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# The sense of belonging to a neighbourhood: can it be measured and is it related to health and well being in older women?

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## Abstract

This study investigates the sense of belonging to a neighbourhood among 9445 women aged 73–78 years participating in the Australian Longitudinal Study on Women's Health. Thirteen items designed to measure sense of neighbourhood were included in the survey of the older women in 1999. Survey data provided a range of measures of demographic, social and health-related factors to assess scale construct validity. Factor analysis showed that seven of the items loaded on one factor that had good face validity and construct validity as a measure of the sense of neighbourhood. Two of the remaining items related to neighbourhood safety and comprised a factor. A better sense of neighbourhood was associated with better physical and mental health, lower stress, better social support and being physically active. Women who had lived longer at their present address had a better sense of belonging to their neighbourhood, as did women living in non-urban areas and who were better able to manage on their income. Feeling safe in the neighbourhood was least likely in urban areas, increased in rural townships, and was most likely in rural and remote areas. Older women living alone felt less safe, as did women who were less able to manage on their income. This study has identified two sets of items that form valid measures of aspects of the social environment of older women, namely the sense of neighbourhood and feelings of safety. These findings make a contribution to our understanding of the relationship between feelings of belonging to a neighbourhood and health in older women.

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*Keywords:* Women; Sense of neighbourhood; Safety; Healthy ageing; Australia

## Introduction

The question of whether neighbourhood contexts can affect health is a research area of increasing interest (Kawachi, 2002). The challenge is to conceptualise, operationalise and test associations between aspects of the social environment, such as residential neighbourhoods, and population health (Kawachi, 2002; Macintyre, Ellaway, & Cummins, 2002). Population health and quality of life have been shown to be influenced by

the social and physical settings in which people conduct their daily activities (Russell, Hill, & Bassar, 1998; Cubbin, LeClere, & Smith, 2000). The protective effects of social networks on morbidity and mortality have long been recognised (Yasuda et al., 1997; Lindstrom, Merlo, & Ostergren, 2002). Older adults who are embedded in active social networks tend to have better physical and mental health than older adults who are less involved with other people (Thompson & Krause, 1998). Social networks may include family members, friends, social or religious groups and neighbours.

Neighbours are an important community resource, particularly for older people (Schwirian & Schwirian, 1993). The neighbourhood is a context in which socially supportive relationships can be established and

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maintained (Schwirian & Schwirian, 1993). The neighbourhood may become a vital element of the support system for older people who become socially isolated through poor health, limited mobility, financial constraints or lack of access to transport (Russell et al., 1998). It has been shown that as women age, their dependency on their neighbourhood increases (Yasuda et al., 1997).

The sense of belonging to a neighbourhood is the result of a complex process involving objective qualities of the neighbourhood, the psychological and physical state of the person and the person's own subjective definition of neighbouring and neighbourhood (La Gory, Ward, & Sherman, 1985). The objective and subjective dimensions influencing neighbourhood satisfaction may include the environment, emotional attachment to the community, interaction with other individuals in the community and formal participation or involvement in community organisations (Bolan, 1997). The dimensions may also include personal safety, fear of crime and the nature and quality of social contacts (Schwirian & Schwirian, 1993; Macintyre et al., 2002). These factors are interrelated because the physical characteristics of the neighbourhood, such as the condition and adequacy of the dwelling and surroundings, may influence the establishment of social ties (Schwirian & Schwirian, 1993). If the physical characteristics of the neighbourhood are not conducive to establishing contact, then obtaining support may be more difficult, particularly for older people who live alone (Thompson & Krause, 1998). Such physical barriers, as well as psychological barriers such as the fear of crime, can result in fewer opportunities for contact and support.

Regular physical activity in older adults can facilitate healthy ageing, improve functional capacity and prevent disease (Booth, Owen, Bauman, Clavisi, & Leslie, 2000). However, people who fear being robbed and who are afraid to leave their dwelling, limit their outdoor physical activities, such as walking (Ross, 2000). The factors associated with physical inactivity are poorly understood but regular participation of friends, access to local facilities and safe places for walking have been shown to be associated with being active (Booth et al., 2000).

One characteristic of communities that has generated considerable attention in the literature is the concept of social capital, which consists of features of social organisation which act as resources for individuals and facilitate collective action (Lochner, Kawachi, & Kennedy, 1999). Social capital is an ecological characteristic that should be distinguished from individual characteristics (Lochner et al., 1999; Lindstrom et al., 2002). Four constructs that are considered to be slightly different, yet overlapping, aspects of social capital were examined by Lochner et al. (1999). The constructs were neighbour-

hood cohesion (measures of affective and instrumental support, at the aggregate community level), collective efficacy (where group members believe in the overall ability of the collective to act effectively), psychological sense of community (where group members have a feeling of belonging and being important to each other), and community competence (the problem solving ability of a community through collective effort) (for a review see Lochner et al., 1999). After reviewing the definition and measurement of these constructs, they concluded that there has been insufficient theoretical and empirical work carried out to enable a definitive guide to the measurement of social capital and that more valid ways to measure collective attributes of communities are needed.

The concept of neighbourhood cohesion is usually measured by assessing neighbourhood networks, instrumental and emotional social support available within the neighbourhood, casual interaction with neighbours and other resources potentially available to all members of the social structure. Lochner et al. (1999) concluded that neighbourhood cohesion is a community level characteristic, with several instruments having been designed to quantify this collective attribute.

The concept of collective efficacy has also been measured at a community level, by the aggregation of two subscales: social cohesion and informal social control (Sampson, Raudenbush, & Earls, 1997). The social cohesion and trust subscale consists of five items, asking respondents whether they agree, on a five point scale, with the statements: "people in this neighborhood can be trusted", "this is a close-knit neighborhood", "people around here are willing to help their neighbors", "people in this neighborhood generally don't get on with each other", "people in this neighborhood do not share the same values". The informal social control subscale consists of five items to assess the likelihood of community intervention in situations such as delinquency and violence. In a study of 8782 residents in 343 neighbourhood clusters in one city, collective efficacy was shown to be positively related to socioeconomic status, home ownership and age of residents and negatively associated with high mobility (Sampson et al., 1997).

The concept of social cohesion and trust has many similarities to the concept known as psychological sense of community, developed by McMillan and Chavis (1986). The psychological sense of community construct was formulated to measure four dimensions, namely membership (feeling part of a group); influence (between the individual and the group); integration (needs will be met by being in the group) and shared emotional connection (shared history) (McMillan & Chavis, 1986). Sense of community is hypothesised to be determined by the extent to which community members experience a sense of solidarity and a sense of significance (Clarke,

Table 1  
Distribution of responses to each item (percent), mean (standard deviation) of item scores and percent missing

	Distribution of responses (%)					Percent missing	Mean (SD) <sup>a</sup>	
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree			
<i>Sense of neighbourhood items</i>								
a	I would be really sorry if I had to move away from the people in my neighbourhood	4	4	28	37	26	3.7	3.79 (0.99)
b	I have a lot in common with people in my neighbourhood	3	7	31	43	16	4.2	3.63 (0.91)
c	I generally trust my neighbours to look out for my property	3	3	10	57	27	3.3	4.04 (0.82)
e	I am good friends with many people in this neighbourhood	2	3	16	57	22	3.7	3.94 (0.80)
f	I like living where I live	2	1	7	52	37	2.2	4.27 (0.73)
h	My neighbours treat me with respect	1	1	7	65	25	2.6	4.15 (0.63)
k	People in my neighbourhood are very willing to help each other out	2	3	19	57	19	3.8	3.88 (0.78)
<i>Neighbourhood safety items</i>								
i	Children are safe walking around the neighbourhood during the day	2	4	12	64	19	5.1	3.95 (0.76)
m	It is safe to walk around the neighbourhood at night	12	24	25	31	8	3.2	3.01 (1.13)
<i>Excluded items</i>								
d	People in my neighbourhood make it a difficult place to live <sup>b</sup>	50	36	9	3	2	7.5	4.31 (0.87)
g	I have little to do with people in this neighbourhood <sup>b</sup>	20	34	22	20	3	7.6	3.52 (1.01)
l	If I no longer lived here, hardly anyone around here would notice <sup>b</sup>	15	45	21	15	4	5.4	3.52 (1.04)
j	I get involved with most local issues	5	19	41	28	7	7.0	3.09 (0.96)

<sup>a</sup>Complete cases ( $n = 7677$ ).

<sup>b</sup>Negatively worded item with reversed scoring.

1973). Sense of solidarity refers to sentiments such as feelings of belonging, togetherness, cohesion, and identification, so that members talk in terms of “we” and “our” rather than in terms of distinction or division (Clarke, 1973). Sense of significance entails members feeling that they are appreciated as important contributors to the group, thereby developing a sense of achievement, fulfillment and worth (Clarke, 1973). However it is important to recognise that communities are not homogenous and people sharing even the same neighbourhoods do not necessarily have the same sense of belonging (La Gory et al., 1985).

Despite the ongoing research of this concept, there is still no agreement on a definitive and consistent measure of psychological sense of community and the psychometric properties and factor structures of the proposed subscales have been shown to be inconsistent across

subgroups within the population (Hill, 1996; Chavis & Pretty, 1999; Lochner et al., 1999). In addition, psychological sense of community and other neighbourhood measures have been developed and evaluated in urban settings (Chipuer & Pretty, 1999; Macintyre et al., 2002). Measures need to be modified, and thoroughly evaluated, for use in rural and sparsely populated areas.

A number of Australian studies have investigated aspects of the neighbourhoods where people live. The Healthy Communities Survey in Tasmania asked about feelings concerning neighbours and neighbourhood, to assess the impact of neighbourhood connectedness on health and well being (Department of Health and Human Services, 1999). In that study, neighbourhood connectedness was assessed using 13 items (Table 1), including eight items (a, b, d, e, g, j, k, l) from an earlier national survey by the Australian Institute of Family

Studies (AIFS) (Brownlee, 1993). Principal component analysis of the eight items in the AIFS survey indicated that they could be summed to yield a single “sense of community” index for each person (Brownlee, 1993). The Healthy Communities Survey added five items (c, f, h, i, m) based on the theoretical literature concerning the link between social connectedness and health and well being. Their aggregate measure of neighbourhood satisfaction, defined as the mean of scores for the 13 items, was found to be positively correlated with quality of life (Department of Health and Human Services, 1999). However the psychometric properties of the scale items, and the validity of using these items to measure a single construct, have not been assessed. Most of the items measure similar concepts to those used in the measurement of sense of community and some items (a, b, c, e, f, k) are comparable to those used in measures of neighbourhood cohesion and the five-item social cohesion and trust subscale (Sampson et al., 1997; Lochner et al., 1999).

In their review of the literature, Macintyre et al. (2002) concluded that conflicting findings about the effect of neighbourhood on health may be due to differences in the way area effects are posited and used. They urged investigators to develop and test robust hypotheses about the potential impact of features of the local social and physical environment on health. This paper seeks to contribute to the methodological literature about the conceptualisation and measurement of neighbouring and the sense of community. The subgroup being studied is older women participating in the Australian Longitudinal Study on Women’s Health (ALSWH), also known as Women’s Health Australia. ALSWH began in June 1995 to provide a basis for improved health policies and services for women in Australia, by collecting longitudinal data on a broad range of individual and contextual factors that may influence health and well being in women. The purpose of the present study is: (1) to evaluate the use of a recognised set of items on sense of neighbourhood as a scale; (2) to determine whether the items represent one or more underlying factors; (3) to test the validity of a summed score compared with factor-based scores for any derived factors; and (4) to examine construct validity and describe associations with demographic and health-related characteristics of the selected summary score.

## Methods

### *Sample*

The ALSWH study was designed to investigate multiple factors affecting the health and well being of women over a 20-year period (Brown et al., 1998).

Women were randomly selected from the national Medicare health insurance database, which includes all permanent residents of Australia, with over-representation of women living in rural and remote areas. Over 40,000 women in three age-based cohorts (18–23 years, 45–50 years and 70–75 years) completed the first survey in 1996. A comparison with the 1996 census indicated the respondents were broadly representative of women in the same age groups, with some over-representation of married women and women with higher levels of education (Brown et al., 1998).

In 1999, women in the oldest cohort completed their second survey that included questions on their sense of neighbourhood, socio-demographics, physical health and well being. Women who completed the first survey were considered ineligible for this survey if they had died ( $n = 488$ ), were too ill (e.g. dementia, stroke) to complete the survey ( $n = 102$ ), had returned the first survey without providing contact details ( $n = 508$ ) or could not be traced ( $n = 336$ ). Nine hundred and twenty women chose to complete a shortened version of the survey over the telephone, which did not include the neighbourhood items and were excluded from these analyses. The response rate to the mailed full-length version of the second survey was 83% (9501/11506). Respondents tended to be Australian born, more educated, more able to manage on available income and reported better health and well being than other eligible women.

Of the 9501 women who completed the full-length version of the second survey a further 56 were excluded because their housing situation was inconsistent with assessing opinions about their neighbourhood (13 women living in a nursing home and 43 whose housing situation was unknown). Thus the evaluation of neighbourhood items was based on data from 9445 women aged 73–78 years.

### *Measures*

The neighbourhood items included in the 1999 ALSWH survey (Table 1) duplicate those of the Tasmanian study, with minor differences in wording for two items and with the omission of the response category of not applicable (Department of Health and Human Services, 1999). The response options used in the present study were: strongly disagree, disagree, neutral, agree, and strongly agree. Responses were scored from 1 (strongly disagree) to 5 (strongly agree), with scores for the negatively worded items (d, g, l) reversed so that for all items a higher score reflected greater satisfaction.

Health was measured by the physical (PCS) and mental health (MCS) component scores derived from the Medical Outcomes Study SF-36 (McCallum, 1995). The Duke Social Support Index (Koenig et al., 1993)

measured social support. Respondents were asked ‘How long have you lived in your present home?’ and responses were classified as: less than 1 year, 2–5 years, 6–10 years, 11–20 years, 21 years or more. Women were asked to rate the extent to which they were stressed about seven aspects of their lives, including their own health, the health of family members, living arrangements, money, and relationships. The scores for the stress items ranged from 0 for not at all stressed to 4 for extremely stressed and were averaged to give a mean perceived stress score with higher values indicating more stress (Brown, Dobson, Bryson, & Byles, 1999). Level of exercise was determined from self-reported time spent engaging in “vigorous activity”, “moderate activity” and “walking” in the previous week (Brown & Bauman, 2000). The number of minutes reported for each of these activities were weighted by 7.5, 4, and 3, respectively and totalled to obtain a summary measure of physical activity. Scores were categorized as: <40 (none or very low), 40–<600 (low), 600–<1200 (moderate), and 1200 or more (high). Self-reported height was recorded in metres.

### *Statistical analysis*

Factor analysis was used to determine whether the empirical data supported a single factor, as the factor structure may be sensitive to the population under study. The rotated factor pattern from principal components analysis (with varimax rotation) was used to check the groupings of the items and the contribution of each item to the factors. Items with high factor loadings (>0.5) on a single factor were judged to contribute to that factor; items with a weak factor loading or high levels of cross-loading on more than one factor were judged not to contribute to a factor.

Two equal sized groups were selected at random to allow split sample analysis and the results were compared for consistency. Factor analysis based on complete cases with no missing data included 3846 and 3831 women (total of  $n = 7677$ ). A second factor analysis of the split samples based on the pair-wise correlation matrix for non-missing pairs of variables, rather than complete cases, included 4723 and 4722 cases (total of  $n = 9445$ ).

Several measures were used to assess the fit of the derived factors (Hair, Anderson, Tatham, & Black, 1998). First, the amount of variance accounted for by the factor solution for each item, the communality, was expected to be at least 0.5. Second, the item-to-total correlation for each item, measuring the correlation between an individual item and a summed score excluding that item, was expected to exceed 0.5. Finally, the internal consistency was considered adequate if the value of Cronbach’s alpha was 0.6 or more.

Two types of summary score were calculated for each factor identified in the factor analysis. For each woman with complete data, a composite factor score was calculated as the total of response scores, weighted by the standardised scoring coefficients on that factor from the factor analysis. A second score, the summed score, was calculated as the sum of response scores for the items that loaded together, with unit weighting. Up to two missing items were allowed in the calculation of the summed score, with the average of the non-missing data substituted for the missing items. The correlation between the factor score and the summed score was calculated. Because of greater transferability to other populations and studies, the summed score will be preferred over the factor score if validity can be demonstrated (Hair et al., 1998).

Construct validity was assessed by examining whether scores behaved as expected in relation to other constructs. It was hypothesised that neighbourhood scores would be positively related to physical and mental health, physical activity, social support and years living in the present home. Similarly, a negative correlation with stress was postulated. A null association was proposed between neighbourhood scores and height. Associations with these factors were evaluated with Pearson correlation coefficients. Differences in unadjusted mean neighbourhood scores for the demographic characteristics of marital status, living alone or not, ability to manage on income and area of residence were estimated using the least-squares means option in the general linear model procedure (SAS Institute Inc., 1999). To reduce the effects of inflated type 1 errors due to multiple comparisons and the large sample size, the level of statistical significance was set at 0.005. All analyses were performed using SAS (SAS Institute Inc., 1999).

## **Results**

### *Characteristics of the sample*

About half the women (52%) were married and of the 41% who were widowed, 85% lived alone. Forty two per cent of the women lived in urban areas, 41% lived alone and 25% found it impossible or difficult to manage on their income. Thirty nine per cent of the women had lived in their present home for more than 20 years.

### *Univariate analysis*

Response frequencies, percent missing and mean scores are shown for all 13 items in Table 1, with items grouped according to the findings of the factor analysis described later. The women in the study were generally



Table 2

Item-to-total correlation, communality and factor loadings for sense of neighbourhood and neighbourhood safety for women with responses to nine items ( $n = 8177$ )

		Item-to-total correlation	Communality	Sense of neighbourhood	Neighbourhood safety
b	I have a lot in common with people in my neighbourhood	0.66	0.65	<b>0.80</b>	0.05
e	I am good friends with many people in this neighbourhood	0.66	0.64	<b>0.79</b>	0.11
c	I generally trust my neighbours to look out for my property	0.63	0.59	<b>0.76</b>	0.09
a	I would be really sorry if I had to move away from the people in my neighbourhood	0.58	0.54	<b>0.74</b>	0.04
k	People in my neighbourhood are very willing to help each other out	0.64	0.57	<b>0.71</b>	0.26
h	My neighbours treat me with respect	0.61	0.54	<b>0.69</b>	0.25
f	I like living where I live	0.58	0.49	<b>0.68</b>	0.18
m	It is safe to walk around the neighbourhood at night	0.24	0.71	0.02	<b>0.84</b>
i	Children are safe walking around the neighbourhood during the day	0.43	0.66	0.26	<b>0.77</b>
	Standardised Cronbach's alpha	0.85			
	Cumulative percentage of variance explained			47%	60%

happy with where they lived, felt they were treated with respect, and had trust in their neighbours to help look out for their property. Thirty nine per cent of women felt that it was safe to walk around at night. Almost one quarter of these older women had little to do with their neighbours and around one in five felt that it would not be noticed if they no longer lived there.

#### Factor analysis

Results of the factor analyses of the split samples, using both the complete cases and pair-wise correlations, were strongly consistent. Results are presented for all complete cases ( $n = 7677$ ). Internal consistency of the 13 items was high (standardised Cronbach's alpha 0.86). Item-to-total correlations were low (0.24) for item m, intermediate for items d, i, j and l (0.38–0.42) and high (0.55–0.70) for the remaining 8 items. Three factors were identified in the factor analysis and they accounted for 57% of the variance in the responses to the 13 items (results not shown). Items i and m were considered to comprise a neighbourhood safety factor, with high levels of communality and strong loadings, while loadings of all other items on this factor were weak. Items d, g, j and l tended to behave less consistently than other items across the various analyses, had higher cross-loadings and had the highest rates of missing data (5.4–7.6%). Thus, these 4 items were excluded from further analyses.

Factor loadings from a final factor analysis of nine items (a, b, c, e, f, h, i, k and m) are shown in Table 2. The minimum communality was 0.49 and item-total correlations were high ( $> 0.58$ ) for all satisfaction items and low for safety items. Factor scores were derived from this analysis.

#### Scores

Factor scores for sense of neighbourhood and neighbourhood safety were calculated for 8177 women (87%) with no missing items in the final factor analysis. A summed sense of neighbourhood score was based on the 7 items loading most strongly onto the sense of neighbourhood factor. Allowing mean substitution for up to two items, the summed score was calculated for 9171 women (97%). As the summed score resulted in fewer missing values than the factor score and as the correlation between the summed and factor scores was 0.97, the summed score was chosen for further analysis. The summed sense of neighbourhood score had a mean of 27.6 with standard deviation 4.5.

A summed neighbourhood safety score was calculated for the 8835 women responding to items i and m. This score correlated highly with the neighbourhood safety factor score (Pearson correlation coefficient 0.98) and hence was chosen for further analysis. The summed

Table 3  
Construct validity of the summed scores for sense of neighbourhood ( $n = 9171^a$ ) and neighbourhood safety ( $n = 8835^a$ ) among women aged 73–78 years

	Sense of neighbourhood		Neighbourhood safety	
	<i>Correlation</i>	<i>p-value</i>	<i>Correlation</i>	<i>p-value</i>
SF-36 Physical Health Component score	0.07	<0.001	0.08	<0.001
SF-36 Mental Health Component score	0.15	<0.001	0.11	<0.001
Stress score	-0.14	<0.001	-0.12	<0.001
Social support score	0.33	<0.001	0.14	<0.001
Height	Less than -0.01	0.95	0.02	0.098
	<i>Mean<sup>b</sup> (95% CI)</i>	<i>p-value</i>	<i>Mean<sup>b</sup> (95% CI)</i>	<i>p-value</i>
Years in present home		<0.001		0.537
<i>One year or less</i>	26.8 (26.4, 27.2)		6.9 (6.7, 7.0)	
2–5 years	26.8 (26.6, 27.1)		6.9 (6.8, 7.0)	
6–10 years	27.3 (27.0, 27.5)		6.9 (6.8, 7.0)	
11–20 years	27.7 (27.5, 27.9)		7.0 (6.9, 7.0)	
21 or more years	28.1 (27.9, 28.2)		6.9 (6.9, 7.0)	
<i>Physical activity</i>		<0.001		<0.001
None or Sedentary	27.2 (27.0,27.4)		6.9 (6.8,6.9)	
Low	27.6 (27.5,27.8)		6.9 (6.8,7.0)	
Moderate	28.0 (27.8,28.2)		7.0 (6.9,7.1)	
High	28.0 (27.8,28.2)		7.1 (7.0,7.2)	

<sup>a</sup> There are missing data for up to 136 for sense of neighbourhood and 128 for neighbourhood safety.

<sup>b</sup> Means not significantly different from one another are joined by a line.

neighbourhood safety score had a mean of 6.9 with a standard deviation of 1.6.

### Construct validity

The sense of neighbourhood score was positively but weakly correlated with physical and mental health; more strongly correlated with social support; negatively correlated with mean stress; and not significantly correlated with height (Table 3). The size and direction of correlations with neighbourhood safety scores were similar except that social support had weaker correlations with safety (Table 3). Sense of neighbourhood scores increased with years living in the present home, with women living in their home for 21 years or more having higher scores than all other women (Table 3). Women reporting no physical activity or a sedentary lifestyle had lower sense of neighbourhood scores than all other women (Table 3). While there were no significant differences in mean neighbourhood safety scores according to years living in the present home, women reporting high levels of physical activity reported a higher mean safety score than women leading a sedentary lifestyle or with low levels of physical activity (Table 3).

### Demographics

Separated and divorced women had significantly lower mean sense of neighbourhood scores than married, widowed and never married women (Table 4). Those living alone had slightly higher sense of neighbourhood scores but lower safety scores. Sense of neighbourhood scores increased with ease of managing on present level of income and decreasing urbanisation (Table 4). Neighbourhood safety scores were highest among married women and women more able to manage on their income. Safety scores increased with decreasing urbanisation (Table 4).

### Discussion

The present study evaluated a set of items related to neighbouring and neighbourhoods. These items had been used in previous Australian studies but this study was the first to examine the performance of the items in a large, geographically diverse sample of older women. This paper presents several important findings that make a contribution to our understanding of the



Table 4

Mean sense of neighbourhood ( $n = 9171^a$ ) and neighbourhood safety ( $n = 8835^a$ ) scores among women aged 73–78 years with various demographic characteristics

	Sense of neighbourhood		Neighbourhood safety	
	Mean <sup>b</sup> (95% CI)	<i>p</i> -value	Mean <sup>b</sup> (95% CI)	<i>p</i> -value
<i>Marital status</i>				
Married/defacto	27.6 (27.4, 27.7)	<0.001	7.1 (7.0, 7.1)	<0.001
Widowed	27.8 (27.6, 27.9)		6.8 (6.7, 6.9)	
Never married	27.8 (27.3, 28.4)		6.7 (6.5, 6.9)	
Separated/divorced	26.6 (26.2, 27.0)		6.6 (6.5, 6.8)	
<i>Living alone</i>				
Yes	27.8 (27.7, 28.0)	<0.001	6.8 (6.7, 6.8)	<0.001
No	27.5 (27.4, 27.6)		7.0 (7.0, 7.1)	
<i>Ability to manage on income</i>				
Impossible/always difficult	26.1 (25.8, 26.5)	<0.001	6.5 (6.4, 6.7)	<0.001
Difficult some of the time	27.3 (27.1, 27.5)		6.7 (6.7, 6.8)	
Not too bad	27.5 (27.4, 27.7)		6.9 (6.9, 7.0)	
Easy	28.3 (28.1, 28.5)		7.2 (7.2, 7.3)	
<i>Area of residence</i>				
Urban	27.2 (27.1, 27.4)	<0.001	6.6 (6.5, 6.6)	<0.001
Large rural	27.6 (27.3, 27.9)		6.8 (6.7, 6.9)	
Small rural	27.7 (27.5, 28.0)		7.0 (6.9, 7.1)	
Other rural / remote	28.1 (27.9, 28.2)		7.5 (7.4, 7.5)	

<sup>a</sup> There are missing data for up to 168 for sense of neighbourhood and 157 for neighbourhood safety.

<sup>b</sup> Means not significantly different from one another are joined by a line.

relationship between feelings of belonging to a neighbourhood and health in older women.

Firstly, the factor analysis showed that the 13 items in the scale were not measuring a single construct. A subset of two items relating to neighbourhood safety comprised one factor. The score obtained from these two items, referred to as the neighbourhood safety score, was found to be related to the degree of urbanisation of the locality, the socioeconomic status and living arrangements of the women. Feeling safe in the neighbourhood was least likely in urban areas, increased in rural townships, and was most likely in rural and remote areas. Older women living alone felt less safe, as did women who were less able to manage on their income. The performance of this factor might be improved by having more items in future surveys.

A second subset of seven items, comprising the sense of neighbourhood score, had good face validity as a measure of the sense of belonging to a neighbourhood. The factor showed good construct validity. A higher score on this factor was associated with better physical and mental health, lower stress, better social support and being physically active. Women who had lived longer at their current address had a better sense of belonging to their neighbourhood, as did women living

in non-urban areas and who were better able to manage on their income. These findings are consistent with previous studies that showed residential stability to be associated with community attachment (Bolan, 1997). The positive association between length of time in a neighbourhood and feelings of belonging is consistent with the principle that a time lag between exposure and outcome is plausible in social epidemiology (Blakely & Woodward, 2000).

The reason for moving to a new residence may affect subsequent feelings about the new environment (Bolan, 1997). Relocation may be forced due to circumstances beyond one's control or it may be by choice. This information is not available in the present study. Schwirian and Schwirian (1993) showed that people in better health and with more financial resources have more control over where they live and hence socioeconomic status may mediate the relationship between sense of neighbourhood and well being. The average time to settle in a new location and establish roots has been estimated as 6–18 months, but some individuals adjust and adapt more easily to new situations (Bolan, 1997). The characteristics of older women who relocate and settle well can be studied in future phases of this longitudinal study.

The inclusion of four items from the original scale was not supported by this study. Three of these items were negatively worded and had higher rates of missing data than other items. Higher levels of missing data may be partly due to the content of the questions or to socially desirable responding (Schwarz & Knauper, 1999). It is possible that the women who missed the negatively worded items in the neighbourhood scale considered the items to be socially undesirable and were unwilling to provide answers to them. The fourth item that was excluded asked whether the women were involved with local issues. This item had the highest neutral response, did not load on the sense of neighbouring factor and may be measuring another construct, such as community participation.

The strengths of this study include the use of a large, geographically diverse sample of older women and the use of appropriate statistical methods to assess the scale validity. Previous studies using these items have been dependent on smaller samples or selected geographic areas and have failed to examine the performance of the items. The survey data collected in this study included a range of demographic, social, psychological and health related variables that were used to assess scale validation and the construct validity of the two factors was demonstrated. Six of the seven items in the sense of neighbourhood factor in this study were very similar to those used in the measurement of neighbourhood cohesion and the five-item social cohesion and trust subscale (Sampson et al., 1997; Lochner et al., 1999). The extra item measuring the sense of belonging included the related concept of mutual respect. The results of this study have shown that for this large sample of older women, living in major cities, rural townships and remote areas of Australia, the measurement of place effects is feasible.

A limitation of the present study is the attrition in the cohort between the first and second survey. The group who were lost to follow-up included women who withdrew from the study because of ill-health or other reasons, those who declined to complete the follow up survey, and those with whom we had lost contact. This attrition group may differ in their sense of neighbourhood and so our estimates of the sense of neighbourhood among older women may be biased. However the results of the factor analysis appeared to be robust in the split sample analyses and are less likely to be affected by the loss to follow up. Another limitation of the present study is that it did not include items measuring some other dimensions of neighbourhood satisfaction. The relationship between the physical characteristics of the neighbourhood and the establishment of social ties was not examined but may contribute to a better understanding of the role of the physical setting in which these older women live. Unfortunately, data are unavailable to determine whether these findings are consistent for

older men in Australia, as the longitudinal study was commissioned to explore factors contributing to healthy ageing among women.

There are implications of our findings for health and social policy and service delivery. It is important for health promotion policies to take account not only of socioeconomic characteristics of people, but also the contexts of their everyday lives. This paper makes a contribution to debates about how one might measure two particular elements of everyday life. It has identified two sets of items that form valid measures of aspects of the social environment of older women, namely the sense of neighbourhood and feelings of safety. Our findings that women living in urban areas, with poorer health and lower socioeconomic status have a lower sense of neighbourhood and greater concerns about safety highlights the need for policies that reduce this social exclusion. Some people accustomed to a fairly minimal level of social interaction may not seek out organised social activities and the value of their independence must be respected (Russell et al., 1998). However, as shown in this study, older people who are embedded in active social networks tend to have better physical and mental health than those who are less involved with other people (Thompson & Krause, 1998). It must also be recognised that health status may influence an individual's capacity to develop or maintain active social networks. For example, engaged, socially active people may become less so as a result of health decline. Analysis of longitudinal data is necessary to examine the relationship between declining health and the continuity of social networks.

Enhancing the community environment may provide effective ways to change individual health behaviour (Sundquist, Malmstrom, & Johansson, 1999). This study has shown the relationship between feeling part of a neighbourhood, feeling safe and being physically active. The present high rates of modifiable risk factors such as obesity and insufficient physical activity will increase the socioeconomic burden of cardiovascular disease and diabetes (Dunstan et al., 2001). Strategies to enhance the uptake of physical activity, including providing safe places for walking, should be considered.

It has been postulated that older people who live with others may do better because others can detect when assistance is needed, whereas those living alone have to ask for help (Thompson & Krause, 1998). In our study, women who lived alone had a stronger sense of belonging to their neighbourhood. Of the women living alone, 85% were widowed, and conversely, 85% of widowed women were living alone. These women may have developed supportive social networks to compensate for living alone. Preliminary findings based on this cohort suggest that, as a key life event, widowhood has an initial negative impact on the health and well being of older women. However for those who survive the initial

period, there may be a positive shift into a new life phase in the long term (Feldman, Byles, & Beaumont, 2000).

Previous research has suggested that dependency on their neighbourhood increases as women age (Yasuda et al., 1997). The longitudinal nature of the present study will allow this cohort of older women to be followed prospectively, to determine the relationship between the neighbourhood variables examined in this paper and the longer-term health and well being of these women.

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