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The association of social support networks and loneliness with negative perceptions of ageing: evidence from the Irish Longitudinal Study on Ageing (TILDA)

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ABSTRACT

It is well known that negative ageing perceptions have various detrimental effects on indicators of successful ageing, but less is known about the role of social support networks and loneliness in ageing perceptions. The objective of this study was therefore to assess the association of social networks, relationship quality and loneliness with negative ageing perceptions in late life. Cross-sectional data on 6,912 adults aged ⩾50 years from the first wave of the Irish Longitudinal Study on Ageing (TILDA) were analysed. Ageing perceptions were assessed with the Brief Ageing Perceptions Questionnaire. Information on social support networks, loneliness and socio-demographics were obtained using standard questions. Depressive symptoms were assessed with the Center for Epidemiologic Studies Depression scale. Multivariable linear regression was conducted to assess the associations. Social isolation, poor relationship quality (with spouse, children, other family members or friends) and loneliness were all significantly associated with negative ageing perceptions even after adjustment for all potential confounders including depressive symptoms. Our study indicates that targeting integration into social support networks and improving relationship quality may potentially reduce the extent to which older individuals adopt negative ageing perceptions. Future studies with prospective design are warranted to understand the temporal direction and causal association of social support networks and loneliness with negative ageing perceptions.

KEY WORDS– perceptions of ageing, social support, social networks, loneliness, social isolation, older adults, ageing.

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Introduction

Both in Europe and overall globally, rapid ageing is currently taking place due to a combination of increasing life expectancies and declining birth rates (Rechel *et al.* 2009; United Nations 2015). This trend in demographic ageing is associated with increases in morbidity and disability, which in turn leads to increases in demand for health care and social services, while the declining working-age population will generate less income to ensure the sustainability of existing health systems (Rechel *et al.* 2009; World Health Organization 2011). It has thus become a top priority in European health policy to respond to this challenge by focusing strategies on successful ageing and ultimately increasing the number of years spent in good health (Rechel *et al.* 2013). Evidence is increasing that such strategies increase healthy life expectancies, postpone health expenditure and have wider economic benefits (Christensen *et al.* 2009; Doyle, Mc Kee and Sherriff 2012; Doyle *et al.* 2009; Gandjour 2009; Gandjour and Lauterbach 2005).

A key component to successful ageing pertains to the subjective elements of the ageing process (Doyle, McKee and Sherriff 2012; Wurm *et al.* 2013) such as ageing perceptions. Ageing perceptions are defined as the personal evaluation of one's own ageing process (Moser, Spagnoli and Santos-Eggimann 2011). Research has increasingly demonstrated that ageing perceptions have implications for physical and mental health (Levy 2003). Importantly, ageing perceptions may involve a 'self-fulfilling prophecy' where a more positive outlook towards ageing tends to promote successful ageing and longevity, while negative appraisals of ageing appear to accelerate the ageing process considerably (Wurm *et al.* 2013). Specifically, positive perceptions of ageing have been found to be a predictor of engagement in preventive health behaviours (Levy and Myers 2004), recovery from disability (Levy *et al.* 2012), and a protective factor in terms of functional health and longevity (Levy, Slade and Kasl 2002; Levy *et al.* 2002). In contrast, negative perceptions of ageing have been reported to be associated with various psychiatric outcomes, particularly depressive symptoms (Wurm and Benyamini 2014).

There is a dearth of studies on social context factors in relation to ageing perceptions in general. In particular, to our knowledge, very few studies report on associations between social relationships and ageing perceptions, despite the fact that social support networks and loneliness may theoretically be related to ageing perceptions. For example, one study has shown that being married or in a relationship is related to more positive attitudes to ageing as compared to those who do not have a partner (Bryant *et al.*

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2012). Another study showed that older adults who are less socially active also score higher on expressing negative ageing perceptions (Sanchez Palacios, Trianes Torres and Blanca Mena 2009). Being better integrated in social networks may promote feelings of being socially active and having responsibilities for others, which in turn may produce positive feelings towards getting older (Ranzijn *et al.* 1998; Stevens 1993). In addition, engaging in diverse social networks and feeling socially integrated (as opposed to feeling lonely) may result in greater resilience against prevalent negative ageing stereotypes that depict older people as socially isolated, impaired or dependent (Braithwaite 1986; Nuessel 1982; Ory *et al.* 2003; Scholl and Sabat 2008). Finally, being embedded in more supportive networks may generate optimism or feelings of control, which could also have implications for how people interpret their own ageing process (Karademas 2006; Levy, Slade and Kasl 2002; VanderZee, Buunk and Sanderman 1997; Wurm and Benyamini 2014).

Furthermore, it is also important to consider the role of depression in this association. Depressive disorders are some of the most common disorders among older adults (Byers *et al.* 2010), and strong associations of depression with both ageing perceptions (Chachamovich *et al.* 2008; Richardson *et al.* 2012; Wurm and Benyamini 2014) and social relationships (Santini *et al.* 2015*b*) have been reported. Depression may also be a common risk factor for both poor social support networks and negative ageing perceptions. For example, while depressive attitudes and thought patterns relate to a cynical or pessimistic outlook on life in general, it can be argued that negative perceptions of ageing involve similar cynical or pessimistic attitudes and beliefs focused specifically on one's ageing process.

Given the detrimental effects of negative perceptions of ageing on health and longevity, it is essential to reduce such perceptions in the population of older adults. One way that negative perceptions of ageing are activated may be through poor social relationships. However, to date, there are surprisingly few studies on the association between social relationships and ageing perceptions. Thus, using a large-scale, Irish nationally representative sample, we examined associations between relationship quality, social network integration, loneliness and negative perceptions of ageing among older adults. Based on the aforementioned literature documenting potential links between social relationships and negative ageing perceptions, we hypothesised that: (a) better relationship quality (from all sources) and greater social network integration would be inversely associated with negative perceptions of ageing; (b) loneliness would be associated with negative perceptions of ageing; and (c) depressive symptoms will at least partially explain these associations.

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Methods

Study design and sample

The Irish Longitudinal Study on Ageing (TILDA) is a nationally representative population-based survey of older adults residing in Ireland. The current analysis was based on Wave 1 conducted between October 2009 and February 2011. Full details of the surveys and their sampling procedure have been described elsewhere (Cronin *et al.* 2013; Kearney *et al.* 2011; Nolan *et al.* 2014; Whelan and Savva 2013). In brief, the first wave comprised 8,175 people aged 50 years and above, along with an additional 329 spouses or partners younger than 50 years. The first wave excluded institutionalised individuals, anyone with known dementia or anyone unable to personally provide written informed consent to participate due to severe cognitive impairment.

Face-to-face interviews were conducted by trained interviewers using Computer Assisted Personal Interviewing. The survey also included a self-completion questionnaire that was returned after the visit. All respondents were asked to complete the self-completion questionnaire. The overall response rate for the first wave was 62 per cent and the response rate for the self-completion questionnaire was 84 per cent (Kearney *et al.* 2011; Whelan and Savva 2013). Our analysis restricted the sample to: (a) participants aged 50 years and above; and (b) participants who completed the self-completion questionnaire, which included items for ageing perceptions and loneliness. The sample size after restriction to these individuals was 6,912. Ethical approval was obtained from the ethics committee of Trinity College Dublin. Written informed consent was obtained from all participants.

Measures

Negative perceptions of ageing. Negative perceptions of ageing were assessed with the Brief Ageing Perceptions Questionnaire (B-APQ) (Sexton *et al.* 2014). This scale specifically measures internalised and subjective perceptions of one's own ageing process, such as 'I always classify myself as old', 'Getting older makes me less independent' or 'As I get older I do not cope as well with problems that arise'. The scale consists of 17 items rated on a five-point scale from 1 (strongly disagree) to 5 (strongly agree), with six items reverse coded. Reverse-coded items were recoded so that all items were based on the same scale. Scores were summed to create a scale that ranged from 17 to 85, with higher scores indicating more negative perceptions of ageing. The B-APQ has been psychometrically validated for use with the Irish population aged ⩾50 years, and has been found to have

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good internal consistency and construct validity (Sexton *et al.* 2014). For the B-APQ , Cronbach's α = 0.83. The exact 17-item questionnaire and details regarding its development can be found in a previous publication (Sexton *et al.* 2014). The B-APQ can be seen in the Appendix.

Social networks. Social networks were assessed with the Berkman–Syme Social Network Index (SNI). The SNI is a validated self-report questionnaire (Berkman and Syme 1979) that assesses a person's degree of social integration by: marital/partnership status (married/with partner *versus* not), sociability (number and frequency of contact with children, close relatives and close friends), and church group membership or membership of community organisations. The composite score ranged from 0 to 4 and was categorised according to the standard categorisation described by Berkman and Syme (1979) as 0–1 (most isolated) (reference category), 2 (moderately isolated), 3 (moderately integrated) and 4 (most integrated). Further information about the psychometric properties and evidence for the predictive validity of the SNI is provided elsewhere (Berkman and Breslow 1983).

Relationship quality. Relationship quality was assessed in terms of participants' experiences of social support and social strain from four sources: spouse, children, friends and other family members (brothers, sisters, parents, cousins, *etc.*) (Schuster, Kessler and Aseltine 1990). Social support was measured with three items: 'How much does he/she/they really understand the way you feel about things?', 'How much can you rely on him/her/them if you have a serious problem?' and 'How much can you open up to him/her/them if you need to talk about your worries?' Social strain was measured with four items: "How much does he/she/they make too many demands on you?', "How much does he/she/they criticise you?', "How much does he/she/they let you down when you are counting on him/her?" and 'How much does he/she/they get on your nerves?' Each respondent was asked to answer the questions separately in regards to spouse, children, other family members and friends. Responses for social support and social strain were coded in the following way: 1 (not at all), 2 (a little), 3 (some) and 4 (a lot). The scores for social support and social strain from each source were summed separately to create scales ranging from 3 to 12 and 4 to 16, respectively. For the sake of comparability between social support and social strain, all scales were converted into scales ranging from 0 to 10, with higher scores indicating greater levels of social support or social strain (Santini *et al.* 2015*a*). Thus, the end result was two scales (social support and social strain) for each of the four sources (spouse, children, other family members,

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friends), resulting in eight scales in total. The alpha values were as follows: spouse support 0.86, spouse strain 0.78; children support 0.79, children strain 0.75; family support 0.86, family strain 0.76; and friends support 0.85, friends strain 0.74.

Loneliness. The short form of the University of California, Los Angeles (UCLA) Loneliness Scale was used to assess feelings of loneliness (Hughes *et al.* 2004; Russell, Peplau and Cutrona 1980). The short-form UCLA Loneliness Scale, which assesses subjective feelings of social isolation, is a commonly used measure in loneliness research. The dominant factor underlying the UCLA Loneliness Scale is 'perceived social isolation' (Austin 1983; Russell 1996). The UCLA three-item scale is comprised of three negatively worded questions relating to feelings of isolation, feeling left out and companionship. The three response options are coded as 1 (hardly ever), 2 (some of the time) and 3 (often). Scores are summed to create a total score that runs from 3 to 9, with higher scores indicating a greater degree of loneliness (Cronbach's $\alpha = 0.81$). Previous research has indicated that this scale has an acceptable degree of reliability and has both concurrent and discriminant validity (Hughes *et al.* 2004).

Control variables. Socio-demographic characteristics included age, gender, education, financial circumstances and place of residence. Age was operationalised as a continuous variable. Place of residence was dichotomised into urban (Dublin city or county/another town or city) and rural. Education was classified as: primary (some primary/not complete, primary or equivalent) (reference category); secondary (intermediate/junior/group certificate or equivalent, leaving certificate or equivalent); and tertiary (diploma/certificate, primary degree, postgraduate/higher degree). Current employment situation was categorised as: employed (employed and self-employed, including farming) (reference category); retired; or unemployed, permanently sick or disabled, looking after home or family, and in education or training.

The number of chronic medical conditions was assessed by the question 'has a doctor ever told you that you have any of the conditions on this card?' Reponses included 17 conditions: high blood pressure or hypertension; angina; heart attack (including myocardial or coronary thrombosis); congestive heart failure; diabetes or high blood sugar; stroke (cerebral vascular disease); ministroke or transient ischemic attack; high cholesterol; heart murmur; abnormal heart rhythm; any other heart trouble; chronic lung disease such as chronic bronchitis or emphysema; asthma; arthritis (including osteoarthritis or rheumatism); osteoporosis; cancer or a malignant tumour (including leukaemia or lymphoma but excluding minor skin

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cancers); cirrhosis or serious liver damage. The total number of chronic medical conditions was calculated and operationalised as a continuous variable.

Difficulties with six types of activities of daily living (ADL; dressing, walking, bathing, eating, getting in or out of bed, and using the toilet; Katz *et al.* 1963) were assessed by asking participants to indicate whether they had difficulty performing these activities. ADL disability was defined as having difficulty with at least one of these ADLs.

The scale used for depressive symptoms was the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977), which assesses symptoms experienced in the last week before the survey. The 20 items were scored on scales from 0 (rarely or none of the time, less than one day in the week) to 3 (most or all of the time, five to seven days in the week) with four items reverse coded. Reverse-coded items were recoded so that all items were based on the same scale. Scores were summed to create a scale that ranged from 0 to 60, with higher scores indicating more depressive symptoms (Cronbach's $\alpha = 0.88$). The validity of the CES-D scale as a screening tool for depression in community-dwelling older adults has been well-documented (Hertzog *et al.* 1990; Lewinsohn *et al.* 1997).

Statistical analysis

We analysed data with Stata version 13.1 (StataCorp 2013). The mean ± standard deviation (SD) of the negative ageing perception score is presented by sample characteristics. The between-group difference of the negative ageing perception score was tested by Student's *t*-tests. Multivariable linear regression analyses were performed to assess the association between social networks, relationship quality from four sources or loneliness (exposure variables), and negative perceptions of ageing (outcome variable). Separate models were constructed for each exposure variable [*i.e.* social networks; relationship quality from each source (spouse, children, other family members, friends); loneliness]. Each analysis was therefore restricted to the participants to whom the variable applied (*e.g.* analyses pertaining to relationship quality with children included only those participants who had children).

In order to assess how the inclusion of different covariates influence the association between social networks, relationship quality or loneliness, and negative ageing perceptions, we conducted hierarchical analysis by constructing three models: Model 1 – adjusted for age, gender, place of residence, education, current employment situation, disability and number of chronic medical conditions; and Model 2 – adjusted for covariates in

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Model 1 and depressive symptoms. The selection of these variables was based on previous literature [relating to predictors of ageing perceptions (Kleinspehn-Ammerlahn, Kotter-Gruhn and Smith 2008; Kruse and Schmitt 2006; Westerhof and Barrett 2005) and social support networks (Broese van Groenou and Van Tilburg 2003; Shumaker and Hill 1991; Smith and Christakis 2008; Uchino 2006)]. In particular, we were interested in assessing the effect of depressive symptoms in this association for its theoretically strong link with both the exposure and outcome variables (Chachamovich *et al.* 2008; Richardson *et al.* 2012; Santini *et al.* 2015*b*; Wurm and Benyamini 2014). With the exception of age, number of medical conditions and depressive symptoms, all variables were included in the models as categorical variables. Sampling weights were generated with respect to age, sex and educational attainment to the Quarterly National Household Survey (Central Statistics Office 2010). The sample weighting and the complex study design were taken into account in all analyses to generate nationally representative estimates (Barrett *et al.* 2011). Results are expressed as coefficients and their 95 per cent confidence intervals. A *p*-value less than 0.05 was considered to be statistically significant.

Results

The mean (SD) age of the sample was 63.6 (9.3) years and 52.1 per cent of the sample were women. Male sex, lower education, not being employed, rural residence, ADL disability and higher depressive symptoms were all significantly associated with higher negative ageing perception scores (Table 1). Finally, in terms of the variables on social relationships, significantly higher levels of negative ageing perceptions were observed among those who were more socially isolated and lonely, and those with relationships characterised by more social strain and less social support (Table 2). The associations between social networks, relationship quality, loneliness and negative perceptions of ageing estimated by multivariable linear regression are shown in Table 3. All predictors were significantly associated with negative perceptions of ageing even in the fully adjusted model where higher levels of social network integration and social support from all sources were inversely associated with negative ageing perceptions, while social strain and loneliness were positively associated with negative ageing perceptions. When depressive symptoms were added to the adjusted model, there was a moderate to large attenuation in the coefficients for all exposure variables, although the statistical significance remained unchanged, with the exception of two categories of the SNI.

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TABLE 1. *Negative ageing perception scores by socio-demographic characteristics and health-related variables*

	Mean	SD	*p*
Gender:			0.001
Female	41.3	9.2	
Male	42.0	7.9	
Age (years):			<0.001
50–59	39.6	8.1	
60–69	40.9	8.5	
70–79	44.8	7.8	
80+	48.5	6.9	
Education:			<0.001
Primary	44.4	7.2	
Secondary	40.7	7.8	
Tertiary	38.9	10.4	
Current employment situation:			<0.001
Employed	39.1	7.9	
Retired	43.5	8.7	
Unemployed	42.8	8.1	
Place of residence:			<0.001
Rural	42.2	8.3	
Urban	41.0	8.6	
Number of chronic medical conditions:			<0.001
None	40.4	8.4	
One	41.2	8.5	
Two or more	43.7	8.3	
Disability:			<0.001
No ADL impairments	41.1	8.4	
Any ADL impairments	47.2	8.0	
Depressive symptoms:			<0.001
1st tertile (low)	39.2	8.2	
2nd tertile (middle)	41.5	8.1	
3rd tertile (high)	44.9	8.2	

Notes: The scale used for negative ageing perceptions ranged from 17 to 85, with higher scores indicating more negative perceptions of ageing. Sampling weights were used for the calculation of means and standard deviations (SD); *p*-values are based on Student's *t*-tests. ADL: activity of daily living.

Discussion

The current study investigated the associations of social support networks, relationship quality and loneliness with negative perceptions of ageing among older adults aged 50 and above in Ireland. Greater social network integration was inversely associated with negative perceptions of ageing. Similarly, better relationship quality with social ties (spouse, children, other family members, friends) was also associated with perceptions of ageing, where greater social support and higher levels of social strain were related to lower and higher levels of negative ageing perceptions,

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TABLE 2. *Negative ageing perceptions scores by level of social networks, relationship quality and loneliness*

	Mean	SD	*p*
Social Network Index:			<0.001
Most isolated	44.2	9.4	
Moderately isolated	42.4	8.5	
Moderately integrated	41.6	8.3	
Most integrated	40.0	8.2	
Social support from spouse:			<0.001
1st tertile (low)	43.5	8.7	
2nd tertile (middle)	41.1	7.6	
3rd tertile (high)	39.9	8.2	
Social strain from spouse:			<0.001
1st tertile (low)	39.4	8.4	
2nd tertile (middle)	40.6	8.1	
3rd tertile (high)	42.6	8.1	
Social support from children:			<0.001
1st tertile (low)	42.4	8.4	
2nd tertile (middle)	41.2	8.1	
3rd tertile (high)	40.7	8.5	
Social strain from children:			<0.001
1st tertile (low)	40.7	8.3	
2nd tertile (middle)	41.1	8.1	
3rd tertile (high)	42.6	8.5	
Social support from other family members:			<0.001
1st tertile (low)	42.5	8.6	
2nd tertile (middle)	40.9	8.2	
3rd tertile (high)	40.3	8.5	
Social strain from other family members:			<0.001
1st tertile (low)	40.7	8.4	
2nd tertile (middle)	40.9	8.1	
3rd tertile (high)	42.2	8.7	
Social support from friends:			<0.001
1st tertile (low)	43.4	8.1	
2nd tertile (middle)	41.1	8.0	
3rd tertile (high)	39.5	9.1	
Social strain from friends:			<0.001
1st tertile (low)	40.9	8.5	
2nd tertile (middle)	40.9	8.4	
3rd tertile (high)	43.1	8.4	
Loneliness:			<0.001
1st tertile (low)	38.0	8.0	
2nd tertile (middle)	41.7	7.7	
3rd tertile (high)	45.4	8.0	

Notes: The scale used for negative ageing perceptions ranged from 17 to 85, with higher scores indicating more negative perceptions of ageing. Sampling weights were used for the calculation of means and standard deviations (SD); *p*-values are based on Student's *t*-tests.

respectively. Finally, loneliness was positively associated with negative perceptions of ageing. Our findings demonstrate that poor social support networks and loneliness are associated with negative perceptions of ageing. While the coefficients of these associations were attenuated after the

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TABLE 3. *Association of social networks, relationship quality and loneliness (independent variables) with negative ageing perceptions scores (dependent variable) among older adults estimated by linear regression*

	Model 1	Model 2	Percentage mediated by depressive symptoms
	b (95% confidence intervals)		
Social Network Index (Ref. Most isolated)			
Moderately isolated	−1.42* (−2.47, −0.38)	−0.92 (−1.91, 0.07)	35.2
Moderately integrated	−1.91** (−2.94, −0.89)	−0.93 (−1.91, 0.05)	51.3
Most integrated	−2.93** (−4.00, −1.86)	−1.75** (−2.75, −0.74)	40.4
Social support from spouse	−0.65** (−0.78, −0.52)	−0.44** (−0.57, −0.31)	32.3
Social strain from spouse	0.76** (0.63, 0.88)	0.53** (0.41, 0.65)	30.3
Social support from children	−0.69** (−0.81, −0.58)	−0.54** (−0.65, −0.43)	21.7
Social strain from children	0.90** (0.76, 1.04)	0.69** (0.55, 0.82)	23.3
Social support from other family members	−0.38** (−0.46, −0.30)	−0.29** (−0.37, −0.21)	23.7
Social strain from other family members	0.64** (0.51, 0.77)	0.43** (0.30, 0.56)	32.8
Social support from friends	−0.55** (−0.63, −0.46)	−0.47** (−0.55, −0.38)	14.5
Social strain from friends	0.90** (0.76, 1.03)	0.67** (0.54, 0.81)	25.6
Loneliness	1.34** (1.25, 1.43)	1.11** (1.01, 1.22)	17.2

Notes: The scale used for negative ageing perceptions ranged from 17 to 85, with higher scores indicating more negative perceptions of ageing. Model 1: adjusted for age, gender, place of residence, education, current employment situation, disability and number of chronic medical conditions. Model 2: adjusted for covariates in Model 1 and depressive symptoms. Ref.: reference category.

Significance levels: * $p < 0.01$, ** $p < 0.001$.

inclusion of depressive symptoms in the model, it did not fully explain the associations.

Contextualisation of findings

Although knowledge on the mechanisms linking objective and subjective measures of social support networks and negative ageing perceptions is scarce due to little prior research on this topic, several hypotheses may be proposed. First, as mentioned previously, the action of internalising ageing stereotypes into constructs of one's self-perceptions of ageing has been postulated to result in a 'self-fulfilling prophecy' of the stereotype (Levy, Slade and Kasl 2002; Levy *et al.* 2002; Wurm *et al.* 2013). Older adults are often perceived as being boring, weak, mournful, debilitated, cognitively impaired, demented, dependent, helpless or incompetent (Braithwaite 1986; Nuessel 1982; Ory *et al.* 2003; Scholl and Sabat 2008).

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This can lead to negative self-stereotyping, which occurs when these stereotypes are internalised (Kruse and Schmitt 2006; Levy 2009). It is possible that the adoption of such negative stereotypes is facilitated and reinforced under adverse social circumstances. It may be that more socially isolated individuals over time tend to more readily ascribe their situation to negative ageing stereotypes, perceiving that loneliness and social isolation are simply necessary consequences of getting older (Sanchez Palacios, Trianes Torres and Blanca Mena 2009). It may also be that older adults who consistently experience poor relationship quality with their social ties at some point begin to attribute this to the fact that they are transitioning into older adulthood. Hence, in line with negative ageing stereotypes, little support or high strain may become interpreted as part of the normal ageing process where older people are given less priority or they are seen as being more difficult to deal with (*e.g.* in the case of cognitive impairment or dementia) (Braithwaite 1986; Nuessel 1982; Ory *et al.* 2003; Scholl and Sabat 2008).

Second, the internalisation of negative ageing stereotypes, such as being 'alone and lonely', 'dependent' or 'inactive' is potentially further reinforced by several naturally occurring psycho-social factors as people transition into older adulthood and old age, such as declining social roles (Dykstra and de Jong Gierveld 2004; Dykstra, van Tilburg and de Jong Gierveld 2005), the loss of network members due to bereavement (Ha 2008; Utz *et al.* 2002), and increasing dependency on others for formal and informal care (Ovseiko 2007). Such factors may contribute to the extent to which individuals ascribe to negative ageing stereotypes, and by extension, adopt negative perceptions of their own ageing process. Thus, another self-fulfilling prophecy may occur, where diminishing social support networks and perceived social isolation facilitate the adoption of negative perceptions of ageing, which ultimately confirm negative ageing stereotypes by further isolating individuals and reinforcing dependency. For example, research has previously reported that both social isolation/withdrawal and adoption of negative ageing stereotypes can lead to dependency and action inhibition (Barder, Slimmer and LeSage 1994; Coudin and Alexopoulos 2010; Rodin 1989). Conversely, more supportive social networks have been linked to optimism and perceived control, and ultimately psychological wellbeing (Karademas 2006; VanderZee, Buunk and Sanderman 1997). Optimism and perceived control have previously been shown to buffer against the detrimental effects of negative ageing perceptions (Levy, Slade and Kasl 2002; Wurm and Benyamini 2014). Thus, it is possible that supportive relationships facilitate more perceived control or a more optimistic outlook, which in turn reinforces a more positive view of one's ageing process and ultimately decelerates the ageing process.

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Last, having poor social relationships has been reported to be an independent risk factor for developing various adverse physical and mental health outcomes among older adults (Holt-Lunstad, Smith and Layton 2010; Kuiper *et al.* 2015; Santini *et al.* 2015*b*; Smith and Christakis 2008; Uchino 2009). Hence, it can be argued that the protective effects of being embedded in good social support networks imply a deceleration of the ageing process, which may effectively reduce the likelihood of adopting negative attitudes to getting older. Further, it may also be important to consider not only the size of social networks or the quality of relationships, but also the characteristics of the people to whom individuals are socially connected. Recent literature has highlighted the role of social comparison on ageing perceptions among older people (Bennett and Gaines 2010; Horton *et al.* 2008*a*, 2008*b*). For example, the lack of intergenerational interaction between the old and the young has been cited as one essential factor contributing to the adoption of negative ageing perceptions (Ory *et al.* 2003; Weiss, Sassenberg and Freund 2013). In other words, norms of age segregation imply that older adults only socialise and associate themselves with other older adults, which in turn may perpetuate negative ageing stereotypes and cause individuals to interpret their own ageing in a negative light.

Our findings demonstrate a link between ageing perceptions among older individuals and their integration into social networks or the quality of their existing relationships. If our findings are confirmed by longitudinal studies, it may suggest that strategies to increase social network size or improve relationship quality could have a positive impact on ageing perceptions among the older population. While there are no studies on the effect of targeting social support networks to increase positive ageing perceptions, ageing-related cognitions and the extent to which individuals ascribe to negative stereotypes of ageing can be modified under experimental conditions (Levy 1996, 2003; Weiss, Sassenberg and Freund 2013). Further, interventions targeting the social support networks of older adults can effectively reduce social isolation and loneliness, promote healthy social interaction and facilitate community participation, which in turn have various beneficial effects on mental health and psychological wellbeing (Alves, Maia and Nardi 2014; Cattan *et al.* 2005). It is likely that such interventions, by increasing social participation and integration into social support networks, for example, could also have favourable effects on how individuals perceive their own ageing process and the extent to which they view themselves as confirming or disconfirming negative ageing stereotypes.

It should also be noted that online social network platforms, such as Facebook, can be powerful in terms of influencing general perceptions of

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ageing (Levy *et al.* 2014). Given the increasing use of online media among older adults (Zickuhr and Madden 2012), intervening within the context of such social media sites could potentially be an effective tool to reduce negative ageing stereotypes and to promote further more positive ageing perceptions among the general public or specifically through the online social networks of older adults.

A number of different ways exist to intervene in social support networks, *e.g.* by improving social skills, enhancing social support, increasing opportunities for social contact or addressing maladaptive social cognition (*e.g.* therapeutic interventions aimed at altering thought processes related to social interaction) (Heaney and Israel 2008; Masi *et al.* 2011). A meta-analysis covering 30 social network interventions designed to reduce social isolation and loneliness among older adults found that educational and social activity group interventions were effective, whereas the effectiveness of home visiting and befriending schemes remained unclear (Cattan *et al.* 2005). In terms of reducing loneliness specifically, Masi *et al.* (2011) conducted a meta-analysis across 50 intervention studies and found a larger effect size for interventions that addressed maladaptive social cognition than for interventions designed to improve social skills, enhance support or increase opportunities for social interaction.

Finally, it is worth considering that research has established that core social support networks are generally formed in young adulthood, which ultimately has implications for late-life emotional wellbeing (English and Carstensen 2014). Similarly, perceptions of ageing are usually entrenched earlier in life and can have consequences for health and functioning later in life (Levy 2003; Levy, Slade and Kasl 2002; Levy *et al.* 2009). This means that it may be possible to assess both social support networks and perceptions of ageing at a time considerably before the transition into older adulthood, which in turn could prevent various adverse physical and mental health outcomes occurring years, perhaps even decades, into the future.

Strengths and limitations

The strengths of this study include the use of data from a large nationally representative sample of the Irish population, and a validated scale to assess self-perceptions of ageing. To the best of our knowledge, this study is the first to assess associations of social networks, relationship quality from four different sources (including both social support and social strain) and loneliness with negative perceptions of ageing. Our results contribute to the existing gerontology literature and could effectively inform policy makers about how interpersonal relationships and social context

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factors influence ageing perceptions in the general population. However, the results of our study should be interpreted in light of several limitations. First, these findings were based on cross-sectional data, which precludes the possibility of making firm conclusions about directions of causality. For example, social isolation could also be the result of negative perceptions of ageing. Future studies are needed to establish causal relationships between these variables using prospective data. Second, since the data were based on self-report, reporting bias may exist. Third, other factors may mediate the relationship between social relationships and ageing perceptions, such as optimism or locus of control. We did not have proper measures available to test such mediating effects, and future studies testing these pathways are therefore relevant. Finally, residual confounding may exist due to the omission of potential confounders such as personality type due to lack of data (Bryant *et al.* 2016; Moor *et al.* 2006). Thus, their independent and confounding effects remain unknown.

Conclusion

Our findings show that social support networks and perceived social isolation are associated with ageing perceptions. Specifically, social isolation, poor relationship quality with social ties and loneliness are all related to negative perceptions of ageing in older Irish adults. It is possible that public health interventions can effectively reduce the extent to which older individuals adopt negative appraisals of their ageing process by targeting their integration into social support networks. Longitudinal studies are warranted to investigate the predictive validity of social support networks and loneliness on self-perceptions of ageing over time, and further, to explore the extent to which such links could become essential in decelerating the ageing process and ultimately promote successful ageing.

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Appendix

Questions included in the Brief Ageing Perceptions Questionnaire (B-APQ)

Answer options were: 'strongly disagree', 'disagree', 'neither agree nor disagree', 'agree' and 'strongly agree'.

1. I always classify myself as old.
2. I am always aware of the fact that I am getting older.
3. I feel my age in everything that I do.
4. As I get older I get wiser.
5. As I get older I continue to grow as a person.
6. As I get older I appreciate things more.
7. I get depressed when I think about how ageing might affect the things that I can do.
8. The quality of my social life in later years depends on me.
9. The quality of my relationships with others in later life depends on me.
10. Whether I continue living life to the full depends on me.
11. Getting older makes me less independent.
12. As I get older I can take part in fewer activities.
13. As I get older I do not cope as well with problems that arise.

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14. Slowing down with age is not something I can control.
15. I have no control over the effects which getting older has on my social life.
16. I worry about the effects that getting older may have on my relationships with others.
17. I feel angry when I think about getting older.

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