

Social participation as an indicator of successful aging: an overview of concepts and their associations with health

Heather Douglas^{1,3} BPsych (Hons), PhD, Lecturer in Psychology

Andrew Georgiou² BA, DipA, MSc, PhD, Senior Research Fellow

Johanna Westbrook² BAppSc, MHA, GradDipAppEpi, PhD, Director

¹School of Psychology and Exercise Science, Murdoch University, #06-04 Kings Centre, 390 Havelock Road, 169662, Singapore.

²Centre for Health Systems and Safety Research, Australian Institute of Health Innovation, Level 6, 75 Talavera Road, Macquarie University, NSW 2109, Australia. Email: Andrew.Georgiou@mq.edu.au; Johanna.Westbrook@mq.edu.au

³Corresponding author. Email: h.douglas@murdoch.edu.au

Abstract

Objectives. Social participation has generated a wealth of research in gerontology, but the concept suffers from a lack of conceptual clarity that renders it difficult to define and measure. This means that research on social participation is difficult to compare directly. The aim of the present study was to draw the literature on social participation in older adults together to inform health services researchers seeking to investigate social participation as an indicator of successful aging.

Methods. A narrative review of studies investigating the association between social participation and health in adults aged 65 years and older was conducted.

Results. Three concepts of social participation (i.e. social connections, informal social participation and volunteering) were defined, their measurement instruments described and evidence of their associations with health explored. All three concepts have demonstrated associations with an array of health indicators. Prospective studies reveal that social participation at baseline is positively associated with mental and physical health.

Conclusion. A model of social participation on health is presented, showing the evidence that all three concepts contribute to the association between social participation and health through their shared mechanisms of social support and social cohesion with the wider community. Using an instrument that can be separated into these three distinct concepts will assist health services researchers to determine the relative effect of each form of participation on the health of older adults.

What is known about the topic? Social participation has generated a wealth of research in gerontology. The scope of the literature on social participation is broad and the concepts diverse. For this reason, most previous systematic reviews have been unable to comprehensively assess the effect of all concepts of social participation on health. This means the research on social participation is difficult to compare directly, and indicators of social participation in older adults are difficult for policy makers to select.

What does this paper add? This paper overviews the three concepts of social participation, their methods of measurement and their associations with health in older adults. We present a model of social participation that incorporates all three concepts of social participation and their effects on health. We argue that the use of a measure that can be segmented into each of the three forms of social participation will predict more of the variance in health outcomes than any measure on its own.

What are the implications for practitioners? Enhancing the social participation of older adults is a key factor in successful aging that many older adults value. However, many service provision organisations tend to focus on meeting the specific physical needs of clients, rather than targeting services that connect older adults with their community. Targeting social participation may present one of the greatest opportunities to improve older adults' general health, and will also generate societal benefits by increasing community contributions from this group. Selecting an indicator of social participation that measures each of the three concepts overviewed in this paper will enable policy makers to identify the areas in which social interventions for older adults will have the most effect.

Additional keywords: health status indicators, social participation, social cohesion, social capital.

Received 9 February 2016, accepted 16 August 2016, published online 7 October 2016

Introduction

Social participation is a key indicator of successful aging and is associated with mortality,¹ morbidity² and quality of life.³ Enhancing social participation is a central component of the World Health Organization's response to concerns about population aging.⁴ Older adults value the ability to participate in their communities and feel fulfilled by enhanced participation.^{5,6} This participation provides resources into the community through older adults' informal assistance (e.g. to families and friends) and formal community participation efforts (e.g. volunteering) that would otherwise have to be purchased.⁷ Social participation has been included in many conceptual models of successful aging^{8,9} and is the focus of several research studies in gerontology.^{10,11}

Despite the research interest in social participation, the concept suffers from a lack of conceptual clarity. There are multiple concepts that are either used to describe aspects of or used interchangeably with the term 'social participation', including volunteering,¹² civic engagement,¹³ community engagement,¹⁴ community participation,¹⁵ formal social participation¹⁶ and social engagement.¹⁰ The lack of consensus on a definition of social participation results in communication difficulties for those using the concept, problems in the development and selection of instruments to measure social participation, difficulties comparing results across studies and potentially ineffective social policy efforts.¹⁰ Clarity around which concepts 'social participation' includes would assist health services researchers to select appropriate indicators for social participation.

The aim of the present study was to draw together the literature on social participation in older adults to inform health services researchers seeking to investigate social participation as an indicator of successful aging. Specifically, the aims of the study were to: (1) explicate the heterogeneous concepts of participation that have been explored; and (2) synthesise evidence of the effect of social participation on the health of older adults. In the following, we review the concepts of social connections, informal social participation and volunteering in turn, including definitions of each concept, common methods used to measure them and evidence of their effects on health. We then present a model of social participation and its effects on health that takes account of all three.

Methods

Search strategy

PubMed, PsycINFO, Web of Science and Scopus were searched to identify international literature investigating the social participation and health of older adults. Searches were conducted in October 2015 and were limited to articles published in English. The search terms applied to PubMed are listed in Table 1.

Inclusion and exclusion criteria

All studies investigating the association between social participation and health in adults aged 65 years and older were included. Both cross-sectional and longitudinal studies were included.

The literature addressed a variety of social participation and health measures in adults aged 65 years and older. Because of this heterogeneity, we present a narrative overview rather than a systematic analysis. We used the systematic review of definitions of social participation by Levasseur *et al.*¹⁰ to define the types of social participation; specifically, these were described as social contact without a specific goal (social connections), social contact towards a common goal (informal social participation) and social activities aimed at helping others (volunteering). Each concept and its association with health is reviewed in turn.

Results

Social connections

Social connections have been defined as ties with other people spanning the range from intimate to extended.¹⁷ These ties can be defined by their structure (including the number and geographical proximity of ties) and function (including the frequency and reciprocity of contact). Some research suggests categorising ties according to whether they include relatives, friends or neighbours.¹⁸ Other terms for social connections include social network,¹⁹ social integration,¹⁷ social embeddedness²⁰ and human companionships.¹⁸ Social connections are typically measured by asking individuals to report the number of people they are connected with, and the number of monthly face-to-face and telephone contacts they have had with each. Some measures include a question asking individuals to indicate the presence of a confidant, a network of children or to indicate which of their self-reported ties they could call on for help.¹⁹ A score is calculated by summing the number of ties reported. Having regular interactions and being involved in diverse types of ties has a positive effect on health.^{21,22}

Social connections and health

The Lubben Social Network Scale (LSNS) is a commonly used tool to assess social connections in geriatric populations.²³ There are three versions of the scale that assess combinations of both the frequency and quality of family, friendship and neighbour ties. Cross-sectional studies using the LSNS have demonstrated associations between more social connections and a lower incidence of major depressive disorder in Chinese^{24,25} and Singaporean older adults,²⁶ less depressive symptoms among older adults in Hong Kong²⁷ and Macau,²⁴ increased

Table 1. Search terms used to identify social participation and its effects on the health of older adults

Literature	Terms
Health	Health ^A
Aging	Aged ^A OR frail elderly ^A OR aging ^A OR elderly OR older OR older people OR geriatric OR gerontology OR nursing OR old age OR old-age specific OR older adults OR older people OR frail elders OR frail elderly OR older patient
Social participation	Social participation ^A OR social capital ^A OR community involvement OR community participation OR social engagement OR civic engagement

^ATerm searched as both subject heading and free text.

sleep quality in elderly Malaysians living with dementia,²⁸ increased psychological wellbeing in elderly Malaysians²⁰ and elderly Thai citizens,²⁹ less functional impairment in older adults from the US,³⁰ better self-rated health in Canadian older adults,³¹ better health-related quality of life among older Koreans³² and better nutritional status among older adults from Ireland.³³ In a prospective cohort study of 7240 community-dwelling older women in the US, the odds of experiencing increasing and persistently high depressive symptoms over 20 years were significantly elevated for women who had fewer social connections (odds ratios (OR) 3.24 and 6.75 respectively).³⁴ A prospective study examining the risk of falls in a group of older Caucasian women in the US identified that more connections with family members protected older women against falls.³⁵ Compared with women who had family connections in the lowest quartile, the relative risk (RR) of falls associated with family connection scores in the second, third and highest quartiles was 0.90 (95% confidence interval (CI) 0.79–1.03), 0.86 (95% CI 0.74–1.00) and 0.84 (95% CI 0.71–0.99) respectively.³⁵

A series of prospective longitudinal studies also demonstrated the effect of social connections on cognitive decline and dementia incidence. In a community-based sample of 354 US adults aged 50 years and over with intact cognitive function at baseline, participation in more social connections was associated with better maintenance of Mini-Mental State Examination (MMSE) scores, and a reduced odds of a decline in MMSE score at follow-up 12 years later.³⁶ A study of 2513 Japanese–American older men found that older adults (mean age 76.8 years at last follow-up) with the lowest level of late life social connections (none or one tie) had a 125% higher risk of dementia than older men with the highest number of ties (four to five).³⁷ A prospective study of 2249 women aged 75 years and older in California found that women with larger numbers of social connections at baseline had a lower risk of incident dementia 3 years later (OR 0.74; 95% CI 0.57–0.97).¹⁹ A repeated-measures prospective longitudinal study of 964 community-dwelling adults aged over 65 years in Spain over 7 years found that the probability of cognitive decline was lower for older adults with a high frequency of visual contact with relatives, whereas contact with friends was protective against cognitive decline in women only.^{17,38} An Australian study investigating the effect of social connections on memory scores up to 15 years later in 706 participants aged 65 years and over found that the rate of decline in the ability to recall personal life experiences was steeper for those with the smallest friend networks.³⁹ In other words, older adults in that study with the smallest number of social connections experienced the steepest decline in memory for life events with every passing year.

Informal social participation

Informal social participation includes activities that people engage in with others for personal enjoyment. It has been defined as participation in social activities and socialisation with others.⁴⁰ Other definitions emphasise the ability of an individual to take advantage of opportunities for social interaction.⁴¹ This aspect of social participation has also been referred to as social engagement.^{40–42} A typical measure of informal social participation will ask individuals to indicate how many social activities they have participated in, or community groups of which they are

members. Other measures include both social connections and informal social participation as a combined measure of social participation.⁴³ We included these studies in the present analysis only if they reported separate analyses for informal social participation and social connections.

Informal social participation and health outcomes

Cross-sectional studies have demonstrated an association between informal social participation and indices of health. Being involved in a greater number of groups, including being a member of a community club or a church, was associated with a better peak expiratory flow rate in older adults in the US.²² Among older adults in Japan living in the community, those with low and intermediate levels of group participation had 45% (OR 1.45; 95% CI 1.21–1.73) and 23% (OR 1.23; 95% CI 1.01–1.48) higher odds of having 19 or fewer teeth compared with those with high levels of group participation.^{44,45} Life satisfaction in Korean women aged 65 years and older was significantly and positively associated with participation in community-based social activities ($\beta=0.077$; $P<0.001$).⁴⁶ In a sample of colorectal cancer survivors aged 65 years and older and at least 5 years after diagnosis, engaging in any form of social participation in the community was associated with better mental health component summary scores from the 36-Item Short Form Health Survey (SF-36). In the same study, weekly hours of social participation were significantly and positively associated with higher physical and mental health scores.⁴⁷ A longitudinal cohort study of 1375 adults aged 75 years or older in Sweden found that the adjusted RR of dementia associated with participation versus no participation in social activities was 0.70 (95% CI 0.49–1.01). Dementia incidence decreased with increasing frequency of social participation (less than weekly participation, OR 0.92 (95% CI 0.57–1.47); daily–weekly participation, OR 0.58 (95% CI 0.38–0.91). These associations were independent of the effects of age, sex, education, cognitive functioning, co-morbidity, depressive symptoms and physical functioning.⁴⁸

A subgroup of studies has examined the informal social participation of older adults in assisted living facilities. Assisted living communities provide both housing and personal services for older adults who do not need more traditional nursing home services to address their needs.⁴⁹ The majority of these studies were conducted in the US.^{40,42,50–55} One study included Taiwanese participants.⁵⁶ Only one study reported a longitudinal study design.⁵⁵ The effect of informal social participation was positive across all studies. Three of the studies reported that as informal social participation in activities both inside and outside the assisted living facility increased, symptoms of depression decreased.^{40,50,56} Findings were similar for measures of life satisfaction, with two studies reporting a significant and positive relationship between informal social participation and life satisfaction.^{52,54}

Volunteering

Volunteering includes activities that people engage in for the benefit of others to whom they owe no obligation.⁵⁷ It has been defined as an activity in the context of a community organisation with a name and explicit purposes.¹⁶ Such behaviour has also been referred to as civic engagement¹³ or formal social

participation.¹⁶ Research typically measures volunteering by asking older adults to indicate how many volunteer organisations they are a member of, or how many hours they devote to volunteer roles over a given time period.⁵⁸ These questions are often combined into a composite measure of social participation with the informal social participation activities described above. A potential shortcoming of such research is we are then unable to determine the separate effects of activities engaged in for enjoyment versus those that have the goal of improving some aspect of community life.¹⁶

Volunteering and health outcomes

We only included studies here that reported on the effect of volunteering separately from informal social participation. Most studies on older adults and volunteering have been conducted in the US.^{12,59} A series of literature reviews has enumerated the benefits to older adults of volunteering.^{12,57,59,60} Most studies report on the psychological and social benefits of volunteering,¹² although there is some research that demonstrates associations between volunteering and physical indicators of health. Volunteering has positive associations with perceived health,⁶¹ life satisfaction,⁶² positive mood¹² and reduced mortality levels among older adults.^{63,64} A meta-analysis of 37 largely cross-sectional studies found that older adult volunteers had higher wellbeing than older non-volunteers.⁶⁵ Compared with non-volunteers, volunteers experienced less depressive symptoms and a lower utilisation of healthcare services.⁵⁷ Two reviews of longitudinal cohort studies and one randomised controlled trial found that volunteering in old age predicts better self-rated health, physical functioning and physical activity.^{59,63} Relatively limited research has focused on the effects of volunteering on cognitive decline, but evidence from an analysis of older adults who were

cognitively impaired at baseline demonstrated that older adult volunteers improved their executive function and memory scores relative to cognitively impaired non-volunteers.^{66,67} Older adults who volunteered were less likely to be admitted to hospital with a fall-related hip fracture.⁶⁸ Emerging evidence also suggests that volunteering at baseline is associated with a decreased risk of hypertension at follow-up.^{69,70}

Discussion

Social participation: bringing three separate concepts together

A suggested model of the associations between each form of social participation and the connection with health is presented in Fig. 1. We suggest that the effect of social participation on health is mediated by social support and the individual's sense of community social cohesion. According to the social capital theory of health, community participation leads to higher perceived social cohesion and more available social support.⁷¹ That is, the more individuals participate, the more likely they will perceive that people in their community can be trusted and will help them if they need assistance. The development of community participation results in both higher social cohesion and higher social support, both of which theoretically result in better health outcomes.⁷² The evidence for this proposition is discussed below.

Berry *et al.*⁷³ have found that participation in one domain is typically associated with participation in the others. Having more frequent connections with family, friends and neighbours is also associated with higher participation in community groups and an increased likelihood of volunteering. This suggests that all three forms of social participation will be positively associated. In addition, it has been found that the breadth of participation matters

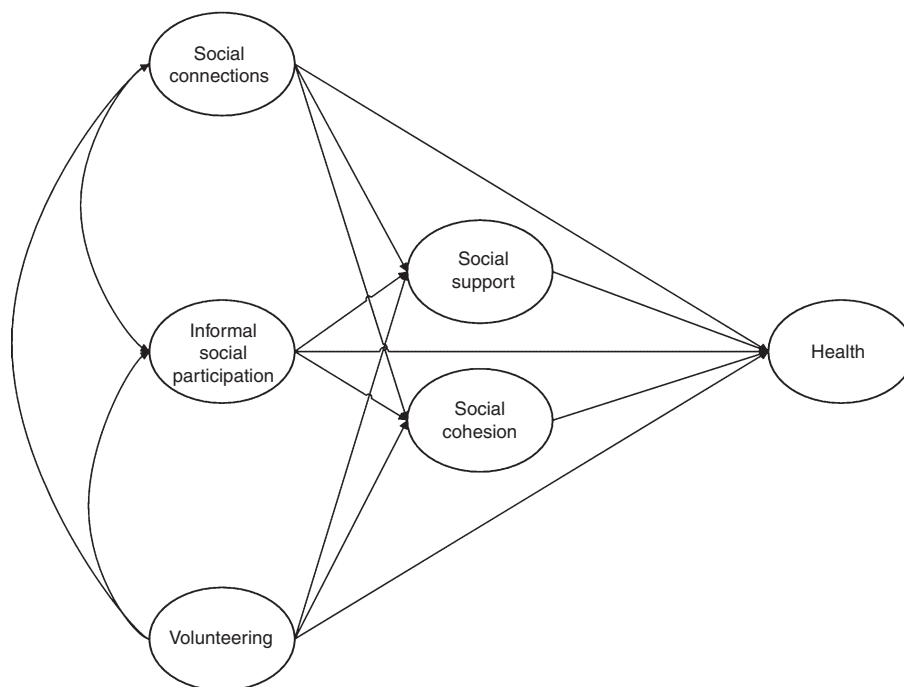


Fig. 1. Model of the effect of social participation on health.

for psychological health.^{73,74} That is, the more types of participation an individual engages in, the better their psychological health is likely to be. This suggests that all three concepts of social participation will be positively associated with health. Few studies have directly investigated these relationships and none that we are aware of has focused exclusively on older adults.

The mechanisms by which increased participation is suggested to have an effect on health is through the increased availability of social support and increased social cohesion. Social support has been defined as the various types of assistance or help available to individuals when they need it.⁷⁵ Social cohesion, in contrast, is the sense of trust and reciprocity that the individual has in the wider community.⁷¹ Both social cohesion and social support are considered proximal indicators of better health according to social capital theory.⁷⁶ The evidence suggests that social support and social cohesion can account for the association between social participation and health. The effect of social participation on the psychological well being of a cohort of elderly Thai adults was found to be accounted for by perceived social support.²⁹ Similarly, an Australian cross-sectional study of midlife and older adults found that social support from friends mediated the association between volunteering and subjective wellbeing.⁷⁷ A longitudinal study of 7088 Australian women aged between 70 and 75 years at baseline found that volunteering was associated with higher quality of life and increased social support. The likelihood of a woman being involved in volunteering increased by 11% for every 5-point increase in quality of life, and by 35% for every 1-point increase in perceived social support.⁷⁸

The assisted living facility studies that included measures of social support in addition to informal social participation found a significant negative association between perceived social support and depression.^{42,51} A study of 999 adults aged 65 years and over living in Britain found that high levels of social cohesion were associated with individuals indicating better overall and physical health.⁷⁹ Evidence from the Household, Income, and Labour Dynamics in Australia survey, although only cross-sectional and not restricted to older adults, found that the effect of three indices of participation were reduced to non-significance by the addition of social cohesion into hierarchical linear regression models.⁷⁶ These findings suggest that the association between all types of social participation and health will be accounted for by the social support available to the individual and their positive feelings about the community in which they live.

Conclusions

Social participation consists of three inter-related concepts most informatively labelled Social Connections, Informal Social Participation, and Volunteering. The literature review indicated that each concept shared a positive relationship with health in older adults, regardless of the measure of health that was used. Longitudinal cohort studies further demonstrated that baseline social participation in any of the three forms is associated with better health outcomes at follow-up on several indices of health, including cognitive function,³⁹ depression,³⁴ better self-rated health and physical functioning,^{59,63} and even a reduced incidence of falls.³⁵ We also examined evidence that the three

concepts of social participation were associated, such that an increased number of connections increases the likelihood that the individual will also participate in more organised community activities associated with clubs and volunteer their time. Cross-sectional evidence from a series of Australian studies suggests that more social participation across all three types is also associated with health.^{73,74,76,80}

One reason that the distinctive associations of different types of social participation have been overlooked as a cause of health status is that they are typically combined into a composite scale. This procedure is justified if we know that all forms of participation have an equivalent effect on health. However, if one of the three categories has a different association with health than the others, then we may not be clearly identifying the area in which intervention in social participation will provide the most benefit.¹⁶ A recent meta-analysis suggested that taking account of the multi-dimensionality of social participation results in a stronger association between social participation and health.⁸¹ We argue that the use of a measure that can be segmented into each of the three forms of social participation will predict more of the variance in health outcomes than any measure on its own. Furthermore, using a tool that can be separated into these three distinct concepts will also assist health services researchers to determine the relative effect of each form of participation on health for older adults.

Because of the heterogeneity of the literature on social participation and health, we were unable to conduct a systematic or quantitative review. Therefore, the magnitude of the associations between social participation and health are a matter for further research. Although the hypothesised model was developed primarily from the research literature concerning adults aged 65 years and over living in the community, evidence suggests that social participation is just as important for other groups, including older adults with dementia,⁸² frail older adults,⁸³ older adults from different cultural backgrounds⁸⁴ and general adult population samples,⁷² and is even relevant to children's quality of life.⁸⁵ Therefore, the model we propose has wider application to many other groups in need of intervention to improve their health outcomes.

Enhancing the social participation of older adults is a key factor in successful aging that many older adults value.⁸⁶ As the world population ages, more attention is being paid to supporting older adults to remain connected to and contributing members of their communities. However, many service provision organisations tend to focus on meeting the specific physical needs of clients, rather than targeting services that connect older adults with their community.⁸⁶ Targeting social participation may present one of the greatest opportunities to improve older adults' general health, and will also generate societal benefits by increasing community contributions from this group.⁶¹ A clear understanding of the concepts included in social participation, how they are related and how they combine to produce improved health outcomes enables health services researchers and policy makers to understand how they can intervene to improve the health of an aging population.

Competing interests

None declared.

Acknowledgements

This research was funded by an Australian Research Council Linkage Grant (LP120200814).

References

- 1 Berkman LF. The role of social relations in health promotion. *Psychosom Med* 1995; 57: 245–54. doi:10.1097/00006842-199505000-00006
- 2 Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. *Soc Sci Med* 2000; 51: 843–57. doi:10.1016/S0277-9536(00)00065-4
- 3 Levasseur M, Desrosiers J, St-Cyr TD. Comparing the disability creation process and international classification of functioning, disability and health models. *Can J Occup Ther* 2007; 74: 233–42. doi:10.1177/000841740707405S02
- 4 World Health Organization. Active ageing: a policy framework. Madrid: World Health Organization; 2002.
- 5 Marshall E, Mackenzie L. Adjustment to residential care: the experience of newly admitted residents to hostel accommodation in Australia. *Aust Occup Ther J* 2008; 55: 123–32. doi:10.1111/j.1440-1630.2007.00687.x
- 6 Van Leuven KA. Health practices of older adults in good health: engagement is the key. *J Gerontol Nurs* 2010; 36: 38–46. doi:10.3928/00989134-20091110-99
- 7 Wuthnow R. Acts of compassion: caring for others and helping ourselves. Princeton: Princeton University Press; 1991.
- 8 Chen K, Hung H, Lin H, Haung H, Yang Y. Development of the model of health for older adults. *J Adv Nurs* 2011; 67: 2015–25. doi:10.1111/j.1365-2648.2011.05643.x
- 9 Suls J, Rothman A. Evolution of the biopsychosocial model: prospects and challenges for health psychology. *Health Psychol* 2004; 23: 119–25. doi:10.1037/0278-6133.23.2.119
- 10 Levasseur M, Richard L, Gauvin L, Raymond E. Inventory and analysis of definitions of social participation found in the aging literature: proposed taxonomy of social activities. *Soc Sci Med* 2010; 71: 2141–9. doi:10.1016/j.socscimed.2010.09.041
- 11 Dijkers MP. Issues in the conceptualization and measurement of participation: an overview. *Arch Phys Med Rehabil* 2010; 91: S5–S16.
- 12 Anderson ND, Damianakis T, Kroger E, Wagner LM, Dawson DR, Binns MA, et al. The benefits associated with volunteering among seniors: a critical review and recommendations for future research. *Psychol Bull* 2014; 140: 1505–33. doi:10.1037/a0037610
- 13 Martinson M, Minkler M. Civic engagement and older adults: a critical perspective. *Gerontologist* 2006; 46: 318–24. doi:10.1093/geront/46.3.318
- 14 Attre P, French B, Milton B, Povall S, Whitehead M, Popay J. The experience of community engagement for individuals: a rapid review of the evidence. *Health Soc Care Community* 2011; 19: 250–60. doi:10.1111/j.1365-2524.2010.00976.x
- 15 Verdonschot MML, De Witte LP, Reichrath E, Buntinx WHE, Curfs LMG. Community participation of people with an intellectual disability: a review of empirical findings. *J Intellect Disabil Res* 2009; 53: 303–18. doi:10.1111/j.1365-2788.2008.01144.x
- 16 Young FW, Glasgow N. Voluntary social participation and health. *Res Aging* 1998; 20: 339–62. doi:10.1177/0164027598203004
- 17 Zunzunegui M, Alvarado BE, Del Ser T, Otero A. Social networks, social integration, and social engagement determine cognitive decline in community-dwelling Spanish older adults. *J Gerontol B Psychol Sci Soc Sci* 2003; 58: S93–100. doi:10.1093/geronb/58.2.S93
- 18 Lubben J, Gironde MW. Measuring social networks and assessing their benefits. In: Phillipson C, Allan G, Morgan D, editors. Social networks and social exclusion. Aldershot: Ashgate; 2003. pp. 20–49.
- 19 Crooks VC, Lubben J, Pettiti DB, Little D, Chiu V. Social network, cognitive function, and dementia incidence among elderly women. *Am J Public Health* 2008; 98: 1221–7. doi:10.2105/AJPH.2007.115923
- 20 Momtaz YA, Haron SA, Ibrahim R, Hamid TA. Social embeddedness as a mechanism for linking social cohesion to well-being among older adults: moderating effect of gender. *Clin Interv Aging* 2014; 201: 863–70. doi:10.2147/CIA.S62205
- 21 Chang PJ, Wray L, Lin Y. Social relationships, leisure activity, and health in older adults. *Health Psychol* 2014; 33: 516–23. doi:10.1037/hea0000051
- 22 Crittenden CN, Pressman SD, Cohen S, Janicki-Deverts D, Smith BW, Seeman TE. Social integration and pulmonary function in the elderly. *Health Psychol* 2014; 33: 535–43. doi:10.1037/hea0000029
- 23 Lubben J, Blozik E, Gillmann G, Iliffe S, von Renteln Kruse W, Beck JC, et al. Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. *Gerontologist* 2006; 46: 503–13. doi:10.1093/geront/46.4.503
- 24 Chan A, Malhotra C, Malhotra R, Ostbye T. Living arrangements, social networks and depressive symptoms among older men and women in Singapore. *Int J Geriatr Psychiatry* 2011; 26: 630–9. doi:10.1002/gps.2574
- 25 Chen S, Conwell Y, Vanorden K, Lu N, Fang Y, Ma Y, et al. Prevalence and natural course of late-life depression in China. *J Affect Disord* 2012; 141: 86–93. doi:10.1016/j.jad.2012.02.027
- 26 Wee LE, Yong YZ, Chng MWX, Chew SH, Cheng L, Chua QHA, et al. Individual and area-level socioeconomic status and their association with depression amongst community-dwelling elderly in Singapore. *Aging Ment Health* 2014; 18: 628–41. doi:10.1080/13607863.2013.866632
- 27 Weng BK. Social network and subjective well-being of the elderly in Hong Kong. *Asia Pac J Soc Work* 1998; 8: 5–15. doi:10.1080/21650993.1998.9755790
- 28 Eshkoor SA, Hamid TA, Nudin SSH, Mun CY. The effects of social support and having a partner on sleep quality in dementia. *Am J Alzheimers Dis Other Demen* 2013; 28: 253–7. doi:10.1177/1533317513481098
- 29 Thanakwang K, Ingersoll-Dayton B, Soonthornhdhada K. The relationships among family, friends, and psychological well-being for Thai elderly. *Aging Ment Health* 2012; 16: 993–1003. doi:10.1080/13607863.2012.692762
- 30 Newsom JT, Schulz R. Social support as a mediator in the relation between functional status and quality of life in older adults. *Psychol Aging* 1996; 11: 34–44. doi:10.1037/0882-7974.11.1.34
- 31 Kobayashi KM, Cloutier-Fisher D, Roth M. Making meaningful connections: a profile of social isolation and health among older adults in small town and small city, British Columbia. *J Aging Health* 2009; 21: 374–97. doi:10.1177/0898264308329022
- 32 Lim JT, Park J, Lee J, Oh J, Kim Y. The relationship between social network of community-living elders and their health-related quality of life in Korean province. *J Prev Med Pub Health* 2013; 46: 28–38. doi:10.3961/jpmph.2013.46.1.28
- 33 Romero-Ortuno R, Casey A, Cunningham C, Squires S, Prendergast D, Kenny R, et al. Psychosocial and functional correlates of nutrition among community-dwelling older adults in Ireland. *J Nutr Health Aging* 2011; 15: 527–31. doi:10.1007/s12603-010-0278-4
- 34 Byers A, Vittinghoff E, Lui L, Hoang T, Blazer D, Covinsky K, et al. Twenty-year depressive trajectories among older women. *Arch Gen Psychiatry* 2012; 69: 1073–9. doi:10.1001/archgenpsychiatry.2012.43
- 35 Faulkner KA, Cauley JA, Zmuda JM, Griffin JM, Nevitt MC. Is social integration associated with the risk of falling in older community-dwelling women? *J Gerontol A Biol Sci Med Sci* 2003; 58: 954–9. doi:10.1093/gerona/58.10.M954
- 36 Holtzman RE, Rebok GW, Saczynski JS, Kouzis AC, Doyle KW, Eaton WW. Social network characteristics and cognition in middle-aged and older adults. *J Gerontol B Psychol Sci Soc Sci* 2004; 59: 278–84. doi:10.1093/geronb/59.6.P278

- 37 Saczynski JS, Pfeifer LA, Masaki K, Korff ESC, Laurin D, White L, *et al.* The effect of social engagement on incident dementia: the Honolulu-Asia Aging Study. *Am J Epidemiol* 2006; 163: 433–40. doi:10.1093/aje/kwj061
- 38 Beland F, Zunzunegui M, Alvarado BE, Otero A, Del Ser T. Trajectories of cognitive decline and social relations. *J Gerontol B Psychol Sci Soc Sci* 2005; 60: 320–30. doi:10.1093/geronb/60.6.P320
- 39 Giles LC, Anstey KJ, Walker RB, Luszcz MA. Social networks and memory over 15 years of followup in a cohort of older Australians: results from the Australian Longitudinal Study of Ageing. *J Aging Res* 2012; 2012: 1–7. doi:10.1155/2012/856048
- 40 Jang Y, Park NS, Dominguez DD, Molinari V. Social engagement in older residents of assisted living facilities. *Aging Ment Health* 2014; 18: 642–7. doi:10.1080/13607863.2013.866634
- 41 Lou VW, Chi I, Kwan CW, Leung AY. Trajectories of social engagement and depressive symptoms among long-term care facility residents in Hong Kong. *Age Ageing* 2013; 42: 215–22. doi:10.1093/ageing/afs159
- 42 Park NS. The relationship of social engagement to psychological well-being of older adults in assisted living facilities. *J Appl Gerontol* 2009; 28: 461–81. doi:10.1177/0733464808328606
- 43 Bassuk SS, Glass TA, Berkman LF. Social disengagement and incident cognitive decline in community-dwelling elderly persons. *Ann Intern Med* 1999; 131: 165–73. doi:10.7326/0003-4819-131-3-199908030-00002
- 44 Aida J, Hanibuchi T, Nakade M, Hirai H, Osaka K, Kondo K. The different effects of vertical social capital and horizontal social capital on dental status: a multilevel analysis. *Soc Sci Med* 2009; 69: 512–18. doi:10.1016/j.socscimed.2009.06.003
- 45 Takeuchi K, Aida J, Kondo K, Osaka K. Social participation and dental health status among older Japanese adults: a population-based cross-sectional study. *PLoS One* 2013; 8: e61741. doi:10.1371/journal.pone.0061741
- 46 Park M, Kim J, Park B. The effects of health on the life satisfaction of poor and nonpoor older women in Korea. *Health Care Women Int* 2014; 35: 1287–302. doi:10.1080/07399332.2014.888064
- 47 Thraen-Borowski KM, Trentham-Dietz A, Edwards DF, Koltyn KF, Colbert LH. Dose-response relationships between physical activity, social participation, and health-related quality of life in colorectal cancer survivors. *J Cancer Surviv* 2013; 7: 369–78. doi:10.1007/s11764-013-0277-7
- 48 Wang H, Karp A, Winblad B, Fratiglioni L. Late-life engagement in social and leisure activities is associated with a decreased risk of dementia: a longitudinal study from the Kungsholmen Project. *Am J Epidemiol* 2002; 155: 1081–7. doi:10.1093/aje/155.12.1081
- 49 Park NS, Knapp MA, Shin HJ, Kinslow K. Mixed methods study of social engagement in assisted living communities: challenges and implications for serving older men. *J Gerontol Soc Work* 2009; 52: 767–83. doi:10.1080/01634370903285541
- 50 Adams KB, Roberts AR. Reported coping strategies and depressive symptoms among African American and White residents of congregate housing. *J Gerontol Soc Work* 2010; 53: 473–94. doi:10.1080/01634372.2010.486431
- 51 Cummings SM. Predictors of psychological well-being among assisted-living residents. *Health Soc Work* 2002; 27: 293–302. doi:10.1093/hsw/27.4.293
- 52 Horowitz BP, Vanner E. Relationships among active engagement in life activities and quality of life for assisted-living residents. *J Hous Elder* 2010; 24: 130–50. doi:10.1080/02763891003757056
- 53 Rossen EK, Knaf KA. Women's well-being after relocation to independent living communities. *West J Nurs Res* 2007; 29: 183–99. doi:10.1177/0193945906292539
- 54 Street D, Burge S, Quadagno J, Barrett A. The salience of social relationships for resident well-being in assisted living. *J Gerontol B Psychol Sci Soc Sci* 2007; 62: S129–34. doi:10.1093/geronb/62.2.S129
- 55 Tighe SK, Leoutsakos JS, Carlson MC, Onyike CU, Samus Q, Baker A, *et al.* The association between activity participation and time to discharge in the assisted living setting. *Int J Geriatr Psychiatry* 2008; 23: 586–91. doi:10.1002/gps.1940
- 56 Tsai C, Ouyang W, Chen L, Lan C, Hwang S, Yang C, *et al.* Depression is the strongest independent risk factor for poor social engagement among Chinese elderly veteran assisted-living residents. *J Chin Med Assoc* 2009; 72: 478–83. doi:10.1016/S1726-4901(09)70411-3
- 57 Gottlieb BH, Gillespie AA. Volunteerism, health, and civic engagement among older adults. *Can J Aging* 2008; 27: 399–406. doi:10.3138/cja.27.4.399
- 58 Toppe C. Measuring volunteering: a behavioral approach. Washington, DC: The Centre for Information & Research on Civic Learning & Engagement; 2005.
- 59 von Bonsdorff MB, Rantanen T. Benefits of formal voluntary work among older people: a review. *Aging Clin Exp Res* 2011; 23: 162–9. doi:10.1007/BF03337746
- 60 Onyx J, Warburton J. Volunteering and health among older people: a review. *Australas J Ageing* 2003; 22: 65–9. doi:10.1111/j.1741-6612.2003.tb00468.x
- 61 Momtaz YA, Ibrahim R, Hamid TA. The impact of giving support to others on older adults' perceived health status. *Psychogeriatrics* 2014; 14: 31–7. doi:10.1111/psyg.12036
- 62 Van Willigen M. Differential benefits of volunteering across the life course. *J Gerontol B Psychol Sci Soc Sci* 2000; 55: S308–18. doi:10.1093/geronb/55.5.S308
- 63 Jenkinson CE, Dickens AP, Jones K, Thompson-Coon J, Taylor RS, Rogers M, *et al.* Is volunteering a public health intervention? A systematic review and meta-analysis of the health and survival of volunteers. *BMC Public Health* 2013; 13: 773. doi:10.1186/1471-2458-13-773
- 64 Musick M, Herzog A, House J. Volunteering and mortality among older adults: findings from a national sample. *J Gerontol B Psychol Sci Soc Sci* 1999; 54: S173–80. doi:10.1093/geronb/54B.3.S173
- 65 Wheeler JA, Gorey KM, Greenblatt B. The beneficial effects of volunteering for older volunteers and the people they serve: a meta-analysis. *Int J Aging Hum Dev* 1998; 47: 69–79. doi:10.2190/VUMP-XCMF-FYU-V0JH
- 66 Carlson MC, Erickson KI, Kramer AF, Voss MW, Bolea N, Mielke M, *et al.* Evidence for neurocognitive plasticity in at-risk older adults: the experience corps program. *J Gerontol A Biol Sci Med Sci* 2009; 64: 1275–82. doi:10.1093/gerona/glp117
- 67 Carlson MC, Helms MJ, Steffens DC, Burke JR, Potter GG, Plassman BL. Midlife activity predicts risk of dementia in older male twin pairs. *Alzheimers Dement* 2008; 4: 324–31. doi:10.1016/j.jalz.2008.07.002
- 68 Warburton J, Peel NM. Volunteering as a productive ageing activity: the association with fall-related hip fracture in later life. *Eur J Ageing* 2008; 5: 129–36. doi:10.1007/s10433-008-0081-9
- 69 Burr JA, Tavares J, Mutchler JE. Volunteering and hypertension risk in later life. *J Aging Health* 2011; 23: 24–51. doi:10.1177/0898264310388272
- 70 Tavares J, Burr JA, Mutchler JE. Race differences in the relationship between formal volunteering and hypertension. *J Gerontol B Psychol Sci Soc Sci* 2013; 68: 310–19. doi:10.1093/geronb/gbs162
- 71 Putnam RD. Bowling alone: the collapse and revival of American community. New York: Simon & Schuster; 2000.
- 72 Berry HL, Welsh JA. Social capital and health in Australia: an overview from the household, income and labour dynamics in Australia survey. *Soc Sci Med* 2010; 70: 588–96. doi:10.1016/j.socscimed.2009.10.012
- 73 Berry HL, Rodgers B, Dear KBG. Preliminary development and validation of an Australian community participation questionnaire: types of participation and associations with distress in a coastal community. *Soc Sci Med* 1982; 2007: 1719–37.

- 74 Berry HL. Social capital and mental health among Aboriginal Australians, New Australians and Other Australians living in a coast region. *Adv Ment Health* 2009; 8: 1–13. doi:10.5172/jamh.8.2.142
- 75 Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: a meta-analytic review. *Perspect Psychol Sci* 2015; 10: 227–37. doi:10.1177/1745691614568352
- 76 Berry HL, Welsh JA. Social capital and health in Australia: an overview from the household, income and labour dynamics in Australia survey. *Soc Sci Med* 2010; 70: 588–96. doi:10.1016/j.socscimed.2009.10.012
- 77 Pilkington PD, Windsor TD, Crisp DA. Volunteering and subjective well-being in midlife and older adults: the role of supportive social networks. *J Gerontol B Psychol Sci Soc Sci* 2012; 67: 249–60. doi:10.1093/geronb/gbr154
- 78 Parkinson L, Warburton J, Sibbritt D, Byles J. Volunteering and older women: psychosocial and health predictors of participation. *Aging Ment Health* 2010; 14: 917–27. doi:10.1080/13607861003801045
- 79 Bowling A, Barber J, Morris R, Ebrahim S. Do perceptions of neighbourhood environment influence health? Baseline findings from a British survey of aging. *J Epidemiol Community Health* 2006; 60: 476–83. doi:10.1136/jech.2005.039032
- 80 Olesen SC, Berry HL. Community participation and mental health during retirement in community sample of Australians. *Aging Ment Health* 2011; 15: 186–97. doi:10.1080/13607863.2010.501053
- 81 Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: a meta-analytic review. *Perspect Psychol Sci* 2015; 10: 227–37. doi:10.1177/1745691614568352
- 82 Nay R, Bauer M, Fetherstonhaugh D, Moyle W, Tarzia L, McAuliffe L. Social participation and family carers of people living with dementia in Australia. *Health Soc Care Community* 2015; 23: 550–8. doi:10.1111/hsc.12163
- 83 Arcury TA, Stafford JM, Bell RA, Golden SL, Snively BM, Quandt SA. The association of health and functional status with private and public religious practice among rural, ethnically diverse, older adults with diabetes. *J Rural Health* 2007; 23: 246–53. doi:10.1111/j.1748-0361.2007.00097.x
- 84 Bélanger E, Ahmed T, Vafaei A, Curcio CL, Phillips SP, Zunzunegui MV. Sources of social support associated with health and quality of life: a cross-sectional study among Canadian and Latin American older adults. *BMJ Open* 2016; 6: e011503.
- 85 Drukker M, Kaplan C, Feron F, van Os J. Children's health-related quality of life, neighbourhood socio-economic deprivation and social capital. A contextual analysis. *Soc Sci Med* 2003; 57: 825–41. doi:10.1016/S0277-9536(02)00453-7
- 86 Grewal I, Lewis J, Flynn T, Brown J, Bond J, Coast J. Developing attributes for a generic quality of life measure for older people: preferences or capabilities? *Soc Sci Med* 2006; 62: 1891–901. doi:10.1016/j.socscimed.2005.08.023