

**UC Davis**

**Norma J. Lang Prize for Undergraduate Information Research**

**Title**

Does Social Integration Influence the Association Between Functional Limitations and Depressive Symptoms in Older Adults?

**Permalink**

<https://escholarship.org/uc/item/2mz4x4q4>

**Author**

Do, Joyce

**Publication Date**

2022-06-06

**Does Social Integration Influence the Association Between Functional Limitations and  
Depressive Symptoms in Older Adults?**

Joyce Do

Department of Human Development, University of California, Davis

## SOCIAL INTEGRATION IN LATE LIFE

**Abstract**

Functional limitations are increasingly common as people age. The Disablement Process Model posits that these limitations can impact an older adult's ability to live independently and lead to diminished mental health. Prior research has linked functional limitations to depressive symptoms in older adults, but we still know little about social factors that may influence this link. The current study aimed to address this gap in the literature by focusing on social integration, which refers to the diversity of social relationships and may buffer older adult from adverse consequences of physical declines in later life. This study utilized data from the Daily Experiences and Well-being Study (DEWS), which surveyed adults over 65 years old in the greater Austin area. The participants ( $N = 333$ ) self-reported functional limitations, depressive symptoms, and social integration. We considered overall social integration, and also the diversity of older adults' close as well as peripheral social networks. Findings showed that older adults who reported having more functional limitations reported having more depressive symptoms. Overall social integration did not moderate the association between functional limitations and depressive symptoms. However, having a more diverse peripheral network significantly attenuate the association between self-reported functional limitations and depressive symptoms. Findings advance our understanding of how social resources like having a diverse network can help protect older adults' mental health when they experience age-related physical declines and have the potential to inform and refine health-promotion interventions.

*Keywords:* social integration, functional limitations, depressive symptoms, late life

## SOCIAL INTEGRATION IN LATE LIFE

### **Does Social Integration Influence the Association Between Functional Limitations and Depressive Symptoms in Older Adults?**

Aging is often associated with physical and cognitive declines that can lead to impediments in daily functions—disabilities (Freedman, 2019). The Disablement Process Model explains the manifestation of a disability from a health condition (e.g., a chronic disease) through different phases and highlights functional limitations as a fundamental component in this process (Fauth et al., 2008; Masala & Petretto, 2008; Verbrugge & Jette, 1994). A functional limitation can be described as a loss or an inability to perform daily tasks that restricts older adults from being able to carry out their daily functions independently and reduces their sense of autonomy (Fingerman et. al, 2020; Freedman, 2019; Yang, 2006). Over the past 25 years, the number of adults 65 years of age or older living with a functional limitation has considerably increased (Freedman, 2019; GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016). Such age-related emergence of functional limitations is often thought to compound older adults' feelings of stress and increase their depressive symptoms (Fauth et al., 2014; Toyama & Fuller, 2019; Yang, 2006). Yet, scholars have also long attempted to identify salutary factors that may protect older adults' well-being. Social experiences may be uniquely important to examine given the crucial roles they play in later life. Indeed, socioemotional selectivity theory posits that as people age, they tend to prioritize social activities and select emotionally satisfying relationships due to a perception of the limited amount of time they have left (Charles & Carstensen, 2010).

The current study sought to understand social factors that may attenuate the association between functional limitations and depressive symptoms in older adults. We were particularly interested in social integration—diversity in older adults' social networks. Social integration captures the range of social relationships that an individual engages with (e.g., close family,

## SOCIAL INTEGRATION IN LATE LIFE

friends, extended family, neighbors) and participates in across multiple social contexts (e.g., neighborhood, community; Holt-Lunstad & Lefler, 2019; Toyama & Fuller, 2019). The literature of social gerontology has primarily documented the benefits of close social ties (Charles & Carstensen, 2010; Huo et al., 2020), but social integration also considers the influence of peripheral ties (ties that are not close yet still exist in older adults' lives, including neighbors, extended relatives, and acquaintances). Previous research has found that social integration benefits older adults' health and well-being (Fingerman et al., 2020; Toyama & Fuller, 2019; Yang, 2006). It remains less clear, however, whether social integration protects older adults' mental health against their functional limitations. This study explicitly examined this issue and tested two hypotheses: (a) older adults' functional limitations would be positively associated with depressive symptoms, and (b) social integration would moderate this association.

### **Functional Limitations and Depressive Symptoms**

A functional limitation is defined as a physical impairment that affects an individual's ability to perform activities such as walking, climbing up a staircase, and getting out of bed (Boult et al., 1994; Lawrence & Jette, 1996). Functional limitations present itself as a chronic stressor that diminishes one's feeling of autonomy and ability to interact with their physical and social environment (Verbrugge & Jette, 1994; Yang, 2006). The decrease in an older adult's ability to carry out mobility activities and a loss of participation among their social network is often cited as a risk factor for depression (Glass et al, 2006; Hajek, 2017; Yang, 2006).

Depression is typically less prevalent in older adults compared to younger adults, which may be attributed to age-related strengths in emotion regulations (Charles & Carstensen, 2010). Aging, however, also exposes older adults to vulnerabilities (e.g., reduced physiological flexibility) that, according to Charles' (2010) Strength and Vulnerability Integration Model,

## SOCIAL INTEGRATION IN LATE LIFE

generates high emotional arousal and elicits a longer recovery time. A functional limitation is a form of a chronic stressor and one of the primary reasons why emotional distress may be sustained in later life, leading to greater emotional suffering in certain older adults. Bruce (2001) argues that emotional reactions such as worthlessness and hopelessness may ultimately result in depression.

Indeed, prior studies have noted an increase in negative affect, mainly depressive symptoms, in adults who have functional limitations (Hajek et al., 2017; Yang, 2006). In a longitudinal study with older adults aged 65 and older ( $N = 4,162$ ), Yang (2006) found that functional limitations are associated with an increase in depressive symptoms over time. Furthermore, Bacon et al. (2015) found that older non-caregiver women ( $N = 611$ ,  $M = 81.5$  years) who have a greater number of disabilities (e.g., basic and instrumental activities of daily living) were more likely to display subsequent depressive symptoms. These results underscore that the loss of autonomy and decrease in physical health is a stressful period for older adults which can lead to depression (Gurland et al., 1988; Hajek et al., 2017). Accordingly, we expected to observe a positive association between older adults' functional limitations and depressive symptoms.

### **Social Integration as a Moderator**

This study also asked whether social integration may attenuate the association between functional limitations and depressive symptoms. Psychological and social resources have been documented in past studies to moderate the impact of stress on depression (Santini et al, 2015; Yang, 2006). Social integration uniquely refers to the structural aspect of an individual's relationships with a focus on network diversity (Holt-Lunstad & Lefler, 2019; Thoits, 2011), considering both close and peripheral ties. Close ties refer to those involving individuals that are

## SOCIAL INTEGRATION IN LATE LIFE

important or influential in one's life and emotionally attached to such as family members, relatives, or friends. Peripheral ties refer to those involving individuals that one interacts with, but they are less intimate, and less knowledge is known about each other (Thoits, 2011). Social support, a well-documented stress buffer, can occur in both close ties and peripheral ties, but these ties may each serve unique functions.

Most studies have focused on the benefits of close ties following socioemotional selectivity theory, which posits that older adults tend to strategically select a smaller social network that is emotionally satisfying. These relationships are essential to the well-being of an older adult as they are the primary source of emotional connection and social support (Huo et al., 2020; Yang, 2006). These protective benefits are emphasized in the stress-buffering model which highlights the mechanism in which social support from close or peripheral ties can reduce the effect of chronic stress on well-being by regulating physiological and behavioral reactions (Cohen & Wills, 1985; Thoits, 2011; Toyama & Fuller, 2019). Yet, peripheral ties may also bring some emotional rewards, as suggested by a small but growing body of research (Fingerman et al., 2019). Peripheral ties have uniquely distinct functions from close ties such as enhancing physical well-being by promoting physical activity, providing resources, and information (Fingerman, 2009).

Despite the negative outcomes associated with living with functional limitations, having a diverse social network may act to mitigate adverse health outcomes associated with aging. Prior research from Ellwardt et al. (2015) suggested that individuals with a large and diverse social network are exposed to novel challenges and situations that enrich their cognitive functioning in late life. A diverse social network introduces an enriched environment with more avenues to explore activities and be intellectually stimulated. Individuals who are socially engaged are able

## SOCIAL INTEGRATION IN LATE LIFE

to rely on their social network to buffer against highly stressful situations and subsequent stress reactions (depression). A diverse social network allows individuals opportunities to interact with social, cognitive, and physical activities that may counteract the negative feelings associated with a loss of autonomy when an individual has a functional limitation. These positive emotions that an older adult's social network elicits may mitigate adverse health outcomes.

In sum, we expected social integration to reduce the association between functional limitations and depressive symptoms in late life. We also explicitly tested close ties and peripheral ties separately to identify the distinct functions of them.

### **Other Factors Associated With Functional Limitations and Depressive Symptoms**

Drawing on past studies, this study adjusted for additional factors related to functional limitations, depressive symptoms, and social integration. These factors include age, gender, education, self-rated physical health, marital status, and minority status. Freedman et al. (2019) observed that economic resources buffered against the adverse effects of physical impairment for those who identify as middle class. Okoro and colleagues (2018) noted lower education, identifying as female, and regions within the southern United States showed a higher prevalence for developing a disability from functional limitations. Henning-Smith et al. (2018) observed how living arrangements in one's late-life can either exacerbate or reduce the degree to which an older adult can carry out activities of daily living. Recent studies suggest that age and marital status could affect how much time is spent with social ties (Fingerman et al., 2020; Bennett, 2015; Hoppman et al., 2011). Schieman & Plickert (2007) recognized racial differences in older adults with functional limitations and self-reported feelings of depression. Specifically, when controlling for the severity of functional limitations, older Black Americans tend to report fewer depressive symptoms when compared to similar aged white peers.



## SOCIAL INTEGRATION IN LATE LIFE

In summary, this study aims to replicate the impact functional limitations have on depressive symptoms. Furthermore, we are interested in understanding the moderating effect social integration has on the association between functional limitations and depressive symptoms.

### **Methods**

#### **Sample and procedures**

Data were collected in 2016-2017 from the Daily Experience and Well-being Study (DEWS) in the greater Austin Metropolitan area in Texas. The procedures for the study were approved by the University of Texas at Austin Institutional Review Board. The sample included 333 adults aged 65 and older. The screening criteria required study participants to be retired (not working full time for pay), and community-dwelling. Adults receiving family care for activities of daily living (i.e., disabilities) were precluded, which allowed us to explore functional limitations in late adulthood. Oversampling in high-density minority areas resulted in a sample in which 33% of the participants identified with an ethnic or racial minority background (e.g., African American, Hispanic, or Latinx). Participants were recruited from a wide range of socioeconomic statuses; although the sample reflects a slightly higher educated older adult population (55% of participants received at least a bachelor's degree) than the general population in the greater Austin Metropolitan Area (46%; U.S. Census Bureau, 2020). Participants were interviewed for 2 hours in person and reported their social ties, depressive symptoms, and functional limitations in addition to background information. Participants received \$50 in compensation.

#### **Measures**

##### ***Self-Reported Functional Limitations***

## SOCIAL INTEGRATION IN LATE LIFE

Participants completed the physical functioning subscale of the 36-item disability scale used in the Medical Outcome Study (MOS-36; Hays et al., 1993; Ware & Sherbourne, 1992). Participants were asked to evaluate within the past four weeks how often their pain or physical health interfered with their normal activities on a scale of 1 (*not at all*), 2 (*a little bit*), 3 (*somewhat*), 4 (*quite a bit*), to 5 (*extremely*). For those participants who indicated experiencing limitations at least a little bit, they were further asked the degree of their limitations across 10 items (e.g., kneeling, climbing stairs, bathing/dressing oneself, carrying groceries). Responses were coded on a 3-point system, (1) *not limited at all*, (2) *limited a little*, and (3) *limited a lot*. Following the MOS scoring system, we recoded the variable such that 0 = *not limited at all*, 50 = *limits a little*, and 100 (*limits a lot*). We calculated a mean score per participant averaging across 10 items ( $\alpha = .78$ ); higher scores indicate greater functional limitations.

### ***Depressive Symptoms***

Participants completed a condensed 11 item depression survey extracted from the original 20-item depression scale from the Center for Epidemiological Studies Depression (CES-D; Radloff, 1977). Participants were asked to reflect on their mood during the past week and rate it on a scale of 0 (*rarely or none of the time*) to 3 (*most of the time*). The scores from all 11 items were totaled up for a possible range of 0 to 33.

### ***Cohen Social Network Index***

Participants reported their participation in their social relationships using a modified version of Cohen et al. (1997)'s social network index. Given a focus on older adults, questions asking about grandchildren and siblings were added to the original measure. Original measures did not capture all the social relationships older adults might have. For example, we added how many grandchildren do the participants have and how many living siblings they still have.

## SOCIAL INTEGRATION IN LATE LIFE

Participants disclosed if they had been in contact with each of 13 types of social partners in the past 2 weeks (e.g., spouse, children, extended relative, friend, neighbor, coworker, church/temple member, co-volunteer). We generated a sum across 13 types of social partners to indicate the overall diversity of participants' social networks. We also calculated two scores each representing the diversity of participants' close social networks (e.g., spouse, children, relative, friend) and peripheral networks (e.g., neighbor, coworker, church/temple member, co-volunteer).

### ***Control Variables***

Participants provided demographic information during the two-hour interview. Age, gender, education, self-rated physical health, marital status, and minority status were recorded as control variables. Participants' age was documented in years. Gender was binary coded as males being 1 and females being 0. Education was recorded on a scale of 1 (*no formal education*) to 8 (*advance degrees*). Participants self-reported their physical health on a scale of 1 (*poor*) to 5 (*excellent*; Ider & Kasl, 1995). We coded marital status as 0 (*not married*) and 1 (*married/remarried/cohabitating*). Participants indicated if they were Hispanic or Latino and their racial group (e.g., African American/Black, White/Caucasian, Asian, and Native American), based on which we generated a variable to indicate racial/ethnic minority status (1 = *minority*, 0 = *non-Hispanic White*).

### **Analytic Strategy**

This study explored the association between functional limitations and depressive symptoms in late life and how social integration could moderate this effect. We estimated multiple regressions and adjusted for age, gender, education, self-rated physical health, marital status, and minority status. The predictor was functional limitations, and the outcome was depressive symptoms. We estimated one regression testing the main effect of functional

## SOCIAL INTEGRATION IN LATE LIFE

limitations, and then a set of regressions testing the moderating effect of social integration. In this set of moderation tests, we first added an interaction term of functional limitations  $\times$  overall social integration in one model. We then estimated another model including two interaction terms: functional limitations  $\times$  close network diversity, and functional limitations  $\times$  peripheral network diversity. All continuous variables were centered on the sample mean. Simple slopes analyses were conducted for significant moderation effects.

### Results

#### Descriptive Information

Table 1 presents descriptive statistics of the participants in the sample. The mean age of the sample was approximately 74 years of age ( $SD = 6.57$ ) with a total age range of 65 to 92 years. The average educational attainment was college education. The sample was diverse in that 55% of the participants were females and 33% self-identified with a racial or ethnic minority group. Fifty-nine percent of the sample were either married or cohabitating. It is worth noting that 20% of the participants reported no functional limitations at all. On average, participants reported  $r$  were Out of our total sample of 333 participants, the participants who self-reported having functional limitations also reported more depressive symptoms.

#### Depressive Symptoms

As hypothesized, older adults who self-reported more functional limitations reported having more depressive symptoms ( $B = 0.04, p < 0.001$ ; Table 2). We also observed some associations between the covariates and depressive symptoms, such that older adults with higher education ( $B = -0.44, p = .01$ ) and better self-report physical health ( $B = -0.72, p = 0.02$ ) reported fewer depressive symptoms.

#### Social Integration

## SOCIAL INTEGRATION IN LATE LIFE

We then examined whether this association between functional limitations and depressive symptoms was moderated through social integration (see Table 3). As explained earlier, we considered overall social integration and also integration in older adults' close and peripheral social networks. We did not observe a significant moderating effect of overall social integration ( $B = 0.00, p = 0.42$ ) or social integration in close networks ( $B = 0.01, p = 0.154$ ). Yet, having a diverse peripheral network seemed to attenuate the association between self-rated functional limitations and depressive symptoms ( $B = -0.02, p = 0.01$ ). Figure 1 presents findings from the simple slopes analysis that we estimated to further understand this moderating effect. Older adults with a less diverse peripheral social network tend to show a stronger association between functional limitations and depressive symptoms ( $B = 0.06, p < .001$ ), whereas the association was non-significant among those with a more diverse peripheral social network ( $B = 0.02, p = .19$ ).

### Discussion

Older adults are more likely to develop and experience functional limitations as they age (Walter et al., 2021). The current study confirmed the positive association between functional limitations and depressive symptoms in late life and extended prior research by highlighting the moderating role of social resources in this association. We considered the role of overall social integration—diversity of older adults' overall social networks—and teased apart the diversity of close versus peripheral social networks. We found that having a highly diverse peripheral social network reduces the association between functional limitations and depressive symptoms. This study has the potential to inform health promotion interventions by highlighting social resources that can modify the impact of age-related physical declines on mental health.

### Functional Limitations and Depressive Symptoms

## SOCIAL INTEGRATION IN LATE LIFE

Researchers posit that with the development of more physical declines in late life, older adults may experience more depressive symptoms (Gurland et al., 1988; Hajek et al., 2017; Monserud et al., 2014; Yang, 2006). Findings from this study are consistent with what past researchers have suggested in which functional limitations could compromise an older adult's mental health (Thoits, 2011). While older adults generally have better emotion regulation skills, exposure to a persistent and chronic stressor such as functional limitations can cause the age-related positive differences to diminish and increase emotional distress in late life (Charles, 2010). Indeed, the Strength and Vulnerability Integration (SAVI) argues that age-related vulnerabilities can result in a reduction of physiological flexibility, which, in turn, creates high emotional arousal and extends the recovery period (Charles, 2010). Older adults with functional limitations are restricted in their ability to engage in social and physical activities. This shapes the types of activities they engage in which often are considered isolating and have been documented to lead to loneliness and reduce mental health (Fingerman et al., 2019). The findings provide us with insight into how functional limitations are a vital factor tied to aging and may allow us to address the looming risk of depression associated with age-related physical declines in late life. Future research is needed to better understand the underlying mechanisms that influence functional limitations on mental health in late life.

### **Social Integration**

This study adds to the growing literature surrounding social integration as a potential mechanism underlying the association between functional limitations and depressive symptoms. Prior research has documented the benefits of being socially integrated related to an individual's physical and cognitive health outcomes (Berkman et al, 2000; Fingerman et al., 2019; Zunzunegui et al., 2003). Individuals who are socially integrated participate in a variety of

## SOCIAL INTEGRATION IN LATE LIFE

diverse behaviors such as going to church and joining a social center for older people. Therefore, we hypothesized that social integration would reduce the association between functional limitations and depressive symptoms in late life. Surprisingly, however, we did not find a significant interaction involving overall social integration. We further considered social integration through teasing apart close and peripheral ties, which adds to the literature as many previous researchers have primarily focused on close ties and this study considers the benefits of peripheral ties.

Older adults with functional limitations reported fewer depressive symptoms if they have a greater diversity in their network. Recent studies have supported the functionalist perspective and shown that peripheral social ties serve different and unique functions in one's social network than close social ties (Fingerman, 2009; Ng et al., 2021). Peripheral ties serve to fill an individual's distinct social needs through providing information, resources, structural holes, novelty, and stimulation to individuals (Fingerman, 2009). Peripheral ties are sustained and reflect an individual's desire to seek continuity and routine (Fingerman et al., 2009). Over time, weak ties are gradually incorporated into an individual's in-group which increases positivity bias towards these ties (Brewer, 2007). In terms of providing support, different peripheral social partners often serve distinct and unique instrumental functions that have no overlap with other peripheral ties in one's social network (Fingerman, 2009). Having a more diverse and larger peripheral social network may increase the chance of an individual satisfying their needs in various areas through the help of their peripheral social partners.

It is surprising that the diversity in older adults' close social network did not seem to protect the mental health of older adults with functional limitations since Rook and Carstensen (2017) documented the role close ties have on reducing conflict and enhancing social support. In

## SOCIAL INTEGRATION IN LATE LIFE

a prior study, Fingerman et al. (2021) observed that older adults who lived together with a close tie share daily household responsibilities and are more sedentary compared to older adults living alone. Sedentary behaviors in late life act to exacerbate functional limitations in adults. In addition, close ties that are problematic and unavoidable are likely to generate high levels of distress among older adults and can compromise physical and emotional health (Fingerman et al., 2004; Rook & Carstensen, 2017). Feelings associated with close ties have been documented as ambivalent compared to weak ties as there is no clear-cut duration of the relationship and conflicts associated with autonomy and interdependence (Fingerman et al., 2004).

### **Limitations and Future Directions**

The study has several limitations which merit further attention. One limitation is the cross-sectional correlational design of the study, which cannot infer a causal relationship between functional limitations and depressive symptoms. In addition, we followed prior research and generated categories of relationships that would fall into close and peripheral ties through the use of Cohen's Social Index. Yet, we recognized that individuals may differ in labeling members from their social network as either close or weak ties. To account for individual variability, it would be interesting for future research to collect qualitative data from older adults and ask explicitly what roles their close and peripheral ties play in their lives. Lastly, even though the data captured a diverse sample of older adults, it might have not captured older adults with severe functional limitations. It is important to sample older adults who have severe functional limitations because the degree of their mobility might adversely impact their ability to maintain social ties, especially peripheral ties. Future research should aim to replicate this study with a larger sample of older adults to better generalize the findings.



## SOCIAL INTEGRATION IN LATE LIFE

Humans are embedded in systems where there are reciprocal processes taking place between oneself and their close and peripheral ties (Fingerman, 2009). The current study provided some evidence of the protective role of peripheral social ties for mental well-being in late life. Peripheral ties moderated the adverse effects of functional limitations on depressive symptoms. While the study was only able to provide evidence for peripheral ties, this suggests that the diversity of social ties in late life could potentially reduce the impact of the stressor, functional limitation, offering additional evidence for the stress-buffering model (Cohen & Willis, 1985). This study highlights the importance of diverse social ties in supporting healthy behaviors including hindering the negative effects of stress and age-related declines. Additionally, the findings indicate important future directions within the research to further study the buffering mechanism of social integration. This can promote the development of effective social interventions to improve physical health in late life.

**References**

- Bacon, K. L., Heeren, T., Keysor, J. J., Stuver, S. O., Cauley, J. A., & Fredman, L. (2016). Longitudinal and reciprocal relationships between depression and disability in older women caregivers and noncaregivers. *The Gerontologist, 56*(4), 723–732. <https://doi.org/10.1093/geront/gnu157>
- Bennett, K. M. (2005). Psychological wellbeing in later life: The longitudinal effects of marriage, widowhood and marital status change. *International Journal of Geriatric Psychiatry, 20*(3), 280–284. <http://dx.doi.org/10.1002/gps.1280>
- Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine (1982), 51*(6), 843–857. [https://doi.org/10.1016/s0277-9536\(00\)00065-4](https://doi.org/10.1016/s0277-9536(00)00065-4)
- Boult, C., Kane, R. L., Louis, T. A., Boult, L., & McCaffrey, D. (1994). Chronic conditions that lead to functional limitation in the elderly. *Journal of Gerontology, 49*(1), M28–M36. <https://doi.org/10.1093/geronj/49.1.M28>
- Brewer, M. B. (2007). The importance of being we: Human nature and intergroup relations. *American Psychologist, 62*(8), 728–738. <https://doi.org/10.1037/0003-066X.62.8.728>
- Bruce, M. L. (2001). Depression and disability in late life: Directions for future research. *The American Journal of Geriatric Psychiatry, 9*(2), 102–112. <https://doi.org/10.1097/00019442-200105000-00003>
- Charles, S. T., & Carstensen, L. L. (2010). Social and emotional aging. *Annual Review of Psychology, 61*, 383–409. <https://doi.org/10.1146/annurev.psych.093008.100448>

## SOCIAL INTEGRATION IN LATE LIFE

Charles S. T. (2010). Strength and vulnerability integration: A model of emotional well-being across adulthood. *Psychological Bulletin*, *136*(6), 1068–1091.

<https://doi.org/10.1037/a0021232>

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis.

*Psychological Bulletin*, *98*(2), 310. <https://doi.org/10.1037/0033-2909.98.2.310>

Cohen, S., Doyle, W. J., Skoner, D. P., Rabin, B. S., & Gwaltney, J. M. (1997). Social ties and susceptibility to the common cold. *JAMA*, *277*(24), 1940–1944.

[doi:10.1001/jama.1997.03540480040036](https://doi.org/10.1001/jama.1997.03540480040036)

Ellwardt, L., Van Tilburg, T. G., & Aartsen, M. J. (2015). The mix matters: Complex personal networks relate to higher cognitive functioning in old age. *Social Science &*

*Medicine*, *125*, 107-115. <https://doi.org/10.1016/j.socscimed.2014.05.007>

Fauth, E. B., Zarit, S. H., & Malmberg, B. (2008). Mediating relationships within the

disablement process model: A cross-sectional study of the oldest-old. *European Journal of Ageing*, *5*(3), 161. <https://doi.org/10.1007/s10433-008-0092-6>

Fauth, E. B., Gerstorf, D., Ram, N., & Malmberg, B. (2014). Comparing changes in late-life depressive symptoms across aging, disablement, and mortality processes. *Developmental*

*Psychology*, *50*(5), 1584–1593. <http://dx.doi.org/10.1037/a0035475>

Fingerman, K. L., Hay, E. L., & Birditt, K. S. (2004). The best of ties, the worst of ties: Close, problematic, and ambivalent social relationships. *Journal of Marriage and Family*, *66*(3),

792–808. <https://doi.org/10.1111/j.0022-2445.2004.00053.x>

Fingerman, K. L. (2009). Consequential strangers and peripheral ties: The importance of unimportant relationships. *Journal of Family Theory & Review*, *1*(2), 69-86.

<https://doi.org/10.1111/j.1756-2589.2009.00010.x>

## SOCIAL INTEGRATION IN LATE LIFE

Fingerman, K. L., Buckser, A., & Turiano, N. A. (2009). Encyclopedia of human relationships.

Fingerman, K. L., Huo, M., Charles, S. T., & Umberson, D. J. (2020). Variety is the spice of late life: Social integration and daily activity. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 75(2), 377–388.

<https://doi.org/10.1093/geronb/gbz007>

Fingerman, K. L., Ng, Y. T., Huo, M., Birditt, K. S., Charles, S. T., & Zarit, S. (2021). Functional Limitations, Social Integration, and Daily Activities in Late Life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 76(10), 1937-1947.

<https://doi.org/10.1093/geronb/gbab014>

Freedman, V. A., Cornman, J. C., Carr, D., & Lucas, R. E. (2019). Late life disability and experienced wellbeing: Are economic resources a buffer?. *Disability and Health Journal*, 12(3), 481–488. <https://doi.org/10.1016/j.dhjo.2019.02.003>

GBD 2015 Disease and Injury Incidence and Prevalence Collaborators (2016). Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: A systematic analysis for the Global Burden of Disease Study 2015. *Lancet*, 388(10053), 1545–1602. [https://doi.org/10.1016/S0140-6736\(16\)31678-6](https://doi.org/10.1016/S0140-6736(16)31678-6)

Glass, T. A., De Leon, C. F. M., Bassuk, S. S., & Berkman, L. F. (2006). Social engagement and depressive symptoms in late life: Longitudinal findings. *Journal of Aging and Health*, 18(4), 604–628. <https://doi.org/10.1177/0898264306291017>

Gurland, B. J., Wilder, D. E. and Berkman, C. (1988). Depression and disability in the elderly: reciprocal relations and changes with age. *International Journal of Geriatric Psychiatry*, 3(3), 163–179. <https://doi.org/10.1002/gps.930030304>

## SOCIAL INTEGRATION IN LATE LIFE

Hajek et al. (2015). Longitudinal predictors of institutionalization in old age. *PLoS One*, *10*(12), e0144203. <https://doi.org/10.1371/journal.pone.0144203>

Hays, R. D., Sherbourne, C. D., & Mazel, R. M. (1993). The rand 36-item health survey 1.0. *Health Economics*, *2*(3), 217–227. <https://doi.org/10.1002/hec.4730020305>

Henning-Smith, C., Shippee, T., & Capistrant, B. (2018). Later-life disability in environmental context: Why living arrangements matter. *The Gerontologist*, *58*(5), 853–862. <http://dx.doi.org/10.1093/geront/gnx019>

Hoppmann, C. A., Gerstorf, D., & Hibbert, A. (2011). Spousal associations between functional limitation and depressive symptom trajectories: Longitudinal findings from the study of asset and health dynamics among the oldest old (AHEAD). *Health Psychology*, *30*(2), 153–162. <https://doi.org/10.1037/a0022094>

Holt-Lunstad, J., & Lefler, M. (2019). Social integration. In *Danan Gu and Matthew E. Dupre, Encyclopedia of Gerontology and Population Aging, Springer International Publishing*, pp. 1–11.

Huo, M., Fuentecilla, J. L., Birditt, K. S., & Fingerman, K. L. (2020). Empathy and close social ties in late life. *The Journals of Gerontology: Series B, Psychological Sciences and Social Science*, *75*(8), 1648–1657. <https://doi.org/10.1093/geronb/gbz044>

Huo, M., Ng, Y. T., Fuentecilla, J. L., Leger, K., & Charles, S. T. (2021). Positive encounters as a buffer: Pain and sleep disturbances in older adults' everyday lives. *Journal of Aging and Health*, *33*(1-2), 75-85. <https://doi.org/10.1177/0898264320958320>

Idler, E. L., & Kasl, S. V. (1995). Self-ratings of health: Do they also predict change in functional ability?. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *50*(6), S344-S353. <https://doi.org/10.1093/geronb/50B.6.S344>

## SOCIAL INTEGRATION IN LATE LIFE

- Lawrence, R. H., & Jette, A. M. (1996). Disentangling the disablement process. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 51(4), S173–S182.  
<https://doi.org/10.1093/geronb/51B.4.S173>
- Masala, C., & Petretto, D. R. (2008). From disablement to enablement: Conceptual models of disability in the 20th century. *Disability and Rehabilitation: An International, Multidisciplinary Journal*, 30(17), 1233–1244.  
<http://dx.doi.org/10.1080/09638280701602418>
- Monserud, M. A., & Peek, M. K. (2014). Functional limitations and depressive symptoms: A longitudinal analysis of older mexican american couples. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 69(5), 743–762.  
<https://doi.org/10.1093/geronb/gbu039>
- Ng, Y. T., Huo, M., Gleason, M. E., Neff, L. A., Charles, S. T., & Fingerman, K. L. (2021). Friendships in old age: Daily encounters and emotional well-being. *The Journals of Gerontology: Series B*, 76(3), 551-562. <https://doi.org/10.1093/geronb/gbaa007>
- Okoro, C. A., Hollis, N. D., Cyrus, A. C. & Griffin-Blake, S. (2018). Prevalence of disabilities and health care access by disability type among adults- United States, 2016. *Morbidity and Mortality Weekly Report*, 67(32), 882–887. doi:10.15585/mmwr.mm6732a3
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385–401.  
doi:10.1177/014662167700100306
- Rook, K. S., & Charles, S. T. (2017). Close social ties and health in later life: Strengths and vulnerabilities. *The American Psychologist*, 72(6), 567–577.  
<https://doi.org/10.1037/amp0000104>

## SOCIAL INTEGRATION IN LATE LIFE

- Santini, Z. I., Koyanagi, A., Tyrovolas, S., Mason, C., & Haro, J. M. (2015). The association between social relationships and depression: A systematic review. *Journal of Affective Disorders, 175*, 53–65. <https://doi.org/10.1016/j.jad.2014.12.049>
- Schieman, S. & Plickert, G. (2007). Functional limitations and changes in levels of depression among older adults: A multiple-hierarchy stratification perspective. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 62*(1), S36–S42. <https://doi.org/10.1093/geronb/62.1.S36>
- Thoits P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal of Health and Social Behavior, 52*(2), 145–161. <https://doi.org/10.1177/0022146510395592>
- Toyama, M., & Fuller, H. R. (2019). Longitudinal stress-buffering effects of social integration for late-life functional health. *The International Journal of Aging and Human Development, 91*(4), 501–519. <https://doi.org/10.1177/0091415019871196>
- U.S. Census Bureau (2020). *Austin city: Texas*. Retrieved from <https://data.census.gov/cedsci/profile?g=1600000US4805000>
- Verbrugge, L. M., & Jette, A. M. (1994). The disablement process. *Social Science & Medicine, 38*(1), 1–14. doi:10.1016/0277-9536(94)90294-1
- Walter, C. S., Narcisse, M. R., Vincenzo, J. L., Felix, H. C., & McElfish, P. A. (2021). Associations between physical activity and functional limitations in Native Hawaiian and Pacific Islander middle-aged and older adults in the United States. *Ethnicity & Health, 1–14*. Advance online publication. <https://doi.org/10.1080/13557858.2021.1921120>

## SOCIAL INTEGRATION IN LATE LIFE

Ware, J. E. Jr, & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36).

I. conceptual framework and item selection. *Medical Care*, 30(6), 473–483.

doi:10.1097/00005650-199206000-00002

Yang, Y. (2006). How does functional disability affect depressive symptoms in late life? The role of perceived social support and psychological resources. *Journal of Health and Social Behavior*, 47(4), 355–372. <https://doi.org/10.1177/002214650604700404>

Zunzunegui, M. V., Alvarado, B. E., Del Ser, T., & Otero, A. (2003). Social networks, social integration, and social engagement determine cognitive decline in community-dwelling Spanish older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 58(2), S93-S100. <https://doi.org/10.1093/geronb/58.2.S93>



## SOCIAL INTEGRATION IN LATE LIFE

**Table 1***Participants (N = 333) ' Demographic Characteristics and Social Ties*

Individual Characteristics	Mean	SD	Range
Age	74.15	6.57	65-92
Functional limitations <sup>a</sup>	24.74	28.49	0-100
Depressive symptoms <sup>b</sup>	3.54	1.02	1-5
Cohen social network index <sup>c</sup>	6.09	1.88	1-11
Education <sup>d</sup>	5.88	1.59	1-8
		<i>Proportion</i>	
Female		.55	
Married or cohabitating		.59	
Ethnic or racial minority <sup>e</sup>		.33	
Reporting no functional limitations		.20	

*Note.* Older adults  $N = 333$ .

<sup>a</sup>Functional limitation was assessed by averaging and recoding 10 items, 0 (*no functional limitations*) to 100 (*high functional limitations*). <sup>b</sup>Depressive symptoms were calculated through the sum of 11 items (e.g., restless sleep, sadness in the past week). <sup>c</sup>Number of roles within social network within the past 2 weeks. <sup>d</sup>On a scale from 1 (*no formal education*), 2 (*elementary school*), 3 (*some high school*), 4 (*high school*), 5 (*some college/vocation or trade school*), 6 (*college graduate*), 7 (*post college but no additional degree*), to 8 (*advanced degree*). <sup>e</sup>Hispanic, Latino, or African American.

## SOCIAL INTEGRATION IN LATE LIFE

**Table 2***Main Effect of Functional Limitations on Depressive Symptom*

Parameter	<i>B</i>	<i>SE</i>
Intercept	23.61***	3.18
Functional Limitations <sup>a</sup>	0.04***	0.01
<u>Participant's Covariates</u>		
Age	-0.04	0.04
Gender <sup>c</sup>	0.70	0.51
Education <sup>d</sup>	-0.44**	0.16
Health <sup>e</sup>	-0.72*	0.30
Marital Status <sup>f</sup>	-0.89	0.52
Minority Status <sup>g</sup>	0.75	0.55

*Note.* Older adults  $N = 333$ .

<sup>a</sup>Functional limitation was assessed by averaging and recoding 10 items, 0 represented no functional limitations to 100 represented a high rating of functional limitations. <sup>b</sup>Social ties were added up to capture overall diversity of participants' social networks and further divided into close and peripheral ties. <sup>c</sup>1 (*male*), 0 (*female*). <sup>d</sup>On a scale from 1 (*no formal education*), 2 (*elementary school*), 3 (*some high school*), 4 (*high school*), 5 (*some college/vocation or trade school*), 6 (*college graduate*), 7 (*post college but no additional degree*), to 8 (*advanced degree*). <sup>e</sup>On a scale from (*poor*), 2 (*fair*), 3 (*good*), 4 (*very good*), to 5 (*excellent*). <sup>f</sup>Coded as 1 (*married/remarried*), 0 (*not married*). <sup>g</sup>Coded as 1 (*a racial minority*), 0 (*not a minority*). \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## SOCIAL INTEGRATION IN LATE LIFE

**Table 3***Social Integration as a Moderator in the Association Between Depressive Symptoms and**Functional Limitations*

Parameter	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	16.30***	0.42	16.16***	0.44
Functional Limitations	0.04***	.01	0.04***	0.01
Social Integration	-0.19	0.13	—	—
Functional Limitations x Social Integration	0.00	0.00	—	—
Close Network Diversity	—	—	-0.19	0.20
Peripheral Network Diversity	—	—	-0.20	0.19
Functional Limitations x Close Network Diversity	—	—	0.01	0.01
Functional Limitations x Peripheral Network Diversity	—	—	-0.02*	0.01
<u>Participant's Covariates</u>				
Age	-0.05	0.04	-0.05	0.04
Gender <sup>a</sup>	0.51	0.52	0.49	0.52
Education <sup>b</sup>	-0.39*	0.16	-0.36*	0.17
Health <sup>c</sup>	-0.75*	0.30	-0.77*	0.30
Marital Status <sup>d</sup>	-0.70	0.53	-0.52	0.57
Minority Status <sup>e</sup>	0.88	0.56	0.87	0.57

Note. Older adults  $N = 333$ .

<sup>a</sup> 1 (male), 0 (female). <sup>b</sup> On a scale from 1 (no formal education), 2 (elementary school), 3 (some high school), 4 (high school), 5 (some college/vocation or trade school), 6 (college graduate), 7 (post college but no additional degree), to 8 (advanced degree) <sup>c</sup> On a scale from (poor), 2 (fair), 3 (good), 4 (very good), to 5 (excellent). <sup>d</sup> Coded as 1 (married/remarried), 0 (not married).

<sup>e</sup> Coded as 1 (a racial minority), 0 (not a minority).

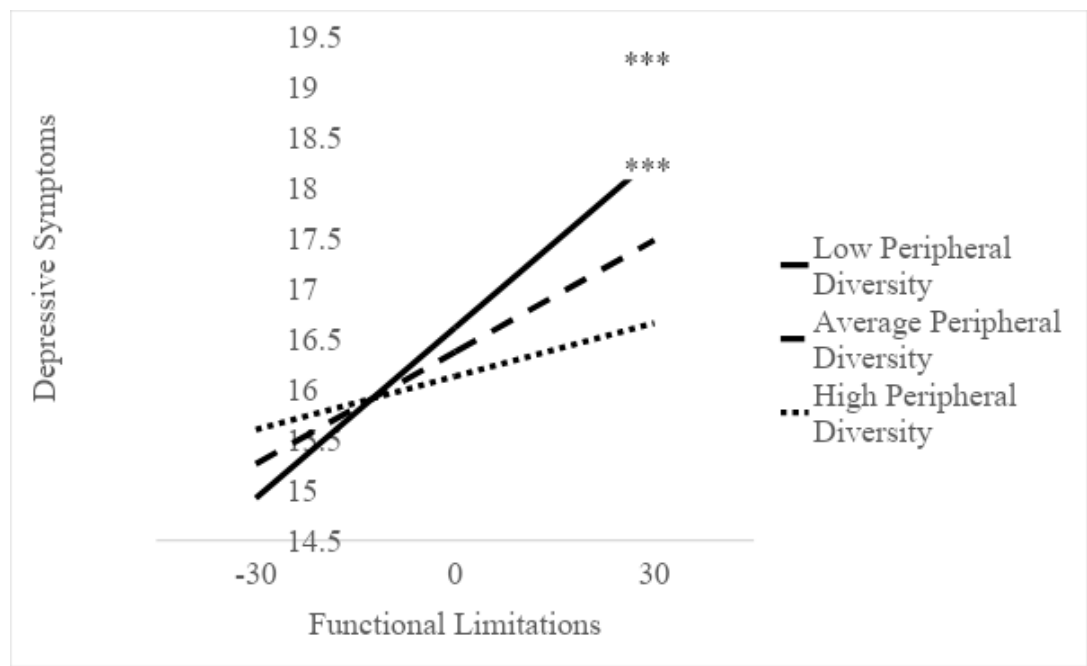
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$



SOCIAL INTEGRATION IN LATE LIFE

**Figure 1**

*Plot of the Interaction of Functional Limitations × Diversity in Peripheral Networks on Depressive Symptoms*



*Notes.* Three slopes indicate the associations between functional limitations and depressive symptoms specifically in peripheral ties. High and low peripheral diversity was 1SD above and below the sample mean respectively.

\*\*\* $p < .001$ .