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DISCUSSION PAPER SERIES

IZA DP No. 13527

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ABSTRACT

Ageing, Health, Loneliness and Wellbeing

Older people experience high rates of depression and suicide, yet they make a positive net contribution to the economy through activities such as employment, volunteering, and looking after grandchildren. The wellbeing of older people is therefore important not only on moral but also economic grounds. To understand which policies will facilitate the overall wellbeing, we use Australian data to explore the determinants of wellbeing and loneliness of natives and migrants in the 65-85 age group, taking into account the extent to which social networks contribute to the wellbeing and possible reduction in loneliness. Results show that social networks have a strong positive effect on wellbeing and a strong effect in reducing loneliness among both natives and migrants. The positive effect of social networks is stronger for females than males.

JEL Classification: I31, J14

Keywords: ageing, wellbeing, loneliness, social networks

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1. Introduction

Social isolation and loneliness are pervasive among the elderly. In Australia, one in four people aged over 65 lives alone, while one in five experiences social isolation. Loneliness is a prime cause of depression among the elderly population: data from the Australian Bureau of Statistics show that men over the age of 85 and women in the 80-84 age group have the highest age-specific rate of suicide (32.9 and 9.0 per 100,000, respectively).[1] Proper health care could potentially help reduce social isolation and loneliness. There are also economic benefits since older people contribute by volunteering, providing informal childcare, and by being in employment, to name a few.

While loneliness has come to prominence in the media because of its effects on depression and mortality in the elderly population, relatively little is known about its determinants and, besides good physical and mental health (Lawton, 1983; Xavier et al, 2003; Steptoe et al, 2015), what enhances wellbeing at an older age. This limited knowledge constrains the design and implementation of programmes that can address the negative effects of social isolation, loneliness and depression experienced by the elderly. The negative effects may carry economic consequences on the otherwise positive net contribution to the economy that older people make through activities such as employment, volunteering, and looking after grandchildren (Park *et al*, 2014). It is therefore important to formulate informed policies to ensure the wellbeing of older people, not only on moral but economic grounds as well.

One particularly under-researched question is whether the various social groups composing society experience wellbeing at an older age in a similar fashion, and whether a better social integration – a variable that can be affected by targeted intervention - contributes to improve life satisfaction. Differences in cultural or ethnic background and social norms underpin different behaviours and expectations about the way in which a person engages with ageing-related needs: from the extent to which one expects family to step in and provide care or cohabitation (Guo et al, 2009; Johar and Maruyama, 2014; Slagsvlog et al, 2012; Coimbra et al, 2013), to addressing language skills unsuited to communicate health symptoms to avoid misdiagnosis (Johnstone and Kanitsaki, 2006; Diamond and Jacobs, 2010) and other barriers preventing migrants from accessing otherwise available support services (Szczepura, 2005; Ponce et al, 2006; Lai and Chau, 2007).

[1] https://www.lifeinmindaustralia.com.au/about-suicide/suicide-data/suicide-facts-and-stats. Accessed 10 December 2019.

This paper contributes to the literature on ageing, wellbeing, and migration in three distinct ways. First, it documents the determinants of wellbeing and loneliness of natives and migrants in the age group 65-85, using the case of Australia as a multicultural society with a large share of foreign-born population. Second, it studies the extent to which social integration, measured by a composite indicator of social network and viewed as a variable that can be affected by targeted policy intervention, contributes to wellbeing and can reduce loneliness at an old age. Third, it carries out the empirical analysis on a large, representative, and comprehensive longitudinal dataset of the population (the Household, Income and Labour Dynamics in Australia survey - HILDA) rather than focusing on a specific minority.

The results show that social integration has a strong positive effect on wellbeing and a strong effect in reducing loneliness among natives and migrants. While some differences by country of origin emerge, it is individual characteristics that determine outcomes. As social networks can be encouraged via targeted action, the paper supports the hypothesis that more effort on social connectivity and integration can produce marked improvements in the wellbeing, and reductions in the loneliness, of the elderly.

The rest of the paper is organised as follows. Section 2 presents the literature review. Section 3 describes the data while Section 4 develops the empirical methodology. Section 5 discusses the results. The last section concludes.

2. Social networks and subjective wellbeing

Subjective wellbeing has become an important part of government policy as a number of countries consider economic measures like GDP as an insufficient measure of the progress of society. For instance, the Office of National Statistics (ONS) in the UK regularly collects data on wellbeing; in the US the Gallup-Healthways Wellbeing Index Poll interviews 1000 adults every day about wellbeing (Harter and Gurley, 2008); the Australian Institute of Health and Welfare publishes biennial national welfare report on wellbeing and its determinants, including indicators of subjective wellbeing such as social isolation and loneliness (Australian Institute of Health and Welfare, 2019). A number of other industrialised countries have similar measures of wellbeing.

There are three aspects of subjective wellbeing: life evaluation, hedonic wellbeing and eudemonic wellbeing.[2] Life evaluation is the self-reported overall life satisfaction or happiness. It is measured using the Cantril ladder 7. People are asked to put themselves on the 11-step ladder with lowest level of satisfaction being at the lowest rung and best possible life at the highest rung. Hedonic wellbeing is about everyday feeling as people are asked about their experience of feeling happy, sad, angry etc. Finally, eudemonic refers to people's feelings about the meaning and purpose of their lives. In this paper we use life evaluation as the measure of wellbeing. We find that both mental and physical health as well as social networks have a significant positive impact of the life satisfaction of those aged between 65 and 85, and, correspondingly, a strong effect on reducing loneliness.

The positive relationship between social engagement and quality of life in old age has been the enduring theme in social gerontology over the past sixty years (Actor *et al*, 2002). There is a vast body of literature on the relationship between social relations, social support networks and happiness. In general, the quality of social network and contact is positively associated with subjective wellbeing among older adults (Pinquart and Sörensen, 2000; Nyqvist et al., 2013). Sense of community is found to be significantly correlated with happiness, worrying and personal coping (Davidson and Cotter, 1991). Among older adults, purpose in life, which has strong association with subjective wellbeing, shows a strong association with social integration, and with relational quality in particular (Pinquart, 2002). Nonetheless, the relationships depend on social-economic structures, demographics and other factors. For example, Beijing's elderly are found to be happier and have larger social networks than Hong Kong's elderly, possibly due to the differences between socialist Beijing and capitalist Hong Kong in their degrees of modernization and urbanization and in social organisations of work and community life, even though the two Chinese cities share a common cultural heritage (Chan and Lee, 2006). Another study finds that the relationship between family support and depression and family support and loneliness is stronger for the Chinese older adults than the US older adults; conversely, the relationship between friend support and depression and friend support and loneliness is stronger for US older adults than Chinese older adults (Poulin et al., 2012). Therefore, it is important to consider the types of social networks and relations in studying wellbeing among older adults (Litwin, 2001; Litwin and Shiovitz-Ezra, 2010; Li and Zhang, 2015). This is particularly important in countries like

[2] See Steptoe *et al* (2015) for detailed explanation.

Australia where the immigrants are a large proportion of the population. A relatively recent study found that older people who come from diverse cultural and linguistic background are at a greater risk of depression than Anglo-Australians (FECCA, 2015). However, those who acculturate into Australian society have greater wellbeing than those who do not (Gunasekara et al., 2019). There are a number of dimensions of acculturation, with two main ones being language and social contacts. For instance, those living in mostly co-ethnic neighbourhood are less likely to have native contacts and therefore less likely to adopt the host country culture, at least in one key dimension. We contribute to the literature by exploring different dimensions of social networks and its impact on subjective wellbeing.

3. Data and construction of variables

We conduct the empirical analysis using the Household, Income and Labour Dynamics in Australia (HILDA) data. The HILDA data was collected annually from 2001 and tracked the same individuals over time, allowing for people (re)enter and (re)exit the survey. To date 17 waves have been collected with more than 17,000 individuals surveyed each year. The longitudinal survey data provides information about family formation, socio-economic status, general and psychological health as well as life satisfaction.

The panel data nature of HILDA implies that its respondents include both those who drop out of the survey (e.g. emigrating from Australia), and those who join it at a later wave (e.g. immigrating to Australia). This feature leads to an unbalanced panel, and to reduce the bias and skewness arising from such attrition, the HILDA provides longitudinal sample weights on a regular basis.

For the purposes of this paper we focus on 65 to 85 years old living in Australia, and including both migrants and natives. As questions on social networks and activities are asked only in three of the 17 waves available, the empirical analysis is restricted to data from waves 6, 10, and 14. In total, our unbalanced panel contains 40,403 observations with 5,881 individuals who are between the ages of 65 and 85, out of which 69.1% are natives and 30.9% are immigrants. Table 1 summarises the mean demographic and wellbeing characteristics of the working sample, by place of birth, as well as their difference obtained from the Kruskal-Wallis test.

Natives and migrants are close in age, gender and family composition, though the differences between these two groups, however small, are statistically significantly different from zero.

Natives and migrants have an average age of about 72.5 years, with broadly equal share of men and women. In about 65% of the cases, they are married, and more than 90% of natives and migrants surveyed have children. They have an average education equivalent to high school (higher for the foreign-born) though about a third of the sample holds a university degree. They also have a similar income, which is about half of Australia's average income.

The key interest for the analysis is the effect of health, both physical and mental, and social networks on the wellbeing and loneliness of natives and migrants. Specific questions in the HILDA survey collect this information. Natives and migrants have relatively high levels of wellbeing (more than 8/10), slightly higher for natives, and relatively low levels of loneliness (about 2.5/10), higher for migrants.

With reference to health, the HILDA asks specific questions measuring both physical (eg: lifting and carrying groceries) and mental health (eg: felt depressed). The HILDA survey then aggregates the responses from these questions using the Medical Outcomes Study Short Form (SF-36) and provides both a general health measure and a mental health measure on a scale between 0 and 100. While physical health is about 60/100, mental health is substantially higher (about 75/100), more so for natives. These statistics highlight that the elderly surveyed by HILDA tend to be a selected sample of relatively healthy and autonomous individuals who are still engaged with society rather than being segregated from it.

Our key independent variable is connectivity with other people, which we measure in a variable capturing an individual's social network. We generate this variable from a set of 13 variables[3] reported in HILDA adopting the approach of Kalfa and Piracha (2018) to the conditions faced by individuals in the 65-85 age category rather than the younger ones of the reference study. As a result we omit questions such as "are you a member of a trade union organisation?" but include others about social activities and engagement, such as having contacts with neighbours, friends and relatives or give money to charity if asked. These 13 variables are reported as a 6-point Likert scale, and as these answers are highly correlated, we construct a social capital index using principal component analysis (PCA). The PCA results are reported in the Appendix.

[3] These include responses to whether the person surveyed is: currently an active member of a club; attend events that bring people together; chat with your neighbours; have telephone, email or mail contact with friends; see members of my extended family or relative; encourage others to get involved with a group; make time to keep in touch with friends; give money to charity if asked; get in touch with a local politician or councillor; get involved in union or political party; make time to attend services at a place of worship; talk about current affairs with friends and family; and volunteer your spare time to work in NGOs.

Table 1 shows marked differences between the average values of the social capital index for natives, for whom the index is positive (.140), and migrants, for whom the average value of the index is -.343, reflecting a lower degree of social engagement. Closer inspection reveals that natives have a much wider range of social network values than migrants (-6/+7 versus -4/+4).

Since residing in a region with a high concentration of immigrants of the same ethnic group increases immigrants' chances of having contacts with co-ethnics such as neighbours or friends and relatives living nearby, we add an "ethnic concentration" index to capture this additional form of social capital for the migrants. Ethnic concentration is defined as follows:

$$Ethnic\_Concentration_{ijt} = \frac{Immigrant_{ijt}}{Immigrant_{jt}} * 100, \qquad (1)$$

where subscript *i* represents a particular ethnic group residing in a specific region *j* and *t* represents the corresponding time period. We use Australian Bureau of Statistics 2001, 2006 ,2011 and 2016 census data on the population across Australia to construct this ethnic concentration variable.

4. Methodology

To analyse the relationship between wellbeing and social network, we initially estimate the following micro-econometric model:

$$SWB_{it} = \mathbf{a}_0 + X_{it}\mathbf{a}_1 + \mathbf{a}_2 SN_{it} + \mathbf{a}_{3t} EC_{it} + \mathbf{t}_t\mathbf{a}_4 + u_i + v_{it} \quad (1)$$

where SWB is the indicator of life satisfaction for individual *i* at time *t* measured from individuals' responses to the question: 'All things considered, how satisfied are you with your life?' The life satisfaction variable is ordinal, the individual choosing a number between 0 (totally dissatisfied with life) and 10 (totally satisfied with life). X_{it} is a vector of individual characteristics that includes age, age squared, marital status, gender, educational level, whether the individual has children, physical and mental health, income, household size, migrant status and years since migration. SN_{it} is an index of social capital obtained from the first principal component analysis of 13 indicators of social interactions[4]; EC is an indicator of ethnic concentration from the same country of origin; t is a year dummy. The parameters u_i and v_{it} form the composite error term: u_i captures time-invariant individual unobserved heterogeneity; v_{it} is an i.i.d. component. The parameter of interest in Eq. (1) is $\mathbf{a}_2$ as that

captures the effect of social capital on SWB conditional on demographic, health and income characteristics.

The empirical specification in (1) is also used to estimate the determinants of loneliness: in this case the dependent variable is obtained from a 7-point Likert scale on the question 'I often feel very lonely'. To partially eliminate the problem of likely serial correlation in the composite error term as OLS pools data across time, Eq. (1) is estimated using a panel data estimator. Since several covariates are time-invariant (gender, if one has children, education), the random effects panel estimator is used.[5]

Augmenting the random effect estimator with the time-averaged values of the time-varying variables (Mundlak, 1978; Chamberlain, 1980; Wooldridge, 2010) as a way to control for unobserved time-invariant heterogeneity and relaxing the assumption of orthogonality between u_i and the observed covariates has no real effects on the coefficients estimated. As a result, the effect of adding a "Mundlak correction" to model (1) is not further discussed.

5. Results

Table 2 reports the estimates of four regressions carried out using model (1). The first two regressions are performed on pooled native and migrant observations; they differ with respect to the inclusion of the ethnic concentration index and the use of separate dummy variables to capture migrants' countries of birth using the host country as a reference group. As the coefficient of ethnic concentration emerges as being statistically not different from zero, the preferred baseline model is the Pooled II, in the second column of Table 2. The last two sets of regression are performed on separate data for natives and migrants.

Few points arising from the pooled regression are worth noting before focusing on the explanatory variables of interest. First, wellbeing in the 65-85 age group depends overwhelmingly on two broad determinants: good health, especially mental health, and companionship, particularly that of the married partner. Mental health is the most statistically

[5] The panel random estimator transforms the data by subtracting from each observation a portion h of its time average, where h depends on the variance of $\mathbf{u_i}$ and $\mathbf{v_{it}}$ and the number of period for which data are observed (Wooldridge, 2010). Although h is not known in practice it can always be estimated (various methods are discussed in Wooldridge, 2010). An estimated h close to zero results in random effect estimates being close to those obtained by pooled OLS, implying that time-invariant unobserved heterogeneity is relatively unimportant, as the variance of $\mathbf{u_i}$ is small relative to that of $\mathbf{v_{it}}$. Conversely and more commonly, if the estimated h is close to 1, then the variance of $\mathbf{u_i}$ is large relative to that of $\mathbf{v_{it}}$, and the bias caused by unobserved time-invariant heterogeneity is large.

significant factor behind wellbeing (t-statistic well over 10), with a coefficient three times as high as that of physical health (.029 versus .012). This distinction is important as it highlights areas of high demand for activity in old age. Besides health, being married is the single most important determinant of wellbeing, raising average wellbeing by over 20% in the case of those with a partner alive. Both factors are well-known predictors of wellbeing at an old age (Larson, 1978). Second, wellbeing emerges as being inversely related to the level of education: the negative sign relating education to wellbeing is not new, as reviewed by Michalos (2007 - http://www.oecd.org/site/worldforum06/38303200.pdf). In such cases it has been generally interpreted as a connoisseur effect: the more one knows the less satisfied one is about something experienced. It is difficult however to apply this interpretation to the case of wellbeing at a later age. Third, having children emerges as being important for wellbeing, but only for specific subgroups, as will be discussed later. Finally, little is revealed by the country of origin fixed effects, aside from the case of Chinese migrants: there, the negative and statistically significant coefficient suggests that migrants from China are on average less happy than comparable natives.

With reference to the variable of interest, social network emerges as being a very significant positive determinant of wellbeing, with a very stable coefficient. The more socially engaged is an individual in old age, the higher his/her wellbeing.

Performing the analysis on separate data for natives and migrants leads to very similar results to those just discussed with one exception: having children appears to matter only in the case of natives but not migrants. This may reflect that a possible conflict between first- and second-generation migrants (Neto, 1995; Abouguendia and Noels, 2001; Giguere, Lalonde and Lou, 2010).

Table 3 expands the analysis by focusing on gender differences using the observations from the regression on pooled data. The results show some substantive differences by gender with reference to the importance of the social network, having a living companion and children, and the country of origin. With reference to social network, the positive effect on wellbeing is significantly larger among women than men (.053 versus .034), supporting evidence that women better embrace, and respond to, social engagement (Zunzunegui et al, 2003). Women also receive higher wellbeing when they are mothers, as having children has a positive and statistically significant effect on their wellbeing. This is not the case for men, where the effect of having children is statistically no different from zero.

In addition, there seems to be a substantive difference in the effect of the living partner on wellbeing. The effect for women is less than half that reported by men, suggesting that they are a fundamental channel for their husbands' wellbeing. Finally, the country effect recorded at pooled data level are associated with women: here it is notable the difference between those of Italian origin, who are on average much happier than comparable natives, and those originating from China, who instead are on average much less happy.

These results indicate that women's wellbeing depends on a wider set of determinants than men's, and as such it appears less affected when one of these determinants ceases to exist – for example with the loss of the partner. In contrast, men's wellbeing depends on a narrower set of factors and as such they are more vulnerable when one of determinants ceases to exist.

To complete the analysis of wellbeing, model (1) was re-estimated using the sense of loneliness as a dependent variable, and the results are summarised in Table 4. Relative to wellbeing, loneliness is affected by fewer determinants but having a social network remains a critical one: its presence reduces loneliness considerably on both natives and migrants. The other relevant factors reducing the sense of loneliness are mental health and being married.

6. Conclusions

Using a large representative longitudinal survey from Australia, the paper explored the determinants of wellbeing and loneliness of natives and migrants in the age group 65-85, taking into account the extent to which social integration, measured by a composite indicator of social networks, contributes to wellbeing and possible reduction in loneliness. The results showed that social integration has a strong positive effect on wellbeing and a strong effect in reducing loneliness among natives and migrants. The positive effect of social networks is stronger for females than males.

There are strong policy implications for the results obtained. Extant literature has shown the importance of social networks (sometimes referred to as weak and strong ties) on individuals' labour market outcomes. This paper shows how important social networks are in the overall wellbeing of older age population as well. The findings will benefit native and migrant communities in the aged care sector and also assist the formulation of appropriate policies in ensuring the wellbeing of elderly individuals, which has also as a positive on the health expenses of a country.

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Table 1 – Summary statistics

	Natives	Migrants	Difference
Dependent variable			
Life satisfaction	8.36	8.21	.15**
	(1.38)	(1.55)	
Feel lonely	*2.57*	*2.69*	*-.12***
	(1.82)	*(1.86)*	
Social network indicator	.140	-.343	.483***
	(2.04)	(2.03)	
Age	72.8	72.5	.3*
	(5.7)	(5.5)	
Gender: male	.48	.51	-.03***
	(.50)	(.50)	
Married	.64	.69	-.05***
	(.48)	(.46)	
Education	2.35	2.66	-.31***
	(1.73)	(1.75)	
Physical health	61.4	60.3	1.1
	(22.0)	(23.1)	
Mental health	77.8	75.2	2.6***
	(16.1)	(17.8)	
Income	10.0	9.9	.1***
	(.82)	(.84)	
Household size	1.81	1.94	-.13***
	(.73)	(.83)	
Has children	.91	.92	-.01
	(.28)	(.27)	
Years since migration		46.4	
		(13.9)	
Ethnic community		.010	
		(.056)	
N	**4,148**	**1,680**	

Table 2 – The determinants of life satisfaction

Life satisfaction	Pooled I	Pooled II	Natives	Migrants
Age	.143*	.158**	.153*	.209
	(.082)	(.074)	(.081)	(.150)
Age squared	-.084	-.095*	-.089	-.135
	(.056)	(.050)	(.055)	(.102)
Gender: male	-.011	-.049	-.004	-.135*
	(.046)	(.041)	(.047)	(.081)
Married	.225***	.231***	.226***	.175**
	(.054)	(.047)	(.055)	(.089)
Education	-.066***	-.065***	-.064***	-.083***
	(.013)	(.012)	(.014)	(.022)
Physical health	.013***	.012***	.013***	.014***
	(.001)	(.001)	(.001)	(.002)
Mental health	.028***	.029***	.028***	.031***
	(.001)	(.001)	(.001)	(.002)
Ln income	-.012	-.020	-.019	.010
	(.023)	(.021)	(.024)	(.041)
Household size	-.051	-.017	-.039	.008
	(.033)	(.029)	(.033)	(.046)
Has children	.224***	.196***	.207***	.034
	(.077)	(.068)	(.078)	(.136)
Ethnic concentration	-.088			
	(.078)			
Social network	.049***	.044***	.046***	.047**
	(.011)	(.010)	(.011)	(.019)
Germany		.188		
		(.144)		
Netherlands		.009		
		(.134)		
Italy		.135		
		(.155)		
Vietnam		-.039		
		(.338)		
Philippines		.013		
		(.365)		
China		-.929***		
		(.278)		
India		-.150		
		(.212)		
English-speaking migrants		.039		
		(.052)		
Constant	-.488		-.852	-2.94
	(3.04)		(3.03)	(5.54)
R^2 within	.0975	.1009	.1002	.0924
R^2 between	.2845	.2930	.2855	.3049
R^2 overall	.2757	.2788	.2722	.3001
Wald chi	1,259.85	1,621.69	1,180.05	536.21
Rho	.423	.408	.433	.398
N	4,262	5,302	4,024	1,623

Notes: Analysis was conducted using HILDA waves 6, 10, and 14. Estimates that are statistically significant at 1%, 5% and 10% level are indicated with *, **, and ***.

Table 3 – The determinants of life satisfaction by gender

Life satisfaction	Females	Males
Age	.219**	.106
	(.103)	(.104)
Age squared	-.135*	-.064
	(.070)	(.071)
Married	.154**	.374***
	(.061)	(.076)
Education	-.078***	-.051***
	(.017)	(.017)
Physical health	.013***	.011***
	(.001)	(.001)
Mental health	.029***	.029***
	(.002)	(.002)
Ln income	-.040	-.007
	(.031)	(.029)
Household size	-.029	-.007
	(.039)	(.040)
Has children	.242**	.118
	(.097)	(.095)
Social network	.053***	.034**
	(.014)	(.014)
Germany	.297	.078
	(.212)	(.196)
Netherlands	.105	-.045
	(.215)	(.170)
Italy	.641***	-.263
	(.239)	(.202)
Vietnam	.433	-.608
	(.452)	(.509)
Philippines	.390	-.434
	(.506)	(.531)
China	-1.05***	-.673
	(.356)	(.449)
India	-.178	-.076
	(.284)	(.318)
English-speaking migrants	.087	-.017
	(.073)	(.074)
Constant	-3.22	.960
	(3.84)	(3.85)
R^2 within	.0838	.1269
R^2 between	.3113	.2813
R^2 overall	.2889	.2775
Wald chi	905.15	754.00
Rho	.368	.449
N	2,807	2,495

Notes: Analysis was conducted using HILDA waves 6, 10, and 14. Estimates that are statistically significant at 1%, 5% and 10% level are indicated with *, **, and ***.

Table 4 – The determinants of loneliness

Loneliness	Pooled	Natives	Migrants
Age	-.206**	-.156	-.378*
	(.105)	(.119)	(.221)
Age squared	.143**	.106	.270*
	(.071)	(.081)	(.150)
Gender: male	-.011	.004	-.091
	(.055)	(.064)	(.108)
Married	-.570***	-.626***	-.424***
	(.064)	(.075)	(.124)
Education	-.006	-.010	.017
	(.015)	(.018)	(.031)
Physical health	-.002*	-.003*	-.001
	(.001)	(.001)	(.002)
Mental health	-.037***	-.036***	-.038***
	(.002)	(.002)	(.003)
Ln income	.044	.044	.039
	(.030)	(.034)	(.057)
Household size	-.029	-.020	-.034
	(.039)	(.046)	(.071)
Has children	.046	.085	-.036
	(.091)	(.106)	(.176)
Social network	-.096***	-.098***	-.087***
	(.013)	(.015)	(.027)
Germany	.011		
	(.191)		
Netherlands	-.152		
	(.177)		
Italy	-.430**		
	(.206)		
Vietnam	.142		
	(.457)		
Philippines	-.308		
	(.489)		
China	.549		
	(.372)		
India	.458		
	(.284)		
English-speaking migrants	-.065		
	(.069)		
Constant	12.8***	11.2**	18.7**
	(3.89)	(4.15)	(8.19)
R^2 within	.0303	.0337	.0257
R^2 between	.2443	.2360	.2641
R^2 overall	.2007	.1951	,2149
Wald chi	1,078.27	782.17	296.01
Rho	.293	.322	.204
N	5,249	3,980	1,269

Notes: Analysis was conducted using HILDA waves 6, 10, and 14. Loneliness is obtained from a 7-point Likert scale associated with the question 'I often feel very lonely', with strongly agreeing corresponding to the highest value. Estimates that are statistically significant at 1%, 5% and 10% level are indicated with *, **, and ***.

Appendix

Answers to the following 13 questions, reported on a 6-point Likert scale ranging from rarely (=0) to very often (=6), with the exception of question 1 for which the answer is a dichotomous Yes/No, have been used to generate the social network indicator via a Principal Component Analysis (CPA):

Do, or are, you:

- currently an active member of a club?
- attend events that bring people together?
- chat with your neighbours?
- have telephone, email or mail contact with friends?
- see members of my extended family or relative?
- encourage others to get involved with a group?
- make time to keep in touch with friends?
- give money to charity if asked?
- get in touch with a local politician or councillor?
- get involved in union or political party?
- make time to attend services at a place of worship?
- talk about current affairs with friends and family?
- volunteer your spare time to work in NGOs?

The eigenvectors of the PCA are displayed in Table A1. They are the basis on which the social network indicator is obtained.

Table A1 PCA analysis: eigenvectors

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
CPclub	0.2219	0.2016	-0.5586	0.2860	0.3907	0.2259	0.1651
CPevent	0.3379	-0.0134	-0.2882	0.0870	-0.2988	0.0657	0.3545
CPchat	0.2535	-0.3076	-0.2216	-0.1372	-0.5694	0.2447	0.2106
CPcontact	0.2657	-0.3992	-0.0450	-0.1735	0.1108	-0.1850	0.3795
CPrelative	0.2461	-0.3282	0.0154	0.093	0.3655	-0.5702	0.2204
CPinvolve	0.3401	0.3102	0.0693	0.0624	-0.1542	-0.1315	0.3193
CPfriend	0.3255	-0.3424	0.0061	-0.0557	0.0496	0.0091	0.3611
CPcharity	0.2364	-0.0752	0.4568	0.2866	0.3063	0.5801	0.1391
CPpolitician	0.2474	0.3423	0.1933	-0.4295	0.1317	-0.1414	0.3076
CPparty	0.2520	0.3722	0.1234	-0.4049	-0.0566	0.0015	0.3320
CPworship	0.2192	0.1079	0.4072	0.5806	-0.3556	-0.2722	0.1270
CPaffair	0.3034	-0.1538	0.2241	-0.2368	0.1151	0.2654	0.4074
CPvolunteer	0.3144	0.2954	-0.2672	0.1500	0.0886	-0.0842	0.3365