from electoral registers in Australia may under-represent younger people who may not have registered to vote and non-English speaking people who are less likely to be eligible to vote. Compared with census data in the region, the sample was slightly skewed towards women and older people. Apart from these minor variations the sample is representative of the demographics of the study region.

Interviews

Three hundred and twenty-eight individuals returned a form included in the questionnaire indicating their willingness to be interviewed, and were allocated as 'high' and 'low' participators as judged by their responses to the questionnaire survey items on levels of social and civic participation (see Baum & Palmer, 2002). Twenty low participators (10 low income, 10 high income) and 20 high participators (10 low income, 10 high income) were randomly selected to participate in in-depth interviews. Interviews were semi-structured and conducted face-to-face. They ranged from 60 to 150 min. Interview questions related to health, experience of

neighbourhood life and elements of neighbourhood-level social capital such as social and civic participation, trust and reciprocity.

Data analysis: survey

A latent variable path analysis was performed using partial least-squares (PLS) regression procedures (Sellin & Keeves, 1994; Sellin, 1995) with the computer software PLSPATH 3.1 (Sellin, 1990). Latent variable path analysis involves the creation of 'latent variables', or unobservable theoretical constructs, through their association with observable or 'manifest variables'. For example, a latent variable of HEALTH BEHAVIOURS¹ can be created using measurable or manifest variables such as 'exercise sessions per week', 'alcohol consumption per week', and 'tobacco consumption per week'.

Path analysis using PLS was used here as it is particularly appropriate where there are many manifest and latent variables, where some or all of the manifest variables are categorical, where distributions are non-normal and under conditions of heteroscedasticity (i.e. where the residuals on manifest and latent variables are correlated) (Falk, 1987).

In PLS path analysis the *outer model* indicates the relationships between the latent variables and the observed or manifest variables. There are three types of relationships between a latent variable and its associated manifest variable/s. In *outward* mode the latent variable is estimated in a way similar to that of a principal component, and factor loadings are used to represent the common variance among manifest variables. Factor loadings $> \pm 0.30$ are considered significant. In *inward* mode the latent variable is seen as being produced by manifest variables where the latent variable is estimated in a way similar to multiple regression analysis and regression weights are calculated. For a latent variable in the inward mode that has one categorical manifest variable with three or more categories, the categories can be ranked in terms of the relationship between that latent variable and another latent variable of interest (see Ziersch & Baum, 2004, for further description). In *unity* mode the latent variable has only one associated manifest variable and both the weight and factor loading is always 1.00. For all three modes both weights and loadings range between +1 and -1 and the results are therefore in standardised form.

The *inner model* illustrates the hypothesised relationships among the latent variables,² and the strength of

¹In the text latent variable names are written in small capitals.

²This hypothetical model posits a sequential relationship between variables such that the effect of a variable on all other variables that come *after* it can be considered. This means that two-way relationships between variables cannot be considered.

these relationships is indicated by the regression weights for each path. PLS path analysis enables an estimation of the strength of both direct relationships between latent variables, and also the indirect relationships between latent variables through their common association with mediating variables.

In PLS path analysis the initial hypothetical model includes all paths between each latent variable with those latent variables coming after it in the model sequence. This model is then trimmed with paths between latent variables removed if the weights were less than 0.10 (Cohen, 1992). However, for paths directly leading to the outcome variables, this criterion was relaxed to less than 0.08, to allow for a consideration of less important but potentially interesting findings. Traditional significance testing is not appropriate in PLS path analysis. Instead, the size of the estimated path coefficient is used to assess the strength of a variable's effect. In addition, using a jack-knife procedure, standard errors can be calculated by PLSPATH 3.1 and paths trimmed according to a 'rule of thumb' where the jack-knife mean of a path must also be twice the jack-knife standard error, to remain in the inner model. Cohen's (1992) effect size was also utilised where regression coefficients ranging 0.10–0.29 were considered small effects, 0.30–0.49 considered medium effects and greater than 0.50 considered large effects. Unless indicated otherwise, the paths discussed represent small effect sizes in Cohen's terms. R^2 values are also reported for each latent variable indicating the proportion of variance accounted for by the model.

Thirteen latent variables were used in the model (see Appendix 1 for a full description of these variables). Manifest variables or items for the social capital latent variables were chosen on a theoretical basis. The order of the variables in the hypothetical model was determined by our previous research in the area and a review of the literature.

Six demographic variables were included as likely to directly impact on health, or to influence the experience of neighbourhood life—gender, age, education, income, housing tenancy, and years spent living at the current address.

A variable, NEIGHBOURHOOD POLLUTION, was created regarding perceptions (on a scale of 1–5) of the level of noise in the neighbourhood and how clean the neighbourhood was, with a high score indicating perceptions of a cleaner and quieter neighbourhood.

A number of social capital-related variables were also included in the model which related to respondents' experience of the neighbourhood, and in each case higher scores indicated higher levels of each of these elements. NEIGHBOURHOOD CONNECTIONS included four questions relating to the strength of connections with other neighbourhood residents. The variable NEIGHBOURHOOD TRUST related to the extent to which people

felt that most people in the neighbourhood could be trusted. RECIPROCITY consisted of the number of favours given and received (chosen from a list) in the last 12 months. It should be noted that these two items related to favours to and from neighbours *and* friends, and as such do not relate to neighbourhood only. NEIGHBOURHOOD SAFETY was also included in the model. This variable involved perceptions of the neighbourhood as safe to walk at night, and feelings of safety in the home. Another variable LOCAL CIVIC ACTION related to whether respondents had undertaken one of six local civic actions, such as attending a public meeting or contacting a local councillor.

The outcome variables of MENTAL HEALTH and PHYSICAL HEALTH were measured using the SF-12 (Ware, Kosinski, & Keller, 1995), scored with weights from the Australian National Health Survey. The SF-12 is a self-report health measure which enables the calculation of mental and physical health summary scores, each of which range from 0 to 100, with higher scores indicating better health. The analysis was undertaken separately for each of these summary scores.

In the initial model, all paths between each latent variable with those latent variables coming after it in the model sequence were included, with paths trimmed if their regression weight was less than 0.10.

Interview analysis

The interviews were analysed thematically with the assistance of NUD*IST covering themes relating to health, the physical neighbourhood and elements of neighbourhood-based social capital such as social and civic participation, trust, reciprocity and safety.

Results

Survey

Neighbourhood life and social capital

The following relationships are reported in Table 1 (inner model) and Figs. 1 and 2 (outer model and inner model).³

³Figs. 1 and 2 both illustrate the relationships between the demographic and neighbourhood and social capital variables in relation to physical and mental health, respectively, though for simplicity they do not illustrate the inter-relationships between the demographic variables. Table 1 reports on the inter-relationships found in physical health analysis. However, the relationships found are almost identical for both the physical and mental health analyses with only minor variations in weights and loadings. The one exception is that of the variable 'tenancy' where the signs in the outer model are reversed in the mental health analysis. However, the inner model relationships of this variable with other latent variables are also reversed, preserving the overall direction of the relationships.

Table 1
Path analysis direct and indirect inner model effects for the non-demographic variables

Variable	R ²	Direct effect	Total effect	Indirect effect
<i>Neighbourhood pollution</i>	0.05			
Age		0.23	0.23	—
<i>Neighbourhood connections</i>	0.15			
Gender		—	0.00	0.00
Age		—	0.18	0.18 ^a
Education		—	0.00	0.00
Income		—	0.01	0.01
Tenancy		−0.14	−0.21	−0.08
Years at address		0.27	0.27	—
Neighbourhood pollution		0.14	0.14	—
<i>Neighbourhood trust</i>	0.31			
Gender		—	0.00	0.00
Age		0.13	0.24	0.10 ^a
Education		0.10	0.10	0.00
Income		—	0.00	0.00
Tenancy		—	−0.05	−0.05
Years at address		—	0.06	0.06
Neighbourhood pollution		0.42	0.45	0.03
Neighbourhood connections		0.22	0.22	—
<i>Reciprocity</i>	0.18			
Gender		—	0.00	0.00
Age		−0.21	−0.19	0.02
Education		—	0.00	0.00
Income		—	0.01	0.01
Tenancy		—	−0.05	−0.05
Years at address		−0.13	−0.01	0.11 ^a
Neighbourhood pollution		—	0.06	0.06
Neighbourhood connections		0.42	0.42	—
<i>Neighbourhood safety</i>	0.35			
Gender		−0.17	−0.17	0.00
Age		−0.19	−0.03	0.16 ^a
Education		—	0.04	0.04
Income		—	0.00	0.00
Tenancy		—	0.02	0.02
Years at address		—	0.03	0.03
Neighbourhood pollution		0.23	0.43	0.20 ^a
Neighbourhood connections		—	0.10	0.10 ^a
Neighbourhood trust		0.44	0.44	—
<i>Local civic actions</i>	0.05			
Gender		—	−0.00	0.00
Age		—	−0.06	0.06 ^a
Education		0.16	0.16	0.00
Income		—	0.00	0.00
Tenancy		—	0.04	0.04
Years at address		—	0.05	0.05
Neighbourhood pollution		−0.11	−0.08	−0.02
Neighbourhood connections		0.17	0.19	—

^aIndicates significant indirect effects (≥ 0.10).

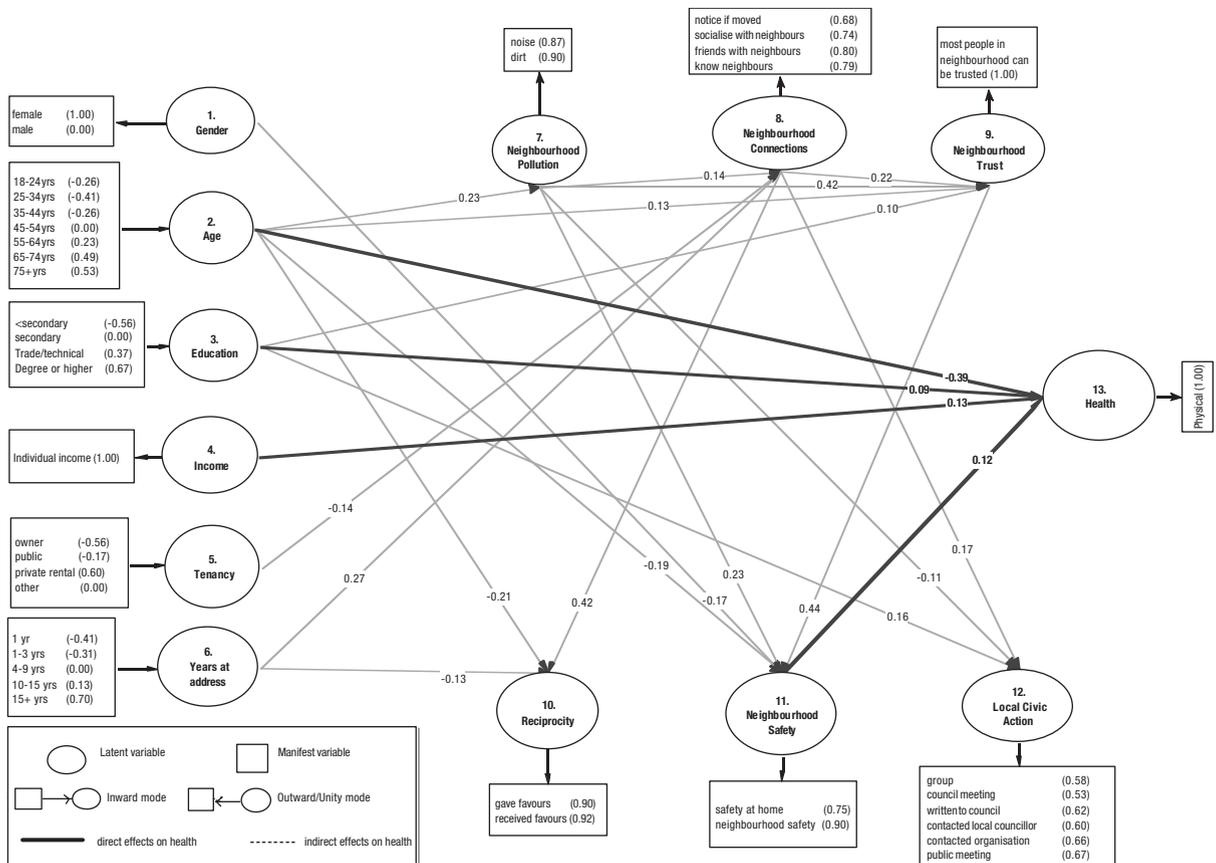


Fig. 1. Path diagram for physical health.

AGE was positively directly associated with NEIGHBOURHOOD POLLUTION, with more positive perceptions associated with the older age groups. This accounted for 5% of the variance. No other variables were indirectly associated with NEIGHBOURHOOD POLLUTION.

TENANCY, YEARS AT ADDRESS and NEIGHBOURHOOD POLLUTION were significantly directly associated with NEIGHBOURHOOD CONNECTIONS, accounting for 15% of the variance. Home owners had stronger neighbourhood connections, compared to those in public housing and ‘other’ tenants. Those in private rental accommodation had the least neighbourhood connections.⁴ Neighbour-

⁴Where a latent variable *A* is negatively associated with latent variable *B*, and latent variable *A* has a manifest variable that is negatively associated with it—the relationship between that latent *A* manifest variable and latent variable *B* is multiplicative i.e. it becomes positive. Therefore, where the latent variable of TENANCY is negatively associated with NEIGHBOURHOOD CONNECTIONS and home owners and public housing tenants have negative weights—it indicates that these tenant types have *stronger* neighbourhood connections than private rental or ‘other’ tenants.

hood connections were stronger for those who had lived at the same address longer, particularly those in the same house for 15 years or more. Neighbourhood connections were also higher for those who had more positive perceptions of pollution in the area. Age was indirectly associated with NEIGHBOURHOOD CONNECTIONS, with the older age groups having higher levels of neighbourhood connections.

AGE was positively directly associated with NEIGHBOURHOOD TRUST. Older age groups were more likely to think fellow residents could be trusted. EDUCATION was also significantly associated with NEIGHBOURHOOD TRUST, with those with higher educational achievement more trusting of others in the neighbourhood. NEIGHBOURHOOD POLLUTION (medium effect size) and NEIGHBOURHOOD CONNECTIONS were positively associated with NEIGHBOURHOOD TRUST, with trust increasing with stronger neighbourhood connections and more positive assessments of pollution. AGE was also indirectly associated with NEIGHBOURHOOD TRUST, with the older age groups having higher levels of trust. These variables accounted for 31% of the variance.

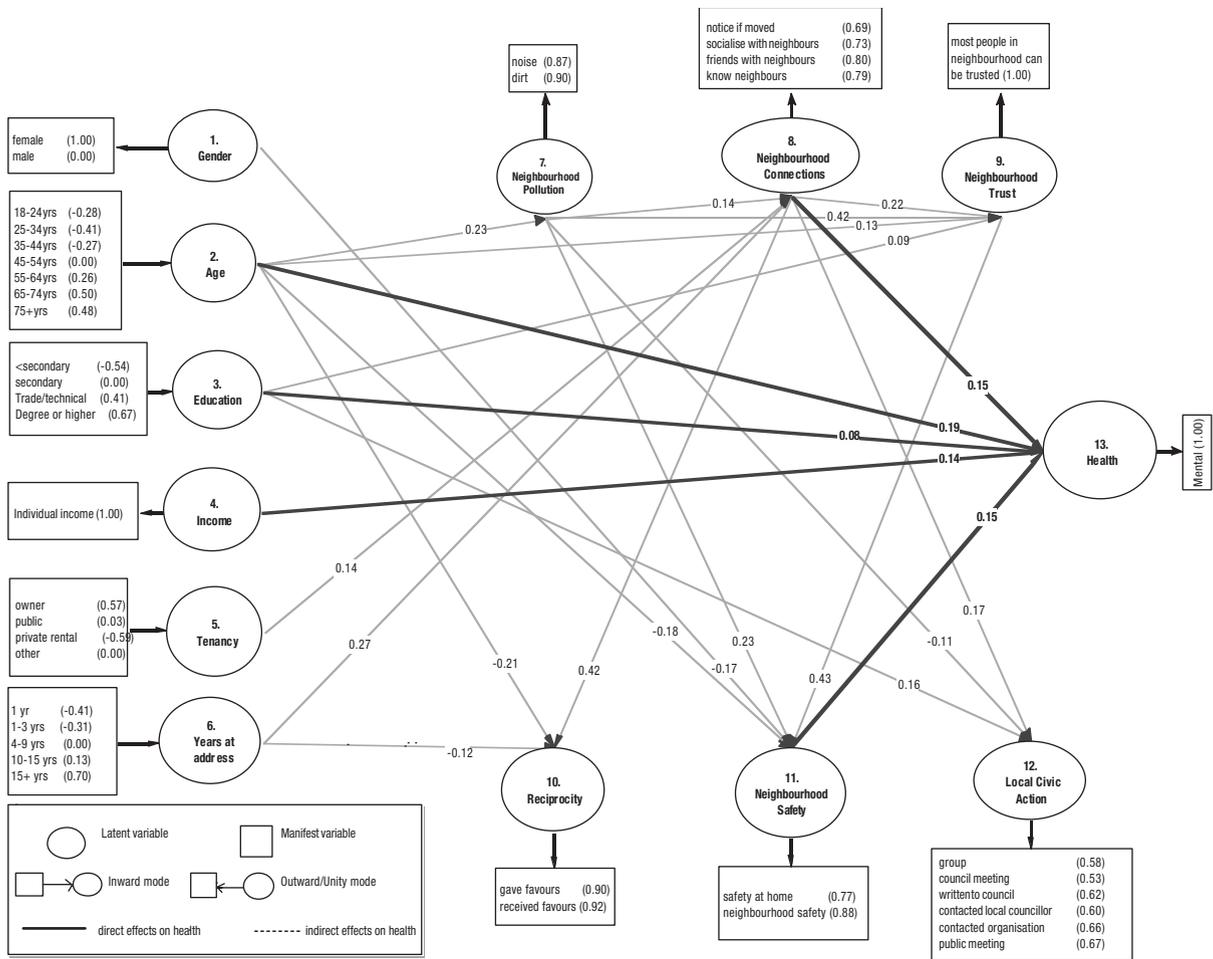


Fig. 2. Path diagram for mental health.

Three latent variables were directly associated with RECIPROCITY, accounting for 18% of the variance. RECIPROCITY was negatively associated with AGE, with the older age groups exchanging fewer favours than the younger age groups. It was positively associated with the extent of neighbourhood connection (medium effect size). However, it was negatively associated with the years spent at the same address. YEARS AT ADDRESS was indirectly positively associated with RECIPROCITY, meaning that living longer at an address was positively associated with other variables that were themselves positively associated with reciprocity.

Four latent variables were significantly directly associated with NEIGHBOURHOOD SAFETY, accounting for 35% of the variance. The variable GENDER was negatively associated with safety, with women having lower levels of perceived safety. AGE was negatively associated with safety, with the older age groups feeling less safe. Interestingly, AGE was also indirectly associated with safety, though in the positive direction. This

suggests that despite the fact that the older age groups have, for example, higher levels of neighbourhood trust (which is itself positively associated with more positive perceptions of safety), they are still overall less likely to feel safe. NEIGHBOURHOOD POLLUTION was positively associated with perceptions of safety, with those who had more positive views of pollution in the area, also feeling safer. NEIGHBOURHOOD TRUST was also positively associated (medium effect size), with perceptions of safety increasing with trust in neighbours. NEIGHBOURHOOD CONNECTIONS were indirectly positively associated with NEIGHBOURHOOD SAFETY, with those with stronger local connections feeling safer.

Three latent variables were associated with LOCAL CIVIC ACTION, accounting for 5% of the variance. EDUCATION was positively associated, with civic activities increasing with level of education. NEIGHBOURHOOD POLLUTION was negatively associated with LOCAL CIVIC ACTION, with less favourable assessments of the area linked to a greater number of civic actions.

NEIGHBOURHOOD CONNECTION was positively associated with LOCAL CIVIC ACTION, suggesting those who were strongly locally linked were more likely to be locally civically active.

Health

Four variables were significantly directly associated with PHYSICAL HEALTH, accounting for 28% of the variance (Table 2, Fig. 1). AGE was negatively associated with PHYSICAL HEALTH, with the older groups having poorer health. INCOME was positively associated with PHYSICAL HEALTH, with health increasing with income level. EDUCATION was also marginally positively associated with PHYSICAL HEALTH, with better physical health scores for those who were more educated. NEIGHBOURHOOD SAFETY was positively associated with PHYSICAL HEALTH, where those with more positive perceptions of neighbourhood safety also reported higher levels of physical health. No further variables were indirectly significantly associated with PHYSICAL HEALTH.

Five variables were significantly associated with MENTAL HEALTH, accounting for 10% of the variance (Table 3, Fig. 2). AGE was positively associated with MENTAL HEALTH, with this time older age groups having better mental health. INCOME was positively associated with MENTAL HEALTH, with those on higher incomes having better mental health. EDUCATION was marginally associated with MENTAL HEALTH with mental health increasing with education level. NEIGHBOURHOOD CONNECTIONS and NEIGHBOURHOOD SAFETY were positively associated with MENTAL HEALTH, with those with stronger neighbourhood connections and higher levels of perceived neighbourhood safety, having better mental health. No other variables were significantly indirectly associated with mental health.

Interviews

The interviews were designed to elaborate on the relationships found in the quantitative analysis and enabled more detailed exploration of the complexities of the relationships and aspects of neighbourhood life, social capital and health. These respondents were asked both what they thought affected their own health and what made a healthy community. There was significant overlap between their perceptions of these two aspects of health. Responses related to social aspects of health, the physical environment, safety, civic involvement and the availability of services.

Social aspects of neighbourhood

Respondents generally saw good neighbourhood relations as important to individual and community health. Problems with these relationships detracted from both community and individual health. Thus many

Table 2

Path analysis direct and indirect inner model effects for physical health

Variable	Direct	Total	Indirect
<i>Physical health: R² = 0.28</i>			
Gender	—	−0.04	−0.04
Age	−0.39	−0.48	−0.08
Education	0.09	0.13	0.04
Income	0.13	0.13	0.00
Tenancy	—	0.00	0.00
Years at address	—	0.00	0.00
Neighbourhood pollution	—	0.05	0.05
Neighbourhood connections	—	0.01	0.01
Neighbourhood trust	—	0.05	0.05
Neighbourhood safety	0.12	0.12	—

Table 3

Path analysis direct and indirect inner model effects for mental health

Variable	Direct	Total	Indirect
<i>Mental health: R² = 0.10</i>			
Gender	—	−0.05	−0.05
Age	0.19	0.13	−0.06
Education	0.08	0.13	0.05
Income	0.14	0.14	0.00
Tenancy	—	0.04	0.04
Years at address	—	0.05	0.05
Neighbourhood pollution	—	0.08	0.08
Neighbourhood connections	0.15	0.17	0.01
Neighbourhood trust	—	0.06	0.06
Neighbourhood safety	0.15	0.15	—

interviewees saw people in their neighbourhood getting along together and informal interaction playing a key role in creating a healthy community:

(A healthy community is...) Getting on well with your neighbours I suppose and knowing a few people in your street. (Jake,⁵ 26 years)

This interaction was often discussed in particular in terms of reciprocity—helping one another out.

Oh I just think its knowing people get along. If there was an instance where you felt that you really needed help and others were there at least, or supporting. (James, 18 years)

As part of this the role of tolerance was stressed:

⁵All names used are pseudonyms.

I suppose tolerance. And if you're tolerant you probably also are going to be helpful to your neighbours if there is a need. (Barbara, 59 years)

Individuals varied dramatically in the extent of their neighbourhood connections and had been selected to highlight these contrasts. Some had very strong connections with frequent interactions, high levels of trust and regular exchange of favours. These were often longer-term residents and/or those who spent a lot of time in the area. Reciprocity was a particularly strong theme in local connections. For example, Alexandra, a 19-year-old student and long-term resident in her area who lives with her father, noted these reciprocal exchanges between neighbours:

The man next door is always home—he's a pensioner and he's always home, always having a look. If something goes on he knows straight away, and that's just a huge help of "oh you know, there was a white car here. I don't know what it wanted". He's very friendly and Dad always talks with him and we always do favours. Like when we go away, he feeds our animals and when he goes away, we look after his house and feed his animals or water his lawn... So it's very "if you scratch my back, I'll scratch yours". Not even that, just "if you need help, I'm here."

However, others were quite isolated. Some had not been in the area for long, or spent a lot of time outside the area at work or with friends or partners who lived elsewhere. In other cases, interactions with neighbours were characterised by conflict. For example, Rob had felt let down by a neighbour, a young single mother, who he had tried to assist through lending tools and household goods and providing access to his phone. However, this woman had run up a large interstate phone bill and had since left her house, taking with her the items he had lent to her. According to Rob, she also threatened him with violence after he informed the public housing authority of her plans to sell the security doors from her house. Paul, 66 years old, had a police order to stay away from a neighbour due to ongoing conflict.

In the interviews, people such as Rob and Paul discussed the negative impact of such conflict on their sense of wellbeing and the way that these poor neighbourhood relations detracted from their health. Others revealed that they sometimes felt emotionally drained supporting others, or did not have the time or energy to participate in reciprocal exchanges demonstrating that social networks may have detrimental effects.

For many respondents a 'sense of community' was perceived as an important aspect of a healthy community and to individual wellbeing. This concept implied

connections, trust and reciprocity. A typical comment was:

I think deep down it is to everybody...because I don't want to be a hermit, and unless you're a hermit community's got to be part of your life hasn't it? (Pamela, 53 years)

However, people's expectations of what gave a sense of community varied. Some felt disappointed that there were not deeper neighbourhood connections and those from the country often negatively compared city communities to a sense of community in the country, as John (51 years) put it '*a city good community ain't nothing like a country community*'. However for others the simple 'hellos' between neighbours, provided a sense of community.

For some a sense of community or strong interaction with neighbours wasn't important to their wellbeing:

...Community doesn't bother me very much. I mean I like to have amenities I think of a certain standard, but not a sense of community. I mean I've always maintained friendships with people in the street, but they're not your friends as such. They're neighbours. I don't really know whether the sense of community is something I'd agree with or want. (Alan, 40 years)

These residents were more likely to be those who had not lived long in their area, and often had aspirations to move to other 'better' areas in the more affluent eastern suburbs.

Physical neighbourhood environment

A particularly strong theme about what made a healthy community was the presence or absence of environmental pollutants. This related to traffic pollution, noise pollution and industry, all of which are significant features of many of the neighbourhoods within the study area. A number of people expressed concern about specific industrial pollution in their area:

We do get a bit of shit from (*industrial company*)...it's the smog...It's the same with the cement company. They used to let the crap go up the stack and is used to blow out. (Paul, 66 years)

We have other pollution too now. We have transport coming through now too. We have road AA (*large trucks/lorries*) trains, which are coming through the area now. Although we may have lost certain types of pollution, we have gained others. (Sharon, 40 years)

People also referred to the general cleanliness, sense of pride in and general look of area:

The community I live in is neat and tidy, respectable and that. I don't think I could handle the place of where people don't appreciate what they've got, and

don't look after what they've got. Therefore their houses look rundown; you've got rubbish strewn and flying down the street and everything like that. (Debbie, 22 years)

A strong theme about neighbourhood was the noise in the area. Almost all interviewees felt that their area was quiet and/or peaceful and this was important to their enjoyment of the area. This was in terms of lack of traffic, but also other residents. The presence of trees and green spaces was also noted as important to enjoying an area.

Safety

Fear, violence and safety were prominent in people's discussion of their areas.

(A healthy community is)...where people respect other people's property, don't do graffiti or vandalise or break into people's homes. Yes, where you feel safe to go out and you're not locked up and feel like you're locked in your house all day...If people really felt safe in their community, they'd get out and walk about. (Sophie, 20 years)

These feelings of safety were linked to the extent of neighbourhood connection and length of time living in the area. A number of people connected a sense of safety to the control of children. This related to children being both the perpetrators and victims of crime.

Feelings of safety also related to residents looking out for one another where strong neighbourhood connections acted as an informal 'neighbourhood watch'⁶ which made people feel safer:

(A healthy community is one that) just looks out for each other, because stuff does go on and if you can sort of limit the amount of bad behaviour in your neighbourhood...whether its because everyone's looking out for each other or whatever, I think its a much better community, where they don't have to worry about things like the stealing and graffiti. (James, 18 years)

Civic communities

A number of people also talked about the importance for healthy communities of participation in formal or civic activities:

There's enough of majority of the community that's willing to put their hands up for like Neighbourhood Watch again...So yes, I think there's a good healthy aspect to the community at the moment. (Peter, 44 years)

Availability of services

Central to discussions about healthy communities was the availability of amenities and services, part of what Macintyre and colleagues term 'Local Opportunity Structures' (e.g. Macintyre & Ellaway, 2000).

Communities need infrastructure—they need infrastructure to hold them together...So I think there has to be access to community infrastructure...Things like libraries, interpreting services, shuttle busses, all of those things—those community infrastructures give people a sense of well being and a sense of security as well. (Beth, 26 years)

These were important not only for the services themselves but also in their role as meeting places (relates to Third Places as described by Oldenburg, 1989) where residents informally interacted:

I suppose areas that families and people can go to—large ovals where people can kick balls, run dogs, do all bits and pieces, play equipment for kids. That in general would start a healthy community because the community is getting out of their homes and into a neutral territory where everyone might actually talk or socialise. (Debbie, 22 years)

Discussion

The path analysis results support a long and consistent literature concerning the social distribution of health, with both income and education related to mental and physical health such that those who were more advantaged socio-economically were also better off health-wise. In addition, age was related to both measures of health, with older age groups having lower levels of physical health, but higher levels of mental health.

The quantitative analysis indicated that perceptions of the extent of neighbourhood pollution were more positive among older residents, even controlling for number of years spent living at the current address, although these perceptions were not related to either measure of health. The qualitative analysis, however, did support this relationship, suggesting that particularly issues of noise and air pollution, were of health concern (see also Wakefield, Elliot, Cole, & Eyles, 2001). The quantitative analysis also found that positive perceptions of the extent of pollution were associated with stronger neighbourhood connections, higher neighbourhood trust and greater feelings of safety. It is not possible to determine whether this suggests that cleaner and quieter neighbourhoods promote neighbourhood-based social capital or whether it is *perceptions* of these environmental features that count.

⁶Local neighbourhood groups which focus on crime prevention.

The results suggested that a number of features of neighbourhood-based social capital were related to health. Neighbourhood connections were related to mental health, though the quantitative analysis did not find an association with physical health. It would be expected that social connections would impact on mental health more directly, than physical health. The qualitative work indicated that strong neighbourhood ties were particularly important to long-term residents and those who were more 'neighbourhood-dependent' (Forrest & Kearns, 2001; Meegan & Mitchell, 2001) such as the elderly and unemployed. The quantitative analysis also suggested that length of time in the area and home ownership strengthened local ties, supporting other research indicating that such time and money investments act as an incentive to greater community participation (DiPasquale & Glaeser, 1999). However, even weak ties in neighbourhoods were important to some residents, again consistent with other studies (see, for example, Forrest & Kearns, 2001). In addition, neighbourhood and other ties were not always positive for physical or mental health and in some cases the qualitative data indicated they may be characterised by conflict and may have a distinctly negative impact on health (see also Campbell & Gillies, 2001).

In the quantitative analysis neighbourhood trust and reciprocity were not related to either health measures. It is acknowledged that the reciprocity measure asked about both neighbours and friends, though many of the favours asked about were locally focused. However, the interview material indicated that a sense of neighbourhood connection encompassed both neighbourhood trust and reciprocity. It is possible that the elements of neighbourhood trust and reciprocity that are relevant to health were already accounted for by the neighbourhood connection measure. In addition, the question on neighbourhood trust may have also been covered by neighbourhood safety item. For example, respondents may have interpreted the question in terms of their trust that fellow residents would not be a personal threat or threat to their property, rather than more intimate elements of trust such as keeping confidences. The finding that reciprocity was inversely related to length of time in the area was curious. This may be due to the more general nature of the question asking if participants had exchanged favours with neighbours or *friends* in the last 12 months. People who had moved more frequently may have had greater numbers of people with whom they could exchange favours. The association between neighbourhood trust and education and age is consistent with research that links trust to educational achievement and older age (Hogan & Owen, 2000; Shah, 1998; Smith, 1997).

The quantitative analysis found that neighbourhood safety was associated with both mental and physical health. Women and the elderly were most likely to feel

unsafe (Lupton, 1999). Perceptions of safety were positively associated with favourable perceptions of neighbourhood pollution and strong trust in neighbours.

Civic actions in the neighbourhood were more likely from those who had strong neighbourhood connections, suggesting that individuals, who are locally socially involved, were more likely to also participate in civic activity. Negative perceptions of neighbourhood pollution were associated with civic activities. It is not clear whether this relates to people living in objectively worse physical environments or to differences in perceptions of the same physical environment. In addition, those with higher education were more likely to be civically involved, supporting much literature that links civic participation to educational achievement (Baum et al., 2000; Hogan & Owen, 2000; Shah, 1998; Verba, Scholzman, & Brady, 1997). The quantitative and qualitative analysis indicated that involvement in local civic activities was not associated with individual health outcomes. However, a number of interviewees cited local civic action as contributing to and being an indicator of a healthy community.

The qualitative analysis also supported the contention of Macintyre and colleagues (e.g. Macintyre & Ellaway, 2000) that the availability of services and amenities in an area has health implications in the direct provision of health-promoting services, and also, indirectly, through their role in facilitating social interactions between neighbours.

The study indicated that neighbourhood-based social capital does not necessarily operate in a uniform manner, lending support to Macinko and Starfield (2001)'s criticism of the use of single item measures. We used a range of items to measure social capital and its operation within neighbourhoods and this has revealed complex, and at times, contradictory findings. While our study looked at neighbourhood-based social capital, measured at the individual level, there were indications that respondents were involved in other communities and had strong ties with people outside their neighbourhood. Characterising individuals within an area on the basis of community or neighbourhood-level measures potentially misrepresents their social capital stocks (i.e. 'atomistic fallacy'—Riley 1963 in Macintyre & Ellaway, 2000).

Study limitations

The path analysis model order meant that only one-way relationships between variables could be considered and that the impact of a variable could only be considered for variables following it. This means, for example, that it was not possible to consider the way that local civic action may impact on neighbourhood connections, because local civic action followed neighbourhood connections in the model.

Given the cross sectional nature of the study, it is unclear if the impact of age represents the effect of ageing on community involvement or highlights a cohort effect. It is likewise important to note that health status may influence people's access to social capital and their perceptions of neighbourhood life. Longitudinal research will be required to determine the dynamics of these relationships.

As noted, the two indicators for neighbourhood pollution used in the quantitative analysis were fairly narrow and did not specifically ask about environmental pollution, the strongest of the environmental issues raised in the interviews. Future measures should consider broader perceptions of the physical environment. The limitation of the reciprocity measure as a neighbourhood-based measure has already been noted, in not specifically asking about the exchange of favours between *neighbourhood* residents.

The final models for physical and mental health accounted for 28% and 10% of the variance in scores, respectively. There are clearly other factors that are relevant to health that were not considered here. For example, we did not have any measures of 'lifestyle' factors such as tobacco and alcohol consumption or regularity of exercise.

In addition, we only looked at *perceptions* of area factors, and did not have 'objective' measures by which to compare areas to determine whether these differences in perceptions related to individual factors or actual area differences. For example, the direct observation of neighbourhood characteristics advocated by Sampson and Raudenbush (1999) would be a useful addition to the methodology.

Our conceptualisation of 'community' was at the neighbourhood level. Other conceptualisations of community at both smaller aggregations such as the street or block, and larger aggregations such as council areas or whole of city may have provided different findings. Likewise, as the data were only collected from the western suburbs of Adelaide, the findings may be specific to this area.

Conclusion

Our study provides a picture of neighbourhood-based social capital by using measures of perceptions of the extent of pollution and neighbourhood connections, neighbourhood trust, reciprocity, safety and extent of local civic action. Our data suggest that neighbourhood-based social capital has only a weak impact on health through perceptions of safety and neighbourhood connections. Socio-economic factors appear to have independent and stronger effects on health; however, they were generally not related to the neighbourhood social capital measures.

Our qualitative data on perceptions of factors that contribute to individual and community health confirm other data (Hancock & Duhl, 1986) showing that the health status of a community reflects social and physical environments, safety, availability of services and community willingness to partake in civic action. These data are important in stressing the need to see social capital as just one element of the components of neighbourhood health and as one that has both positive and negative effects.

Our qualitative data allow a tentative suggestion that the social capital available in a neighbourhood in terms of willingness to take civic action and creation of a sense of community through reciprocity, trust and connections between neighbours may create more or less supportive communities. As our study is cross sectional, we cannot comment on patterns of causality and lower levels of social capital may exist in areas with concentration of people with poor health status.

Our study also reinforced the need for measures of social capital that capture the complexity of the concept. An understanding of this complexity is vital to the development of social policies relating to social capital and health equity. These policies need to be driven by an understanding that social capital may be quite different, for example, for well educated compared to less-educated people, or for people living in poor neighbourhoods compared to those in rich ones, or for those in the workforce and those who are not in the workforce. People may accumulate social capital both in the neighbourhood in which they live and outside it (Ziersch, 2002). Policies that do not take account of the subtleties of social capital mediated through class, culture, labour force participation, gender and age, may be dangerous.

This study points to some of the complexities noted above but a survey and one-off interviews provide very blunt tools for understanding the true dynamics of social capital. We particularly note the increasing number of critiques of social capital that stress the importance of ensuring that social capital is only used in social policy within a framework that stresses the health effects of macro-level social and economic policies (Lynch, Davey Smith, Kaplan, & House, 2000; Pearce & Davey Smith, 2003). These criticisms note the danger that labelling individuals or communities as 'low in social capital' may become a form of victim blaming. Thus, despite the bluntness of our instruments, our results suggest that there are pathways between social capital and health but the direct links between income and health are the most significant. Future social capital research could usefully concentrate on how macro-level economic policy affects the ability of communities to promote social capital. Living in trusting, reciprocal and friendly communities would be an aim of most people. But their chances of

doing this are most likely shaped by social and economic forces largely outside their control. Our work supports Pearce and Davey Smith (2003) warning of the dangers of studying social capital without considering broader macro-economic policy.

We also note that not all aspects of neighbourhood-based social capital are linked to health. Civic action, in particular shows no relationship. The reasons for this are complex and require specifically targeted research to explore further. Not all civic action happens locally but when it does it may reflect either the fact that there are more issues of concern in that area or that some local factors influence the capacity of a community to organise. We suspect (and hope for confirmation from further research) that civic action is one aspect of social capital that requires measurement at both the individual and community level.

Overall, our study suggests that social capital does determine health especially mental health outcomes to some extent but that social capital as a resource is not uniformly distributed across populations and broader social and economic factors affect both health and social capital. A consideration of social

capital within this context could make an important contribution to an understanding of health inequities, and how social capital could be utilised in efforts to address these.

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Appendix 1

See Table 4 for details.

Table 4
Description of variables used in the analysis

Variable (outer model mode)	Scale/coding
<i>Gender (unity)</i> Female/male	Females coded (1.00)/males (0.00)
<i>Age (inward)</i> 18–24 years 25–34 years 35–44 years 45–54 years 55–64 years 65–74 years 75+ years	18–24 years (1.00), other (0.00) 25–34 years (1.00), other (0.00) 35–44 years (1.00), other (0.00) 45–54 years (1.00), other (0.00) 55–64 years (1.00), other (0.00) 65–74 years (1.00), other (0.00) 75+ years (1.00), other (0.00)
<i>Education (inward)</i> Primary school or less Secondary school only Trade/technical Degree or higher	Primary school or less education (1.00), other (0.00) Secondary school only (1.00), other (0.00) Trade/technical (1.00), other (0.00) Degree or higher education (1.00), other (0.00)
<i>Income (outward)</i> Income	14 point scale ranging from (<\$6240–\$104,000+ pa)
<i>Tenancy (inward)</i> Owner Private rental Public housing Other	Owner (1.00), other (0.00) Private rental (1.00), other (0.00) Public housing (1.00), other (0.00) Other tenancy (1.00), other (0.00)
<i>Years at address (inward)</i> <1 year 1–3 years	<1 year (1.00), other (0.00) 1–3 years (1.00), other (0.00)

Table 4 (continued)

Variable (outer model mode)	Scale/coding
4–9 years	4–9 years (1.00), other (0.00)
10–15 years	10–15 years (1.00), other (0.00)
> 15 years	> 15 years (1.00), other (0.00)
<i>Neighbourhood pollution (outward)</i>	
Rating of the noisiness of the neighbourhood	5 point scale ranging from 1 (<i>very noisy</i>) to 5 (<i>very quiet</i>)
Rating of the cleanliness of the neighbourhood	5 point scale ranging from 1 (<i>very dirty</i>) to 5 (<i>very clean</i>)
<i>Neighbourhood connections (outward)</i>	
Level of agreement “ <i>I am good friends with many people in this neighbourhood</i> ”	5 point scale ranging from 1 (<i>strongly disagree</i>) to 5 (<i>strongly agree</i>)
Level of agreement “ <i>If I moved hardly anyone around here would notice</i> ”	5 point scale ranging from 5 (<i>strongly agree</i>) to 1 (<i>strongly disagree</i>)
Regularity of visiting neighbours or neighbours visiting	6 point scale ranging from <i>never</i> (1) to <i>once a week or more</i> (6)
Extent to which they know people in the neighbourhood	5 point scale ranging from 1 (<i>I do not know people in my neighbourhood</i>) to 5 (<i>I know most of the people in my neighbourhood</i>)
<i>Neighbourhood trust (unity)</i>	
Rating of the neighbourhood as a place where most people can be trusted	5 point scale ranging from 1 (<i>Most people in the area cannot be trusted</i>) to 5 (<i>Most people in the area can be trusted</i>)
<i>Reciprocity (outward)</i>	
Favours given—“ <i>Have you assisted neighbours or friends with the following activities in the past year</i> ”: Listened to their problems; helped them with odd jobs; lent them household equipment; looked after their house while they were away; assisted them with shopping; cared for a member of their family; lent them money; other	Number of favours given
Favours received— <i>Have neighbours or friends assisted you with the following activities in the past year</i> : Same list as above	Number of favours received
<i>Neighbourhood safety (outward)</i>	
Rating of the neighbourhood as a safe place to walk around at night	1 (<i>Very unsafe place to walk around at night</i>) to 5 (<i>Very safe place to walk around at night</i>)
Answer to “ <i>Do you feel safe in your home</i> ”	4 point scale ranging from 1 (<i>none of the time</i>) to 4 (<i>all of the time</i>)
<i>Local civic action (outward)</i>	
Civic actions undertaken in last 12 months:	
Participated in a resident or community action group	1 (<i>yes</i>); 0 (<i>no</i>)
Attended a council meeting	1 (<i>yes</i>); 0 (<i>no</i>)
Written to the council	1 (<i>yes</i>); 0 (<i>no</i>)
Contacted local councillor	1 (<i>yes</i>); 0 (<i>no</i>)
Contacted appropriate organisation to deal with a local problem (eg. police, council)	1 (<i>yes</i>); 0 (<i>no</i>)
Attended a public meeting to deal with a local problem	1 (<i>yes</i>); 0 (<i>no</i>)
<i>Health</i> (nb separately analysed)	
Physical health	SF-12 summary score
Mental health	SF-12 summary score

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