Title

Social Engagement in Assisted and Independent Living Residences: Role of Perceptions of Aging and Links to Health

Author

Menkin, Josephine Ann

Publication Date

2017

UNIVERSITY OF CALIFORNIA

Los Angeles

Social Engagement in Assisted and Independent Living Residences: Role of Perceptions of Aging and Links to Health

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Psychology

by

Josephine Ann Menkin

2017

ABSTRACT OF THE DISSERTATION

Social Engagement in Assisted and Independent Living Residences: Role of Perceptions of Aging and Links to Health

by

Josephine Ann Menkin
Doctor of Philosophy in Psychology
University of California, Los Angeles, 2017
Professor Theodore Francisco Robles, Chair

Relocating to an assisted living residence can disrupt social networks at a vulnerable time of health decline. Identifying factors associated with social engagement, and how it relates to well-being and physical health, may help promote residents' quality of life. Paper 1 identified how perceptions of aging (e.g., positive vs. negative age stereotypes as describing oneself vs. other residents) related to social engagement in assisted and independent living residences. Paper 2 examined links between residents' social support and health. Eighty-one residents completed structured interviews and were asked to wear actigraphs (i.e., sleep monitors) and complete daily diaries, measuring sleep and pain, for four days. Pilot follow-up interview data facilitated examination of prospective associations between social engagement and later health.

In Paper 1, both self-directed and resident-directed age stereotype endorsement were independently related to measures of perceived support availability and social motivation, but not social integration. The positive and negative stereotype components were also associated with different social outcomes. Residents who thought they more closely matched negative stereotypes reported greater social isolation, less available companionship and emotional support, and greater likelihood of avoiding closeness with residents; stronger endorsement of positive self-directed stereotypes was related to greater perceived availability of companionship and emotional support. Moreover, only stronger positive, not negative, resident-directed stereotype endorsement was related to less perceived social isolation, greater desire to make new friends, and lower likelihood of avoiding closeness with residents.

In Paper 2, greater perceived support availability was robustly related to more positive emotional well-being, but associations between social support and physical health-related outcomes were weaker. Although having more outside friends was related to more efficient and more total sleep at night, associations were small. Other associations were not significant after accounting for potential confounds or did not fit within a larger pattern.

This dissertation highlights varying roles of positive vs. negative stereotypes and stereotypes directed toward oneself vs. other older adults. Perceptions of aging may be practical targets for interventions promoting social engagement in residential care facilities. Social support was also linked to emotional well-being in these communities, although links to physical health were less consistent than expected.

The dissertation of Josephine Ann Menkin is approved.

Lené Levy-Storms

Teresa E. Seeman

Jenessa R. Shapiro

Annette L. Stanton

Theodore Francisco Robles, Committee Chair

University of California, Los Angeles

2017

Dedicated to my grandparents and all the grandparent-like figures who have shaped my path.

Table of Contents

List of Tables

List of Figures

Glossary

Assisted living: Residential communities for older adults that provide housekeeping, personal care, and limited medical help (e.g., helping with medication regimens) for residents as needed.

Independent living: Residential communities for older adults which provides housekeeping and limited additional personal care as needed.

Continuing care retirement community (CCRC): Residential communities with a range of services (a continuum of care), often providing independent living, assisted living, and nursing care services.

Acknowledgments

This work was supported by the UCLA Dissertation Year Fellowship and in part by the UCLA Claude Pepper Older Americans Independence Center (5P30 AG028748) and the UCLA Clinical and Translational Science Institute (UL1TR000124). I would like to acknowledge and thank Dr. Michael Irwin and the UCLA Cousins Center for the generous use of their actigraphs and sleep laboratory. Dr. Jennifer Martin also provided valuable support and training in actigraphy data collection and analysis.

This work would not be possible without the supportive cooperation of staff at the participating residential communities. I am also grateful to all participants for sharing their time and experiences with me and to my undergraduate research assistants for their help preparing data for analysis. A special thank you to Alyssa Choi who saw the whole project through and assisted with actigraphy analysis and follow-up interviews.

Thank you to my committee members Drs. Lené Levy-Storms, Teresa Seeman, Jenessa Shapiro, and Annette Stanton, for your key insights and helpful suggestions on this project and throughout graduate school. Finally, I cannot thank Dr. Theodore Robles enough for his invaluable guidance and support as my primarily advisor and committee chair. Thank you for being a secure base as I ventured out to create my research path.

CURRICULUM VITAE

Josephine Ann Menkin

Education

Master of Arts, Psychology, University of California – Los Angeles, 2012

Bachelor of Arts, *summa cum laude*, Psychology, Northwestern University, 2009

Honors & Fellowships

Dissertation Year Fellowship: University of California – Los Angeles (2016-2017)

Predoctoral Traineeship, Economics and Demography of Aging, T32AG033533, California Center for Population Research, University of California – Los Angeles (2013-2014)

Graduate Research Mentorship Academic Year Fellowship (2012-2013)

NSF Graduate Research Fellowship Program Honorable Mention (2012 & 2013)

Graduate Summer Research Mentorship Award (2012)

Edwin W. Pauley Fellowship (2011-2016)

Distinguished University Fellowship: University of California – Los Angeles (2011-2012)

Phi Beta Kappa National Honor Society (2009)

Publications

Menkin, J. A., Guan, S. A., Araiza, D., Reyes, C. E., Trejo, L., Choi, S. E., Willis, P., Kotick, J., Jimenez, E., Ma, S., McCreath, H., Chang, E., Witarama, T., & Sarkisian, C. A. (in press). Racial/ethnic differences in expectations regarding aging among older adults. *The Gerontologist.*

Menkin, J. A., Robles, T. F., Gruenewald, T. L., Tanner, E. K., & Seeman, T. E. (2016). Positive expectations regarding aging linked to more new friends in later life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. doi:10.1093/geronb/gbv118

Menkin, J. A., Robles, T. F., Robles, Wiley, J. F., Gonzaga, G. C. (2015). Online dating across the life span: Users' relationship goals. *Psychology and Aging, 30*, 987-993. doi:10.1037/a0039722

Robles, T. F., & **Menkin, J. A.** (2015). Social relationships and health in older adulthood. *Emerging Trends in the Social and Behavioral Sciences*.doi:10.1002/9781118900772.etrds0310

Scheibe, S., Notthoff, N., **Menkin, J.**, Ross, L., Shadel, D., Deevy, M., & Carstensen, L. L. (2014). Forewarning reduces fraud susceptibility in vulnerable consumers. *Basic and Applied Social Psychology, 36*, 272-279. doi:10.1080/01973533.2014.903844

Social Engagement in Assisted and Independent Living Residences: Role of Perceptions of Aging and Links to Health

Older adults face life transitions that can disrupt their social networks (e.g., retirement, bereavement, or moving to a new residence). Preliminary evidence indicates that adding new social ties over time may be related to improvements in physical and psychological health even after accounting for network losses (Cornwell & Laumann, 2015). Relocating to an assisted living residence can be a socially disruptive experience at a vulnerable time of health decline but also offers the opportunity to make new friends. Assisted living and similar residential facilities are illuminating microcosms because they are insular social communities with repeated contact among residents. Moreover, age stereotypes are salient within these kinds of age-segregated communities (Dobbs et al., 2008). Identifying psychosocial predictors and health consequences of social adjustment and engagement in assisted living and similar residential care communities could have practical implications for improving quality of life in these settings.

This overview provides context for the dissertation and its two primary aims, starting with a review of relevant research about older adults' social networks, social behavior, and new friendship formation. In addition, it briefly summarizes the predominantly qualitative literature studying social adjustment in assisted and independent living communities. Finally, it further highlights why residential care communities are an interesting and important context in which to study social adjustment, and why social support may be important to maintaining health and well-being in these settings.

Older Adults' Social Networks and Social Engagement

Older adults tend to have smaller social networks than younger adults, with fewer peripheral ties but similar numbers of close contacts (Wrzus, Hänel, Wagner, & Neyer, 2013).

Social engagement is thought to be key to well-being even when social and physical barriers undermine continued social engagement (Lemon, Bengtson, & Peterson, 1972). Older adults can maintain social engagement and meet their social needs with smaller networks by focusing on close, emotionally meaningful relationships. Socioemotional selectivity theory (Carstensen, 1992) suggests that older adults disengage from some social relationships but continue to emotionally invest in others. Older adults, perceiving more limited futures than younger adults, tend to prioritize present-oriented emotion regulation goals (rather than future-oriented goals). For example, older community-dwelling adults appear to optimize their emotional experience by focusing on emotionally meaningful social relationships and disengaging from less rewarding ties (Carstensen, Isaacowitz, & Charles, 1999). This theory is usually used to explain older adults pruning their social networks; however, after relocating to a new residence, it may be emotionally meaningful to create a new sense of community by establishing new social ties (especially if previous social ties are not readily available).

Relationship context is also key to understanding social networks over time. In the social convoy model (Kahn & Antonucci, 1980), an individual travels through life with a convoy of social partners that range in closeness, function, and quality over time. Convoys are influenced by personal characteristics, the situation or environment, and social needs. Close ties are thought to be most stable, while peripheral partners change more across different environments and roles (e.g., school or work), depending on the individual's changing goals and needs. After a transition or role change, especially an uncontrollable change, people may have an especially strong need for support. The social convoy model highlights how external circumstances (e.g., life events or broader environmental context) shape social networks.

Within the older adult population there is considerable heterogeneity in engagement trajectories (e.g., Thomas, 2012). The same life events that weaken social ties (e.g., retirement, relocation, and widowhood) can also be opportunities to strengthen or establish new social ties. For example, a study on retirement found that respondents' average number of social contacts did not change significantly after retirement, but the network membership changed substantially (Van Tilburg, 1992). Older adults appear to bolster their social networks to compensate for life changes. Yet, there is relatively little research elucidating how older adults add to their social networks and make new friends. Moreover, Cornwell and Laumann (2015) recently highlighted the importance of studying new relationship formation; adding new confidants to one's social network was related to better physical and psychological health over time independent of social losses during the same period.

Friendship is thought to be especially important for older adults' well-being because of its voluntary nature (e.g., Wood & Roberston, 1978). Specifically, people can choose to end the relationships that are no longer rewarding, which offers the opportunity to optimize friendship experiences. The modest literature focused on friendship formation in later life ranges from studying compensation and adaptation to specific life events (such as retirement, widowhood, and relocation) to interviewing older adults about their friendship history. The literature has been conducted across disciplines (e.g., sociology, psychology, and social work) and topics (focusing on different discrete contexts or life events) and thus remains quite decentralized.

Social Context and New Friendship Formation in Assisted and Independent Living

One of the most active areas of research on new friendship formation in later life examines friendship following relocation to a senior residential or care facility. Yet this work is preliminary; much of it comes from detailed observation (e.g., ethnographic studies) or qualitative resident interviews with small samples. There has been a helpful focus on contextual, facility factors (e.g., Kemp, Ball, Hollingsworth, & Perkins, 2012), but more work is needed to understand the psychological underpinnings (e.g., motivation) of social behavior of older adults in these types of residential care communities.

Befriending residents. New friendships appear to be a fairly common phenomenon in assisted and independent living residences but range in prevalence. In one continuing care retirement community (CCRC; a residence including independent and assisted living services), 72% of the respondents socialized regularly with others in their community (Stacey-Konnert & Pynoos, 1992). By contrast, Perkins, Ball, Kemp, and Hollingsworth (2013) found only 29% of their assisted living participants included a coresident in their networks. Moreover coresident friendships were typically less intimate than longer held friendships from before the move (e.g., Perkins et al., 2013). However, residents acknowledged deriving emotional meaning and pleasure from these friendships (Kemp et al., 2012). The relationships provided community and social connection and allayed loneliness (Park, Zimmerman, Kinslow, Shin & Roff, 2010).

Self-imposed relational boundaries may contribute to the lack of intimacy in facility friendships (e.g., Perkins, Ball, Whittington, & Hollingsworth, 2012; Shippee, 2009). Participants made explicit statements such as “I try not to get too close” (p. 503, Perkins et al., 2013) and offered varying reasons for maintaining social distance including not wanting to give fodder for gossip and avoiding social obligations to needy coresidents (Moss & Moss, 2007; Perkins et al., 2013). Some assisted living and CCRC residents with functional impairments (such as incontinence or hearing loss) preemptively withdrew due to fears of social rejection (Perkins et al., 2013; Shippee, 2012). Furthermore, social distancing may be a way to view oneself as separate and different from other functionally impaired people at the facility, who are often treated as a homogeneous group (Ball et al., 2004; Ball et al., 2005). For example a 92-year old said he did not include coresidents in his network because “they are all old, over 90, a bunch of old people” (p. 503, Perkins et al., 2013). When relationships with peers were undesirable, residents reported avoidance and isolated themselves in order to avoid the unpleasant emotions associated with frustrating interactions (Park et al., 2010; Perkins et al., 2012). Even trying to talk to a coresident with communication limitations (e.g., hearing impairment) was a negative experience for some (Park et al., 2010).

Befriending staff. One alternative is to spend time with staff instead (Park, Knapp, Shin, & Kinslow, 2009). However, another study of assisted living found residents who included coresidents in their social network were more likely to include staff in their network than those without coresident ties; some residents may simply be more interested in socializing and more inclusive in their definition of friendship than others (Perkins et al., 2013). Some staff are more connected and closer to residents than others (Abbott, Bettger, Hampton, & Kohler, 2012; Ball et al., 2000). However, relationships with staff are not universally positive and can involve infantilization of the resident (Williams & Warren, 2009).

Maintaining outside relationships. Residents often prefer, when possible, to maintain and rely on established close ties from outside the facility as confidants (Park et al., 2009; Park, et al., 2010). Yet there are many barriers to relying solely on these ties such as distance and declining function. Trying to maintain these ties can be a source of distress, with assisted living residents yearning for more contact, feeling a lack of control, and fearing being a burden (Tompkins, Ihara, Cusick, & Park, 2012). Some residents still derive emotional support from relationships despite infrequent contact (Park et al., 2010), but it appears that inability to maintain a satisfactory level of contact with external social partners motivates residents to engage more with coresidents (e.g., Ball et al., 2000; Yamasaki & Sharf, 2011).

Past work on community and facility factors related to social engagement. Research summarized by Kemp et al. (2012) shows that social relationships are embedded within facility and even community context; for example facility size, staff practices, and activity programming shape residents' social environment. The extant assisted-living and long-term care literature has also identified several individual differences that appear to influence social engagement such as gender, common interests, socio-economic status (SES), extant relationships, functional status, and personality (see Table 1 for review of these proposed factors). These influences have been identified primarily from qualitative interviews; additional quantitative and larger scale work will be necessary to determine the factors' prevalence and strength. Some studies have also begun to examine how social engagement in these kinds of residential care communities is related to quality of life. The extant quantitative studies typically test the link between aggregate social support measures and well-being (e.g., Park et al., 2009), with less detail about the nature of the residents' social engagement.

Social support and social adjustment in assisted living has been measured in a variety of ways, from family visitation frequency to perceived support (e.g., Howie, Troutman-Jordan, & Newman, 2014; Mitchell & Kemp, 2000). However, there has been little comparison of associations across these different aspects of social support. While some studies have begun to compare the importance of support from family vs. friends (e.g., Howie et al., 2014) or social engagement inside vs. outside the residence (Jang, Park, Dominguez, & Molinari, 2014) for life satisfaction and depression, more work is needed to clarify the relative strength of associations between different social and health constructs. For example, it may be useful to differentiate between the roles of perceived support and social integration.

Different aspects of social engagement and links to health. Social integration and perceived support are interrelated but are also expected to act independently (e.g., a person can have social contacts and still feel lonely). Past work with older adults has shown that although quantity of social contact and loneliness are related, they are independent constructs (Pinquart & Sorensen, 2001). Social integration and perceived support may also have different connections to health. Social integration can shape health through pathways such as social control and provision of resources. For example, when a person is married their spouse may shape their health behaviors (enact social control; Umberson, 1992) by encouraging them to maintain healthier behaviors through reminders (e.g., to go to the gym), shaping their environment (e.g., cooking healthier meals), and discouraging unhealthy habits (e.g., excessive drinking). Other social relationships may have similar influences on health behaviors (Berkman, Glass, Brissette, & Seeman, 2000). For example, in the assisted living context, having more friends and family may provide a resident with a stronger care network to monitor and shape the resident’s health behaviors. Friends and family contacts may also provide more informational and material resources that could help keep the resident healthy. Even social contacts in the residence may notice when the resident does not come to a meal or leave their room. These contacts within the residence may encourage greater physical activity by inviting the resident to participate in activities outside their room or encourage them to eat regularly and healthily.

While social integration is expected to benefit people even when not experiencing stress (by shaping health behavior, providing resources, and even encouraging sense of self-worth and purpose), perceived support is expected to be especially linked to limiting the impact of stress, which can undermine health. Perceived belonging signals safety while isolation signals threat. Moreover, when exposed to a stressor (e.g., a health problem or a negative social interaction with another resident) a person with greater perceived support is expected to be less likely to appraise the event as a threat. Social support acts as a coping resource. Even if the event is appraised as a threat, perceived support is likely to reflect actual available support that can be enacted in times of stress to help the person return to a less stressed state (Cohen, 2004).

Additional conceptual framework for thinking about social motivation. This project differentiates between motivation to make friends, actual social integration, and even the extent to which people feel support is available to them. These constructs are presented separately because, as in the Theory of Planned Behavior, different factors might influence behavioral intention (e.g., motivation to make new friends) compared to what influences the behavioral outcome itself (e.g., making new friends).

Figure 1 illustrates the theoretical inspiration for this dissertation. Although the dissertation is unable to directly test most links, the core of this theoretical model of social adjustment and friendship formation in assisted living is a synthesis and adaptation of two of the most common health behavior change models: the Health Belief Model (e.g., Rosenstock, 1966; Rosenstock, 1990) and the Theory of Planned Behavior (e.g., Ajzen, 1991). These models are usually used to predict health behaviors such as getting a vaccination or exercising. However, many of the same factors that are expected to predict those health behavior changes appear to apply to social engagement (i.e., the model treats new friendship formation as a health behavior).

Potential influences on behavioral intention (social motivation). The construct of *perceived threat* is borrowed from the Health Belief Model, and here refers to how threatening it would be to people if they do not socially engage in the facility. For example, if residents had a strong need to belong (e.g., they had no family and few external friends to rely on) they would perceive a greater threat and be more motivated to socially engage. *Outcome expectancies* refer to the individuals' weighing of costs and benefits of social engagement; does the benefit of befriending coresidents justify expending the required social energy? Finally, *self-efficacy* refers to whether residents believe they would be able to successfully make new friends. Doubting one's ability to achieve a desired outcome can reduce the motivation to try in the first place. Perceived threat, outcome expectancies, and self-efficacy are interrelated; greater perceived threat could lead making new friends to be seen as a greater benefit, but low self-efficacy might make the effort required (i.e., costs) appear greater.

Potential influences on behavioral outcome (social integration in residence). If perceived threat is high, outcome expectancies are positive, and/or self-efficacy is high, residents will be motivated to pursue new friendships. Then *availability of desirable social partners* and *social resources* will determine the residents' actual level of social engagement (Park et al., 2010). If a resident is motivated to make friends and there are desirable social partners available who also consider the resident to be worth befriending, then the resident is expected to be more socially engaged. If the available social partners are not as desirable, but acceptable, the resident might participate and engage but keep more social distance. But if there are no available desirable social partners, or if the resident is not an attractive social partner, then the resident would likely withdraw, at least temporarily. Assisted living social engagement is dynamic (Kemp et al., 2012), so this new level of social engagement is expected to influence the residents' perceptions about their social network and subsequently could lead to continued new friendship formation or, if satisfied with the current level of support, engaging with a select group of friends until another disruption (e.g., death or relocation of a social tie). The resident's level of social engagement will also influence the facility context by shaping the social environment. And conversely, both the motivation to engage and ability to follow through will be broadly influenced by individual and facility differences.

Residential care communities as an important social context. Residential relocation is a potentially stressful and disruptive experience. Relocating to an assisted living facility in particular often comes after either a functional or social loss (e.g., after a decline in mobility or after losing a spouse). Within this context, understanding how older adults adjust socially to the assisted living setting, and to their age-related changes, addresses a salient social concern and may help promote health maintenance. Although extant, primarily qualitative research describes residents' social experiences, more work is needed to identify factors predicting social engagement. Social integration and engagement have been identified as key correlates of thriving and well-being in an institutional environment. For example, residents are more likely to feel at home in assisted living when they have established positive relationships with co-residents (Cutchin, Owen & Chang, 2003). Furthermore, research in community-dwelling samples has linked social support and health outcomes, but little research tests whether greater social engagement predicts better health within residential care settings.

Dissertation Aims

This dissertation project examined possible predictors and consequences of greater social engagement in assisted and independent living residences. The term social engagement here encompasses reporting greater perceived support availability (and less perceived social isolation), having positive social connections, and motivation to make new friends. Paper 1 examined how different aspects of perceptions of aging, such as endorsement of age stereotypes, related to social engagement in assisted and independent living. Paper 2 tested whether perceived support and social integration in and outside the residence was related to residents' health and function (including sleep quality and pain experience).

Choice of residential care context. I focused on assisted living residences, and independent living residences sharing social activities and context with assisted living, because they house a vulnerable population of older adults who may have recently experienced a health or functional decline or even the loss of a loved one (Perkins et al., 2013). Although the definition of and regulations for assisted living differ across states, they typically house residents who need additional support (but not nursing services) in a communal setting that promotes autonomy and dignity (Assisted Living Federation of America, 2013). Continuing care retirement communities (CCRCs) are typically larger campuses that can include housing and services for independent living, assisted living, and nursing care residents. Because CCRCs provide a continuum of care, depending on the level of integration vs. segregation in these communities, the differences between levels of care can be blurred. Only independent living residents from CCRCs that shared activities and social context with the assisted living residents were included; in residences with greater separation, assisted living care may be derogated by independent living residents or lumped with the nursing facilities (Shippee, 2012).

Depression is an especially common concern in both assisted living and nursing facilities, so understanding how residents engage socially, and whether this benefits their well-being and health, is crucial. Nursing facilities ideally are meant to be temporary recuperation facilities, but assisted living residences can be longer term communities. Compared to independent living communities, assisted living residences are expected to be a more closed, interdependent social environment, and they tend to provide more structured communal programming than senior-segregated housing.

Overarching methodology. Both papers utilize data from detailed, structured interviews with 81 residents from eight residential care facilities. Participants also were asked to wear an actigraph for four days and four nights to measure objective sleep quality. Health trajectory was assessed by a follow-up phone interview and/or medical record review approximately five months after the initial structured interview.

Table 1

Summary of Key Facility and Resident Factors Expected to Relate to Social Engagement in Assisted and Independent Living Residences

Factors	Hypothesized links and examples of support
Facility differences	
Facility size	Larger facilities provide more social partners. However, large census can make it harder for staff to know all the residents and to connect residents to meaningful activities or social partners (Kemp et al., 2012).
Facility policies and practices	When there were more short term or part time staff with limited experience, staff were less likely to know residents well enough to facilitate introductions (Kemp et al., 2012). Greater social engagement when staff encourage residents to attend activities and introduce residents to each other (e.g., Kemp et al., 2012; Sandhu, Kemp, Ball, Burgess, & Perkins,, 2013). Matching activities to residents' interests and functional abilities may help promote socialization (Park et al., 2010). Policies facilitating dying in place, and higher frequency of deaths in residence, appear to result in social distancing (e.g., to avoid the pain of watching a friend die; Kemp et al., 2012).
Resident individual differences	
Gender	Men are less likely to participate in planned social activities than women (Mitchell & Kemp, 2000; Park et al., 2009). Men report a lack of common interests with female residents (Park et al., 2009) and there are fewer older men to befriend (Kemp et al., 2012).
SES	Older adults who were advantaged before moving to assisted living also tend to be socially advantaged once they move in (Stacey-Konnert & Pynoos, 1992; Kemp et al., 2012). Having more resources allows people to be more selective in choosing a residence that is a good fit for them (e.g., has desirable social partners and programming; Burge & Street, 2010).

Marriage or other extant social ties	Marriage or other strong maintained previous relationships may reduce the need for additional social support. Assisted living residents who were least concerned about making new friends at the facility were often either married or had stronger external ties (Kemp et al., 2012; Kemp, 2008). Marriage can also be a barrier to being able to establish desired new friendships, especially when a partner had to act as a caregiver (Kemp, 2008; Moss & Moss, 2007). Past experiences with social loss may also shape perceived resources facilitating and barriers impeding social engagement (Park et al., 2010).
Health conditions and functional status	Residents are often excluded based on their disability, and decline in functional status can mean the loss of friends (Kemp et al., 2012). Poor hearing, speech (Hubbard, Tester, & Downs, 2003), cognitive function and language skill (Keller-Cohen, Fiori, Toler, & Bybee, 2006) have been cited across various long-term care settings as relationship barriers. At least some residents with functional or memory impairment have reciprocal helping relationships with others who have a different disability, and this sometimes facilitated friendship formation in assisted living (Park et al., 2010).
Personality/ attitudes	Even if a resident displayed undesirable behaviors or cognitive impairment, being considered "sweet" was a strong enough asset to help compensate (p. 499, Kemp et al., 2012). Conversely, even among high functioning independent living residents, being considered negative or a complainer invoked ostracism (Shippee, 2012).
Other perceptions, strategies and preferences	Perceived lack of common ground can be used as a reason to not engage (Yamasaki & Sharf, 2011), and conversely commonality with other residents (e.g., profession, mutual interests, religion) and shared preferred activities seem to facilitate meeting and befriending other residents (Kemp et al., 2012; Perkins et al., 2013; Perkinson & Rockemann, 1996). Preferences and strategies are typically continuations of lifelong patterns, such as general relationship desires and openness to new friendships. Private loners continued to prefer to spend time alone (Ball et al., 2000), while others maintained a general approach of wanting to be friendly and open, even if there were some people they preferred to avoid (Kemp et al., 2012). Perceptions of having more limited time left is also expected to undermine motivation to pursue new relationships in the residence (Park et al., 2010)

Note. See Kemp et al. (2012) for more extensive review of community and facility factors.

Paper 1: Perceptions of Aging and Social Engagement in Assisted and Independent Living

Abstract

Perceptions of aging have been linked to social outcomes in community samples; however the relative roles of perceptions of one's own aging vs. general perceptions about older adults remain unclear. Qualitative research has also identified age stigma as a barrier to social engagement in assisted living and age-segregated housing. Paper 1 quantitatively evaluated the relative magnitude of links from perceptions of one's own and other residents' aging to social engagement in these settings. Seventy-nine participants completed structured interviews assessing their self- and resident-directed, positive and negative, age stereotypes and social engagement. Regression, negative binomial, and logistic models (multilevel or with clustered robust standard errors) indicated that self- and resident-directed stereotypes were each associated with perceived support availability and social motivation, but not social integration. Self-directed stereotypes most robustly accounted for variance in perceived support availability. Resident-directed stereotype endorsement was most consistently linked to social motivation. Specifically, stronger endorsement of negative self-directed stereotypes was associated with greater perceived social isolation, less perceived availability of companionship and emotional support, and greater avoidance of closeness with other residents. Stronger endorsement of positive self-directed stereotypes was associated with greater perceived availability of companionship and emotional support. Only stronger endorsement of positive, not negative, resident-directed stereotypes was associated with less perceived social isolation, greater desire to make new friends, and lower likelihood of avoiding closeness with other residents. These findings demonstrated independent roles, not only of age stereotypes directed towards oneself vs. other older adults, but also of positive vs. negative stereotypes.

Paper 1: Perceptions of Aging and Social Engagement in Assisted and Independent Living

Although researchers have identified aspects of perceptions of aging that may influence engagement in assisted and independent living residences (e.g., perceived homogeneity of other residents, and stigmatization based on functional status; see page 4), the area is ripe for more formal (and quantitative) exploration. Below, I review and differentiate among aspects of age stereotypes and age stigma and why each is expected to relate to social engagement outcomes such as social motivation, social integration, and perceived support availability.

Perceptions of One's Own Aging

Previous work in community samples has linked more negative self-perceptions of aging to worse physical and cognitive trajectories over time (Levy, Slade, & Kasl, 2002; Levy, Zonderman, Slade, & Ferrucci, 2011). Stereotype embodiment theory posits that people internalize age stereotypes when young, and as these stereotypes become self-relevant they shape how people age (Levy, 2009 for review). A growing literature has linked more negative perceptions of aging to worse social outcomes as well (such as loneliness or making fewer friends; Menkin, Robles, Gruenewald, Tanner, & Seeman, 2016; Pikhartova, Bowling, & Victor, 2015). Having more positive and less negative perceptions of one's own aging may improve feelings of social self-efficacy. If aging adults perceive things are getting worse as they get older, or if they see themselves as matching negative age stereotypes, they may see themselves as less desirable social partners and may be more worried about social rejection if they were to pursue a new friendship.

Internalization of age stereotypes about older adults in general may shape perceptions of one's own aging (e.g., Kornadt & Rothermund, 2012), yet an older adult's perceptions of their own aging can be strikingly different from their perceptions of other older adults. Older adults can hold negative age stereotypes but see themselves as an exception; for example, a 92-year old assisted living resident said he did not include coresidents in his network because “they are all old, over 90, a bunch of old people” (p. 503, Perkins et al., 2013). This resident appeared to be endorsing negative age stereotypes but did not identify with his age group or apply those age stereotypes to himself. Perceptions of one’s own and other older adults’ aging may overlap partially, but may also act independently. Moreover, perceptions of other older adults, specifically perceptions of other residents in age-segregated residential contexts, are also expected to influence social engagement.

Stigmatization of Other Residents

Generally, people avoid interacting with stigmatized individuals, and older adults living in residential care communities often stigmatize other residents with greater functional impairments and perceive them as “old”. It is common to hear intolerance toward residents with functional or cognitive impairment (Dobbs et al., 2008; Perkins et al., 2012; Shippee, 2009); disability stigma is enmeshed with age stigma. In interviews, residents made unsolicited disparaging statements about other residents and at times appeared to perceive other residents as a homogeneous and unappealing group (Perkins et al., 2013). This could be one of the reasons why Carstensen (1991) observed older adults were not always eager to participate at senior centers or to make friends at nursing homes; aging adults may have avoided identifying as old and not found the potential social partners there to be appealing. If a resident holds more negative age stereotypes about other residents this would be expected to make these other residents less attractive social partners. Even if the resident were motivated to make new friends, they might avoid befriending older residents and focus their attention on younger staff instead.

Positive and Negative Age Stereotypes

Notably, people are exposed to and can hold both positive *and* negative age stereotypes (Levy, 2009). Older adults can be thought of as “senile” but also as “wise”; as curmudgeons but also as loving grandparents. We can even think of the same older adult in both a positive and negative light, such as the stereotype of an older adult who is “doddering but dear” (p. 3, Cuddy & Fiske, 2002). Previous work on perceptions of aging has often focused on negative perceptions of aging, or treats perceptions of aging as ranging along a single dimension of valence (i.e., ranging on a continuum from positive to negative, as in the commonly used Attitude Toward Own Aging subscale from the Philadelphia Geriatric Center Morale Scale, Liang & Bollen, 1983). However, similar to how awareness of age-related changes is multidimensional (with independent awareness of gains and losses; Diehl & Wahl, 2010), it is possible that positive and negative age stereotypes could act independently. Although some limited research has found positive age stereotypes may act as a resource (e.g., positive age stereotype endorsement was associated with better recovery from an acute cardiovascular event; Levy, Slade, May, & Caracciolo, 2006) this research has not compared or examined the independent contributions of positive and negative age stereotypes.

In sum, several aspects of perceptions of aging may shape the social engagement process model (pp. 8-10, also see Figure 1). Perceptions of one’s own aging and perceptions of other residents’ aging are possibly interrelated but distinct individual level influences. In addition, positive and negative perceptions of one’s own or other residents’ aging may also act independently. This study teased apart these separate aspects of age stereotypes.

Research Aims

In order to understand how perceptions of aging relate to social engagement in assisted and independent living residences, Paper 1 had three specific aims:

1) To examine the relative contributions of age stereotypes to social engagement in residential care community settings, distinguishing between age stereotypes directed at oneself vs. directed at other residents
2) To determine the relative importance of positive vs. negative age stereotypes
3) To test whether the importance of various aspects of perceptions of aging differ by social outcome.

More negative (and less positive) perceptions of one's own aging (i.e., self-directed age stereotypes) were expected to be associated with lower social engagement in the facility. More negative (and less positive) age stereotypes directed toward other residents were also expected to have an independent association with social engagement over and above self-directed age stereotypes. Although age stereotypes were expected to relate to all aspects of social engagement (perceived support, social integration, and social motivation), the associations were expected to potentially vary across social constructs. For example, resident-directed age stereotypes were thoughts to matter most for social motivation and social integration within the residence, while self-directed age stereotypes were expected to have more universal associations across social outcomes. Because no other research to my knowledge has directly compared the independent effects of positive and negative stereotypes, examination of the relative contributions of positive vs. negative age stereotypes was more exploratory.

Paper 1 Methods

Participants

Residents (60 women, 21 men, $M_{\text{age}} = 87$, age range: 68-103 years) from eight assisted living and continuing care retirement communities (CCRCs) in the greater Los Angeles area took part in the study. Although the recruitment primarily targeted assisted living residents, independent living residents could participate if they shared some social context with assisted living (e.g., shared social programming; 42% of the sample). Inclusion criteria included being over the age of 65, able to communicate with research staff (i.e., no language or cognitive barriers) and ability to provide informed consent (e.g., not under conservatorship). Although all participants were deemed to provide informed consent (i.e., correctly answered a series of questions indicating they understood what their participation entailed, that it was voluntary, and that they could withdraw at any time), two participants' medical records indicated that they had been diagnosed with dementia in the past. These participants were excluded from all analyses ($N = 79$). The residences ranged in size from 49 licensed apartments to 271 licensed beds. Three of the residences included only assisted living participants; a combination of assisted and independent living residents participated from each of the remaining five facilities.

Procedure

The research opportunity was presented to residents of participating facilities at resident council meetings, at the end of a presentation about positive psychology, and at tea and cookie gatherings for residents recommended by staff social workers as eligible for the study. I explained the study and invited residents to speak with me after the announcement to set up a time to go through the informed consent process prior to scheduling the interview appointment.

After participants demonstrated that they could provide informed consent, a one-hour interview was scheduled at a time of their choice. I conducted semi-structured interviews one-on-

one in a private area, either the participant's room or in another space at the residence where others would not overhear the conversation. The interview was audio-recorded and participants were provided with large laminated copies of the scales from which they were asked to select answers. At the beginning of the interview, participants were oriented to how the scales would be used and were given the opportunity to ask questions. In addition to the primary measures of interest described below, demographic (e.g., age, gender, race/ethnicity, education) and additional social contextual information (e.g., whether the participant had a roommate) was also collected during the interview. Similarly, time in residence was determined from participants' medical records or self-report.

Measures

Perceptions of aging – Age Stereotypes. Endorsement of age stereotypic traits was used to assess perceptions of one's own aging and of other residents' aging. I adapted the Levy, Kasl, and Gill's (2004) Image of Aging scale and incorporated two additional age stereotypic characteristics identified by Hummert, Gartska, Shaner, and Stahm (1994) that were expected to be especially relevant in this study ("sociable") and institutional setting ("depressed"). Specifically, participants were asked how well different age stereotypic characteristics (e.g., "active" and "lonely") match the images that come to mind when thinking about (a) oneself as an older adult and (b) other residents (1 = *not at all*, 5 = *exactly*), referred to in this paper as *self-directed stereotypes* and *resident-directed stereotypes*, respectively.

Self-directed age stereotypes. Specifically, a positive self-directed stereotype composite averaged participants' endorsement of "active", "sociable", "wise", "full of life", "family-oriented", and "positive outlook" as matching their image of themselves as an older adult ($\alpha = 0.64$). One participant declined to answer the "wise" item, so the remaining five items were averaged. Similarly a negative self-directed stereotype composite averaged participants' endorsement of "helpless", "depressed", "lonely", "grumpy", and "senile" as matching their image of themselves ($\alpha = 0.66$). This composite was winsorized, recoding one participant who scored more than three standard deviations about the mean as the next highest observed value. The positive and negative self-directed stereotype composite scores were skewed (such that most people saw themselves positively and not very negatively).

Resident-directed age stereotypes. Similarly, a composite of positive resident-directed stereotypes averaged participants' endorsement of "active", "sociable", "wise", "full of life", "family-oriented", and "positive outlook" as matching their images of other residents ($\alpha = 0.65$). For the four participants who skipped only one item, the remaining five items were averaged. Three participants skipped more than one item and were excluded. One participant scored more than three standard deviations above the mean on endorsement of positive age-stereotypic characteristics about other residents; the variable was winsorized by recoding the participant's score as the next highest value observed in the dataset that was less than three standard deviations from the mean. A negative resident-directed stereotype composite averaged participants' endorsement of "helpless", "depressed", "lonely", "grumpy", and "senile" as matching their images of other residents ($\alpha = 0.75$). Again, for the four participants missing only one item, the remaining four items were averaged, but participants missing more than one item were excluded. The remaining sample size for unadjusted models including positive and negative resident-directed age stereotypes was 75 participants. Although the positive resident-directed stereotype composite scores were roughly normally distributed, the negative resident-directed stereotype composite was slightly positively skewed.

Social engagement outcomes. A range of measurement of social engagement assessed the support participants felt was available from their social network, how many relationships people had, and how eager they were to pursue new relationships.

Perceived support. Perceived support was assessed using three short forms from PROMIS (Patient Reported Outcomes Measurement Information System; Cella, Gershon, Lai, & Choi, 2007). They measured social isolation (e.g., “I feel left out”), availability of companionship support (e.g., “do you have someone with whom to have fun?”), and availability of emotional support (e.g., “I have someone who will listen to me when I need to talk”). Each scale had four items that could range from 1 = *never* to 5 = *always*. Scale scores were calculated by summing the responses.[1]

Perceived social isolation was winsorized, recoding one participant who scored more than three standard deviations about the mean as the next highest observed value. Emotional support availability was highly negatively skewed; 28% of participants responded to each emotional support item indicating they “always” had available emotional support. Therefore, instead of conducting a typical regression model, the data were dichotomized and logistic models estimated whether endorsing positive or negative age stereotypic characteristics as describing oneself was related to how likely a participant was to report always having available emotional support (i.e., how likely to have selected 5 = *always* for each of the emotional support availability items).

---

[1] Participants were asked to think about any of their relationships when answering the perceived support questions, but were also asked afterward whether they would have responded differently if they were only thinking about how they felt based on their relationships within the residence. Although some participants appeared confused by the follow-up question, 64 people said their answers would have been the same for social isolation (nine said they felt isolated less often in residence, three said they felt isolated more often in residence, and three skipped the question). There was more disparity for companionship availability. Only 47 participants said they would have responded the same way; 19 said companionship was less available in the residence, eight said more available, and five skipped the question. Similarly, only 42 said they would have reported the same emotional support availability within the residence; 30 said they had less emotional support in the residence, three said more, and four skipped the question.

Social integration within the residence. In order to measure new friendships, I used the three concentric circle diagram from research with the social convoy model (Antonucci, 1986). Participants were given an image of the diagram: a small circle titled “you” at the center of three larger concentric circles. Participants were told to imagine that the circles represented their social network; for example, the innermost circle included people “who are so close and important, it is hard to imagine life without them” while the outermost circle included people “who are less close, but are close enough and important enough in your life that they should be placed in your personal network”. Participants were asked to name friends from the residence who belonged in these circles, starting with the innermost circle. They were asked to identify whether each person named was a coresident or a staff member and to specify in which circle the first five people listed belonged. The names were summed to determine the participants’ number of coresident and staff friends.

Some residents were expected to be reluctant to call any of their contacts in the facility “friends” (Perkins et al., 2013), so I also asked whether there were any additional residents or staff members who they did not consider as close as the other friends they listed in their network, but who they interacted with regularly and helped them feel like they belonged to a community at the residence. If so, they were asked to count or estimate how many more residents and staff members fit that description and this number was added to the number of residents and staff in their social network circles to create a total number of contacts in the residence.

When a participant scored more than three standard deviations above the mean, I winsorized these count variables, recoding the outlier as the next highest value observed in the data set. Number of coresident and staff friends was recoded for two participants, total contacts in the residence was recoded for one, and number of outside friends was recoded for three.

Social integration outside the residence. The same concentric circle diagram was used to ask participants about friends outside of the residence. The names were summed across the circles to determine the number of outside friends.

Social motivation. Face-valid items assessed how much participants would like to make new friends and how much they "intend" to make new friends (1 = *not at all*, 5 = *very much*). Social distancing was similarly measured with a face-valid item asking to what degree the participants avoided getting close with other residents (1 = *do not avoid at all*, 5 = *avoid a lot*). Avoidance of closeness with other residents had a strong positively skew (42% of residents did not avoid getting close with other residents), so logistic regression was used to test whether perceptions of aging were related to how likely participants were to report avoiding getting close to other residents at all.

Covariates. Participants' level of functional impairment was measured by assessing participants' level of dependence in various activities of daily living as well as communication impairments (any difficulties with walking, climbing stairs, bathing, dressing, using the toilet, transferring from bed to chair, eating, seeing, hearing, or speech). A sum score indicated the number of activities of daily living and communication functions for which the participant had any limitation (ranging from 0 to 10 functional limitations). I selected a set of activities of daily living expected to be the most relevant to, and to have some variability in, this population (from Katz, Downs, Cash, & Grotz, 1970; Cummings, 2002), and for each task asked if participants were 0 = *unable to do without help*, 1 = *able to do with assistance from a device or minimal help*, or 2 = *able to do independently*. When participants talked about issues with incontinence (including wearing pads regularly as a precaution) or when participants' medical record indicated they were incontinent, this counted toward limitation in "using the toilet". Furthermore, I recorded participants' ability to hear, see, and communicate (i.e., clarity of speech and ability to make self understood) using a coding system borrowed from the Long Term Care Minimum Data Set manual (MDS 3.0; Centers for Medicare & Medicaid Services, 2014). When possible, I coded from observation, but I also asked explicitly about participants' ability to read different-size print and their difficulty hearing in different environments. Functional impairment was winsorized, recoding one participant who scored more than three standard deviations about the mean as the next highest observed value.

Number of close family ties was generated by asking participants to list family members who belonged in their social network circles and summing only the number of family members that the participant included in their inner circle. Because participants were only required to specify in which circle the first five belonged, the number of close family ties ranged from 0 to 5.

The "big five" personality traits of extraversion, neuroticism, conscientiousness, agreeableness, and openness to experience were assessed with a brief, 10-item validated measure (BFI-10; Rammstedt & John, 2007).

Data Analysis Plan

Multilevel models and single level models with clustered robust standard errors were utilized to account for clustering of participants within residences. Multilevel models were reported if the likelihood ratio rest (using Stata 14.2; StataCorp, 2015) indicated they fit the data better than single-level models. Otherwise, given that multilevel models can be inaccurate with small numbers of clusters, results from single-level models with robust clustered standard errors were presented.

Negative binomial models were used for count outcomes, logistic models for binary outcomes, and linear regression for the remaining continuous outcomes. List-wise deletion was used; multiple imputation was not expected to differ substantially given the small sample size.

Magnitude of associations between age stereotypes and social engagement. Separate models used positive and negative self-directed age-stereotypes, positive and negative resident-directed stereotypes, or all four age stereotype measures as predictors of each social outcome. If the model was significant, the effect sizes (e.g., R^2) were compared to illustrate the relative magnitude of association between self- or resident-directed age stereotypes and social engagement, as well as self- and resident-directed stereotypes' combined ability to account for variance in social engagement.

Robust associations between positive and negative self- and resident-directed age stereotypes and social engagement. Finally, a full model adjusting for relevant covariates identified which of the four stereotype associations were independent and robust. Although some of the age stereotypes were correlated (see Table 2), each predictor was sufficiently distinct to interpret separately.

Table 2

Summary of Intercorrelations among Age Stereotype Measures

Measure	*1*	*2*	*3*	*4*
1. Positive self	—			
2. Negative self	-0.15	—		
3. Positive resident	0.12	0.08	—	
4. Negative resident	0.07	0.29*	-0.28*	—

Note. Spearman's rho are presented because not all measures were normally distributed. $N = 75$.
* $p \leq .05$

Covariates were limited in order to minimize overfitting (i.e., limited to one predictor for every 10 observations in linear regression models; Babyak, 2004[2]). For models predicting

---

[2] However, some logistic models may still be overfitted, given the number of necessary predictors and relatively small sample size and incidence frequency.

perceived support availability, number of close family ties and functional limitations served as covariates. Participants may have endorsed more positive age-stereotypic characteristics ("family oriented") if they had more close relationships with family members, or more negative age-stereotypic characteristics because they had more functional impairments (e.g., directly impacting perceptions of being "helpless" or "active"). Number of close family ties may also be associated with perceived support (e.g., thinking about family ties in addition to relationships within the residence). Moreover, residents with functional impairments (e.g., incontinence or hearing loss; Perkins et al., 2013; Shippee, 2012) may preemptively withdraw to avoid rejection or being the target of gossip and thus may perceived greater isolation and less available companionship or emotional support.

Models predicting social integration and social motivation adjusted for functional impairments and extroversion. Functional impairments may act as barriers to social motivation and increase avoidance of closeness. More extroverted participants may consider themselves more "sociable" and be more interested in making new friends.

Table 3

Paper 1 Sample Descriptives

Variable	Mean	*SD*	Range
Predictors			
Positive self-directed stereotypes	4.06	0.61	2.67 - 5.00
Negative self-directed stereotypes (winsorized)	1.59	0.59	1.00 - 3.40
Positive resident-directed stereotypes (*N* = 76)	3.16	0.58	1.83 - 4.33
Negative resident-directed stereotypes (winsorized; *N* = 76)	2.50	0.80	1.00 - 4.40
Functional impairment (winsorized; *N* = 74)	2.84	1.99	0 - 8
Number of close family ties	3.75	1.59	0 - 5
Extroversion	3.60	0.93	1 - 5
Social outcomes			
Perceived social isolation (winsorized)	8.65	2.93	4 - 16
Perceived companionship availability	14.95	3.20	7 - 20
Perceived emotional support availability	15.97	4.00	5 - 20
Number of coresident friends (winsorized)	5.63	6.73	0 - 28
Number of staff friends (winsorized)	2.53	3.51	0 - 13
Total number of contacts in the residence (winsorized)	19.46	17.19	0 - 83
Number of outside friends (winsorized)	4.24	4.52	0 - 18
Desire to make new friends	3.67	0.96	1 - 5
Intention to make new friends	3.44	0.96	1 - 5
Avoidance of closeness with residents	2.00	1.01	1 - 5

Note. Unless otherwise specified in the table, *N* = 79.

Table 4

Summary of Intercorrelations of Social Engagement Measures

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1. Perceived social isolation	—										
2. Companionship availability	-0.36**	—									
3. Emotional support availability	-0.29**	0.58***	—								
4. Coresident friends	-0.12	0.20	0.28*	—							
5. Staff friends	-0.06	0.27*	0.22	0.58***	—						
6. Total contacts in residence	-0.31**	0.39***	0.32**	0.70***	0.59***	—					
7. Outside friends	0.03	0.16	0.05	0.13	0.14	0.08	—				
8. Close family ties	0.004	0.13	0.24*	0.32**	0.25*	0.23*	0.19	—			
9. Desire to make new friends	-0.10	-0.04	0.01	0.13	0.01	0.06	0.17	0.24*	—		
10. Intention to make new friends	-0.19	0.16	0.11	0.19	0.07	0.14	0.18	0.22	0.65***	—	
11. Avoidance of closeness with residents	0.41***	0.03	-0.001	-0.10	-0.09	-0.17	0.01	-0.04	-0.18	-0.20	—

Note. Spearman’s rho is presented, as not all measures were normally distributed. Perceived social isolation, coresident friends, staff friends, total contacts in the residence, and outside friends were each winsorized. *N* = 79.

Paper 1 Results

Sample description

Time living in the residence ranged from 13 days to 2789 days; approximately 50% of the sample had moved less than 1.5 years prior to the interview. Twenty-four percent of participants had a roommate[3]. Fifty-nine percent of participants had experienced a recent social loss (i.e., death of someone they cared about). The sample was 94% non-Latino white and was highly educated (i.e., all completed high school, 41% completed at least four-year degree). Approximately half of the participants had indication of cognitive impairment. Based on the DemTect (see Paper 2 Methods), 37 participants had no cognitive impairment and 38 participants had indication of at least mild cognitive impairment (the remaining four participants were not categorized due to visual, audio, or physical functional barriers to task completion).

The sample mean perceptions of perceived support availability approximated the PROMIS population means, however the current sample had slightly lower perceived social isolation and companionship availability. Considering one to two standard deviations away from the PROMIS mean in the undesirable direction as being “mild” to “moderate” impairment, 20% of participants were in this range for social isolation, 29% for companionship, and 24% for emotional support availability. Only one participant had more severe scarcity of emotional support.

Most participants included coresidents in their social network (82%) and had friends outside the residence (81%)[4]. A majority also included staff in their network (54%). Most participants had at least moderate interest in making new friends (91%) and intention to make new friends (89%), and 42% of participants did not avoid closeness with other residents at all.

---

[3] However, only 13% of the sample had a roommate who was not a romantic partner.
[4] Only one participant did not include family members in her social network.

In terms of age-stereotypic characteristics, participants viewed themselves generally positively, but did not view the other residents as charitably. Participants thought positive age-stereotypic characteristics matched their image of themselves as an older adult quite well and that the negative age-stereotypic characteristics did not match very well (Table 3). By contrast, their image of other residents only on average "somewhat" matched the positive age-stereotypic characteristics. They did not think the positive age-stereotypic characteristics matched their image of other residents as well as they had for their image of themselves as older adults, paired t-test $t(75) = -10.07$, $p < .001$. Similarly, participants rated the negative age-stereotypic words as closer to "somewhat" matching their image of other residents, which was more than they had thought the negative age-stereotypic characteristics matched their self-image, paired t-test $t(75) = 9.64$, $p < .001$.

Magnitude of associations between age stereotypes and social engagement

Perceived support. For *perceived social isolation*, self-directed stereotypes accounted for 24% of variance, resident-directed stereotypes accounted for 19% of variance, and all age stereotypes together accounted for 42% of variance. For *companionship availability*, self-directed stereotypes accounted for 14% of variance, resident-directed stereotypes accounted for 8% of variance, and all age stereotypes together accounted for 23% of variance. Finally, for *emotional support availability*, self-directed stereotypes accounted for 25% of variance in likelihood of always reporting available emotional support. In single-level logistic models, resident-directed stereotypes were not related to likelihood of always reporting available emotional support. All age stereotypes accounted for around 26% of variance in likelihood of reporting always having available emotional support (Tables 5 - 7).

Social integration. Neither self- nor resident-directed stereotypes were linked to social integration overall. Self-stereotypes did not account for significant variance in participants' number of coresident friends, in participants' number of staff friends, or in participants' number of contacts in the residence in multilevel negative binomial models[5]. Self-directed stereotypes also did not account for variance in participants' number of friends outside the residence in a single-level model. In multilevel models, resident-directed stereotypes did not account for variance in number of coresident friends, staff friends, total number of contacts in the residence, or in number of friends from outside the residence.

Overall, age stereotypes did not account for significant variance in number of coresident friends, staff friends, or total contacts in the residence. However, all age stereotypes together accounted for significant variance in number of outside friends in a single level model, Wald $\chi^2(4) = 16.12$, $p = .003$. Specifically, stronger endorsement of negative resident-directed stereotypes was related to having more outside friends, $b = 0.24$, $SE = 0.09$, 95% CI [0.07, 0.42]. None of the other age stereotypes were related to number of outside friends. However, given that resident-directed stereotypes did not account for significant variance on their own, this association should be interpreted with caution.

Social motivation. In single-level models, self-directed stereotypes did not account for significant variance in participants' desire to make new friends. Resident-directed stereotypes accounted for 5% of variance in participants' desire to make new friends and all age stereotypes

---

[5] Excluding one outlier, over three standard deviations above the mean on each measure of social integration within the residence, stronger endorsement of positive self-directed age stereotypes was significantly related to more coresident friends, 95% CI [0.17, 1.05], staff friends, 95% CI [0.32, 1.60], and total contacts in the residence, 95% CI [0.18, 0.73], in multilevel models. Negative self-stereotype endorsement was still not related to number of coresident friends, number of staff friends, or number of total contacts in the residence. Excluding an outlier based on number of outside friends, stronger endorsement of negative self-directed age stereotypes was significantly related to fewer outside friends, 95% CI [-0.64, -0.19]. Endorsement of positive self-directed stereotypes was not related to number of outside friends.

together accounted for 11% of variance. For intention to make new friends, self-directed stereotypes accounted for 13% of variance, resident-directed stereotypes accounted for 6% of variance, and all stereotypes together accounted for 16% of variance. In single-level models, self-directed stereotypes did not account for significant variance in likelihood of avoiding getting close to other residents. However, resident-directed stereotypes accounted for 5% of variance, and all stereotypes together accounted for 10% of variance in likelihood of avoiding getting close to other residents (Tables 5 - 7).[6]

Table 5

Independent Associations between Self-Directed Age Stereotypes and Perceived Support Availability and Social Motivation

	Perceived support availability			Social motivation
Self-directed stereotype	Perceived social isolation[a]	Companionship availability[b]	Emotional support availability[c]	Intention to make new friends[d]
Positive	-1.18 (0.32)**	1.47 (0.22)***	1.91 (0.41)***	0.54 (0.16)*
Negative	1.91 (0.58)*	-1.11 (0.48)†	-1.93 (0.40)***	-0.13 (0.22)

Note. Displayed results are unstandardized betas and standard errors. $N = 79$. [a] Single-level regression, $F(2, 7) = 8.94$, $p = .012$. [b] Single-level regression, $F(2,7) = 27.48$, $p < .001$. [c] Single-level logistic model, Wald $\chi^2(2) = 27.95$, $p < .001$. [d] Single-level regression, $F(2,7) = 8.20$, $p = .015$. † $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Table 6

Independent Associations between Resident-Directed Age Stereotypes and Social Engagement

Resident-directed stereotype	Perceived social isolation[a]	Companionship availability[b]	Desire to make new friends[c]	Intention to make new friends[d]	Avoidance of closeness with residents[e]
Positive	-2.06 (0.80)*	0.40 (0.41)	0.34 (0.08)**	0.41 (0.13)*	-0.99 (0.34)**
Negative	0.33 (0.30)	-1.05 (0.43)*	0.19 (0.10)†	0.08 (0.09)	-0.35 (0.34)

Note. Displayed results are unstandardized betas and standard errors. Resident-directed stereotypes do not account for significant variance in emotional support availability or number of coresident friends. $N = 75$.
[a] Single-level regression, $F(2,7) = 15.44$, $p = .003$. [b] Single-level regression, $F(2,7) = 5.46$, $p = .037$.
[c] Single-level regression, $F(2,7) = 9.59$, $p = .010$. [d] Single-level regression, $F(2,7) = 5.01$, $p = .044$.
[e] Single-level logistic model, Wald $\chi^2(2) = 8.67$, $p = .013$. † $p \leq .10$ * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

---

[6] Even excluding “sociable” from the positive composite and “lonely” from the negative composite, the remaining self-directed stereotype items still accounted for 19% of variance in perceived social isolation, $F(2,7) = 5.78$, $p = .033$, for 9% of variance in perceived available companionship, $F(2,7) = 9.83$, $p = .010$, for 24% of variance (based on pseudo R^2) in likelihood of always having available support, Wald $\chi^2(2) = 25.81$, $p < .001$, and for 9% of variance in intention to make new friends, $F(2,7) = 6.10$, $p = .029$. Moreover, the conclusions about the positive and negative composites’ relationship to the social outcomes did not change.

Table 7

All Age Stereotypes Associations with Perceived Support Availability and Social Motivation

Age stereotype	Perceived social isolation[a]	Companionship availability[b]	Emotional support availability[c]	Desire to make new friends[d]	Intention to make new friends[e]	Avoidance of closeness with residents[f]
Positive self	-0.97 (0.43)†	1.63 (0.29)***	1.94 (0.41)***	0.37 (0.23)	0.49 (0.14)**	-0.35 (0.67)
Negative self	2.22 (0.46)**	-1.08 (0.59)	-2.07 (0.50)***	0.21 (0.13)	-0.06 (0.20)	1.06 (0.56)†
Positive resident	-1.95 (0.45)**	0.14 (0.24)	0.08 (0.65)	0.26 (0.09)*	0.32 (0.12)*	-1.14 (0.42)**
Negative resident	-0.04 (0.26)	-0.98 (0.40)*	-0.12 (0.33)	0.12 (0.11)	0.04 (0.09)	-0.55 (0.38)

Note. Self-directed and resident-directed stereotypes have been abbreviated to “self” and “resident”. Displayed results are unstandardized betas and standard errors. $N = 75$. [a] Single-level regression, $F(4,7) = 133.42$, $p < .001$. [b] Single-level regression, $F(4,7) = 11.46$, $p = .003$. [c] Single-level logistic model, Wald $\chi^2(4) = 42.73$, $p < .001$. [d] Single-level regression, $F(4,7) = 8.30$, $p =.009$. [e] Single-level regression, $F(4,7) = 5.37$, $p = .027$. [f] Single-level logistic model, Wald $\chi^2(4) = 47.63$, $p < .001$. † $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Robust Associations between Positive and Negative, Self- and Resident-directed Age Stereotypes and Social Engagement

Perceived support adjusted models. Stronger endorsement of negative self-directed stereotypes was associated with greater perceived isolation, and stronger endorsement of positive resident-directed stereotypes was associated with less perceived isolation, over and above other age stereotype endorsement, number of close family ties, and functional impairment (Table 8). For both companionship and emotional support availability, stronger endorsement of positive self-directed stereotypes was related to greater availability, and stronger endorsement of negative self-directed stereotypes was related to less availability, over and above all other age stereotypes and covariates.[7] Neither positive nor negative resident-directed stereotype endorsement were related to perceived availability of companionship or emotional support.

Table 8

Adjusted Associations between All Age Stereotypes and Perceived Support Availability

Predictor	Perceived social isolation[a]	Companionship availability[b]	Emotional support availability[c]
Positive self	-0.87 (0.50)	1.45 (0.37)**	1.77 (0.54)***
Negative self	2.35 (0.71)*	-1.26 (0.52)*	-1.60 (0.45)***
Positive resident	-1.57 (0.25)***	0.23 (0.36)	-0.03 (0.62)
Negative resident	0.21 (0.22)	-0.96 (0.46)†	-0.19 (0.42)
Close family ties	-0.11 (0.20)	0.31 (0.25)	0.27 (0.20)
Functional impairment	0.15 (0.12)	0.13 (0.18)	-0.24 (.31)

Note. Self-directed and resident-directed stereotypes have been abbreviated to "self" and "resident". Displayed results are unstandardized betas and standard errors. $N = 70$. [a] Single-level regression, $F(6,7) = 576.41$, $p < .001$. [b] Single-level regression, $F(6,7) = 43.09$, $p < .001$. [c] Single-level logistic model, Wald $\chi^2(6) = 79.02$, $p < .001$. † $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

---

[7] The models produced almost identical conclusions using positive and negative self-stereotype composites without "sociable" and "lonely." The exception was that for companionship, self-directed negative stereotyping was marginal if "lonely" was excluded, $b = -0.82$, $SE = 0.37$, $p = .062$.

Social integration adjusted models. After adjusting for functional impairment and extroversion, the multilevel model linking age stereotypes to number of outside friends was not significant, so I did not interpret the individual coefficients further, Wald $\chi^2(6) = 9.49$, $p = .15$.

Social motivation adjusted models. Stronger endorsement of positive resident-directed stereotypes was related to greater desire to make new friends and lower likelihood of avoiding closeness with other residents after adjusting for other age stereotypes, extroversion, and functional impairment (Table 9). Stronger endorsement of negative self-directed stereotypes was related to greater likelihood of avoiding closeness with other residents, but was not related to desire or intention to make new friends. Positive self-directed and negative resident-directed stereotype endorsement were not related to social motivation over and above other age stereotypes and the covariates.

Table 9

Adjusted Associations between All Age Stereotypes and Social Motivation

Predictor	Desire to make new friends[a]	Intention to make new friends[b]	Avoidance of closeness with residents[c]
Positive self	0.33 (0.19)	0.34 (0.19)†	0.15 (0.93)
Negative self	0.20 (0.14)	0.01 (0.20)	1.50 (0.76)*
Positive resident	0.29 (0.11)*	0.37 (0.20)†	-0.98 (0.49)*
Negative resident	0.16 (0.10)	0.10 (0.15)	-0.56 (0.56)
Extroversion	0.07 (0.14)	0.29 (0.13)*	-0.59 (0.45)
Functional impairment	0.03 (0.04)	0.07 (0.06)	-0.08 (0.05)

Note. Self-directed and resident-directed stereotypes have been abbreviated to "self" and "resident". Displayed results are unstandardized betas and standard errors. $N = 71$. [a] Single-level regression, $F(6,7) = 6.20$, $p = .015$. [b] Multilevel regression, Wald $\chi^2(6) = 22.51$, $p = .001$. [c] Single-level logistic model, Wald $\chi^2(6) = 61.79$, $p < .001$. † $p \leq .10$, * $p \leq .05$.

Paper 1 Discussion

As hypothesized, age stereotypes directed toward oneself or toward other residents were strongly related to older adults' feelings about their social environment in residential care communities. The degree to which older adults thought of themselves and other residents in line with positive and negative age-stereotypes appeared to be especially related to their perceived availability of support, but were also related to social motivation. The links between stereotypes and social engagement varied across social outcomes. Positive and negative self-directed age stereotypes and positive resident-directed age stereotypes each had different, independent roles.

Relative Magnitude of Associations with Self- and Resident-directed Age Stereotypes.

Perceived support. Thinking that age stereotypic characteristics matched one's self-image as an older adult was most strongly and consistently related to perceived support availability (accounting for 14-25% of variance). Thinking that age stereotypic characteristics matched one's image of other residents was also related to perceived social isolation and companionship availability (accounting for 8-19% of variance) but was not related to likelihood of always having available emotional support.

Social integration. Overall, neither self-directed nor resident-directed age stereotypes were significantly related to any measures of social integration[8].

Social motivation. Resident-directed stereotypes were more consistently associated with social motivation than self-directed stereotypes. Endorsing age stereotypic characteristics as matching one's image of other residents accounted for 5-6% of variance in participants' desire

---

[8] Without one influential outlier, more than three standard deviations above the mean on measures of social integration within the residence, stronger endorsement of positive self-directed age stereotypes were related to more coresident friends, more staff friends, and more total contacts in the residence, consistently across adjusted models. Similarly, excluding one influential outlier more than three standard deviations above the mean on number of outside friends, stronger endorsement of negative self-directed age stereotypes and lower endorsement of negative resident-directed stereotypes were related to fewer outside friends in the adjusted model.

and intention to make new friends as well as likelihood of avoiding closeness with other residents. Self-directed stereotypes accounted for 13% of variance only in intention to make new friends; there was greater error variability in associations between self-directed stereotypes and the other measures of social motivation.

Independent Roles of Positive and Negative Age Stereotypes

Self-directed stereotype endorsement. Thinking that positive and negative age stereotypic characteristics matched one's self-image as an older adult were both independently associated with perceived availability of companionship and emotional support. Stronger endorsement of positive self-directed stereotypes was linked to greater perceived availability of companionship and emotional support, and stronger endorsement of negative self-directed stereotypes was linked to less perceived availability. In addition, stronger endorsement of negative self-directed stereotypes was also associated with greater perceived social isolation and likelihood of avoiding closeness with other residents.

Resident-directed stereotype endorsement. Only endorsement of positive, not negative, age stereotypes about other residents was related to social engagement. Stronger endorsement of positive resident-directed stereotypes was related to less perceived social isolation, greater desire to make new friends, and lower likelihood of avoiding closeness with other residents.

Interpreting Current Findings in Light of Past Research

Different roles of positive vs. negative stereotypes about oneself vs. other older adults. Recent literature linking perceptions of aging to the social domain (with the exception of Kornadt, Voss, & Rothermund, 2015) has measured perceptions of older adults in general or has combined (and confounded) measurement of perceptions of one's own aging with perceptions about older adults in general. It is unclear whether older participants in this past research were including themselves in the category of “older adults” and to what degree they thought statements about aging apply to older adults in general but not themselves. By measuring endorsement of age stereotypes directed toward oneself and other residents separately and comparing them directly, I was able to begin to tease apart the roles of self-stereotypes vs. stereotypes about other older adults.

Past work often treats perceptions of aging as ranging from positive to negative. However, growing work indicates that age stereotypes are multidimensional (i.e., varying across domains such as health vs. sociability, see Kornadt & Rothermund, 2015 for review). Moreover, people can hold both positive and negative stereotypes about older adults, endorsing different valenced stereotype subtypes (e.g., “golden ager” and “severely impaired”; Hummert et al., 1994) or even seeing the same older adult as having both positive and negative characteristics (e.g., physical impaired but wise). Greater differentiation is warranted because Paper 1 found positive and negative age stereotypes were related to different social outcomes. Positive and negative self-directed stereotypes were independently related to perceived availability of companionship and emotional support, but only negative self-directed stereotypes were related to feelings of social distance (perceived social isolation and avoiding closeness with other residents). Only positive, not negative, resident-directed stereotypes were associated with social engagement. Continuing to differentiate between positive and negative stereotypes moving forward will facilitate understanding their nuanced roles. Do negative self-perceptions of aging matter more than positive for social distancing (even at the same level of social integration)?

Extending stereotype embodiment theory from community-dwelling samples to residential care. Past work building from stereotype embodiment theory (Levy, 2009) posits that when people internalize negative age stereotypes and see them (at least implicitly) as self relevant, this undermines physical and cognitive function. Recent work has extended this theory to show that more negative perceptions of aging are also linked to less social support (e.g., Menkin et al., 2016). However, this past work has only surveyed community-dwelling older adults. Here, stronger endorsement of negative self-directed age stereotypes was related to less perceived support availability (especially greater perceived social isolation). This is consistent with Pikhartova and colleagues' (2015) finding that greater baseline endorsement of the lonely age stereotype was related to greater likelihood of loneliness over time and with Menkin and colleagues' (2016) finding linking negative expectations about aging to less perceived support availability. However, in this sample, age stereotypes were not associated with social integration, in contrast to past research which found that having more negative perceptions of aging (specifically expecting more age-related decline) at baseline was linked to making fewer new friends over a two year period (Menkin et al., 2016). In Paper 1, half of the sample had lived in the residence for less than 2 years; new friendships may be less stable in this setting if residents' health declines. Moreover, Paper 1 is cross-sectional; associations between perceptions of aging and new friendship formation may be stronger in prospective data. In sum, some but not all links between perceptions of aging and social behavior extend to this residential care setting.

Although only Pikhartova et al. (2015), not Menkin et al. (2016), found links between perceptions of aging and loneliness, some of the strongest observed links between age stereotypes and social engagement in Paper 1 were between age stereotypes and perceived social isolation. This was true even if "lonely" and "sociable" were excluded from the composites. Stereotypes of older adults as lonely or isolated are very culturally prevalent, and the stereotype composites (even without matching items) appeared to be representing higher order constructs of positive and negative age stereotype endorsement. The differences in association strength may also be related to similarities in conceptual representation, and perhaps even underlying neural network activation patterns (Lieberman, 2007). When self-directed age stereotypes are activated, they may have closer neural associations with other perceptions about oneself (and feelings about oneself relative to others). This could facilitate a strong link between perceived isolation (one of the most self-focused social engagement measures) and self-directed stereotypes.

Implications for stigma research. Age stereotypes can also stigmatize *other* older adults. Overall, the participants seemed to use downward comparison when thinking of other older adults. They rated themselves as matching positive age stereotypic characteristics more and negative age stereotypic characteristics less than other residents, consistent with previous work showing older adults tend to perceive themselves as having less serious problems than others their same age (e.g., Heckhausen & Brim, 1997).

Past stigma research highlights that people avoid interacting with negatively stereotyped others, but Paper 1 indicates that endorsement of *positive* stereotypes about other older adults shaped social approach motivation more. Only positive, not negative, resident-directed age stereotypes were related to greater social motivation and less frequent social isolation over and above self-directed age stereotypes. Positive perceptions of other residents (or lack thereof) appear to be even more important in this context than specifically seeing other residents as having negative age-stereotypic qualities.

Past work on “positive” stereotypes (e.g., about women) is often framed in the context of benevolent prejudice; even stereotypes that on the surface appear positive are actually detrimental and effectively undermine the stereotyped individuals’ position in society. Within Paper 1, positive self-directed and positive resident-directed stereotypes were both related to greater social engagement in assisted and independent living. This is an unusual example of positive stereotypes being related to positive outcomes. However, we should continue to be wary of the potential pitfalls of promoting positive age stereotypes (e.g., unrealistically high expectations may backfire).

Summary of benefits of more precise measurement of different facets of age stereotypes. The independent associations between self- and resident-directed age stereotypes and different social outcomes supports the utility of measuring stereotypes about the self and others separately. It also appears useful to measure positive as well as negative age stereotypes. Endorsement of positive stereotypes about other residents was a significant correlate of perceived isolation over and above negative resident stereotypes, but not vice versa. Finally, studying perceptions of aging and age stereotypes in different contexts demonstrates generalizability of past findings and may identify domains where perceptions of aging are especially salient or influential. For example, age stereotypes may play a larger role in contexts such as residential care communities where people have more frequent contact with older adults.

Limitations. Measuring positive and negative perceptions about oneself and others separately was already an innovation, but the measurement could be further refined. The age stereotypic characteristics were primarily social or personality-related characteristics (with the exception of “wise” and “senile”). Future research should test whether the observed associations with social engagement generalize across stereotype domains (e.g., cognitive function, physical appearance). In addition, these characteristics were generated in past studies of age stereotypes, but it is possible that the residents’ endorsement of the positive and negative characteristics was more a reflection of positive or negative perceptions of oneself and other residents rather than of age stereotype endorsement specifically. In the future, including additional positive and negative characteristics that do not reflect age stereotypes (e.g., artistic, aggressive) would help differentiate between positive and negative perceptions generally vs. positive and negative age stereotypes specifically.

Additional work will be necessary to determine the boundaries of generalizability. The sample was predominantly white, but perceptions of aging and their associations with aging outcomes like mental health may vary across ethnicities (e.g., Chinese and Korean American immigrants expected more age-related declines than African American and Latino participants; Menkin et al., 2017). Although non-Latino white and African American older adults tend to have similar age-expectations (Sarkisian, Shunkwiler, Aguilar, & Moore, 2006), racial composition differences may also have contributed to the divergent social integration findings between the current sample and Menkin and colleagues' (2016) predominantly African American sample. Racial composition and diversity (vs. homogeneity) within senior residences likely also shape the social context. Moreover, although links from perceptions of aging to social engagement generalized from community samples to assisted living, some of the specific patterns of positive and negative stereotypes about oneself and other older adults may not extend back to community samples. Perceptions of aging (self- and other-directed) within assisted living residences may be more negative or more differentiated than perceptions of one's own and others' aging among community-dwelling adults. However this is a stimulating social context to study perceptions of aging; for example, older adults in assisted living have salient targets of downward comparison (residents receiving higher levels of care) but may also use upward comparison (comparing their current situation and network to before their move).

The current study is cross-sectional and cannot determine causality. It is possible that having more friends in the residence led participants to evaluate other residents more positively. Moreover, despite standardization of interview administration, the interviewer was not blind to hypotheses and may have unconsciously biased participants' responses. With more resources in the future, hiring a separate interviewer, blind to hypotheses, would help minimize demand characteristics. Nevertheless, this research lays the foundation for future prospective studies (e.g., following new residents' social engagement over time) which could more carefully examine possible bidirectional relationships between age stereotypes and social engagement. Future intervention studies testing whether promoting positive and reducing negative age stereotypes promote social engagement and health could also provide evidence of a causal link.

Implications for interventions. This study suggests age stereotypes directed toward oneself and other residents may be related to different outcomes, which is important because we would likely use different approaches to shift perceptions about one's own aging vs. changing perceptions about other residents. To shift perceptions of one's own aging, it may be appropriate to use a self-affirmation intervention promoting focus on valued personal characteristics or possibly even implicit exposure to positive age stereotypic words (Levy, Pilver, Chung & Slade, 2014). On the other hand, positive perceptions of other residents could be facilitated through buddy programs and highlighting similarities between new and existing residents.

Similarly, this study highlights the potential value in specifically promoting positive views of aging over and above reducing negative views. Past stereotype frameworks that only focus on reducing negative stereotypes about others may not be very effective in promoting friendships with older adults. However, while positive resident-directed age-stereotypes appeared to be related to better social outcomes in this context, we should still be wary of promoting positive age stereotypes and unrealistically high expectations. Promoting positive age stereotypes oversimplifies a heterogeneous group and may backfire, but promoting greater individualization (rather than perceiving residents as a homogeneous group) and highlighting positive commonalities may achieve the same positive outcomes. Age stereotype interventions at the resident level, or even the staff and facility level, may be an important tool to create a more conducive environment to foster new social ties. Social support is linked to health outcomes and identifying possible predictors of social adjustment in residential care communities has great potential value.

Paper 2: Potential Consequences of Social Support for Self-Reported and Objective Health in Assisted and Independent Living

Abstract

Social support has been linked to health in community samples, but less research focuses on these links within assisted or independent living. Seventy-nine assisted and independent living residents completed structured interviews assessing perceived support availability and social integration within and outside of the residence as well as self-reported emotional well-being, physical health, sleep, and pain. Participants also wore a sleep monitor and completed a daily diary for four days to objectively measure sleep quality. Pilot longitudinal self-reported health data were collected approximately five months later. Regression models with clustered robust standard errors indicated that perceived support availability was consistently related to emotional well-being. Less perceived social isolation and greater perceived availability of companionship and emotional support were related to more frequent positive affect (and happiness specifically), even adjusting for neuroticism and recent social loss. Less perceived social isolation and greater companionship availability were also related to less boredom. Social support and integration were less consistently linked to physical health. However, having more outside friends was associated with greater objective sleep efficiency and total sleep time even adjusting for relevant covariates. These observed links to physical health were small, and less disturbed sleep may facilitate maintenance of outside friendships. Little evidence linked social engagement to later changes in health. Detecting associations between social support and health may have been more difficult in this sample because these volunteer participants scored relatively low in perceived social isolation. Yet, Paper 2 provided evidence that perceived support availability is associated with more positive emotional experience.

Paper 2: Potential Consequences of Social Support for Self-Reported and Objective Health in Assisted and Independent Living

Relocating to an assisted living facility often comes after either a functional or social loss (e.g., after a decline in mobility or after losing a spouse). In the face of these losses or the disruption of relocation, these contexts offer the potential of health improvement, maintenance, or decline. Identifying how social relationships in and outside of the residence relate to well-being and physical health may provide pathways to promote adjustment and better quality of life within residential care settings. Research in community-dwelling samples has linked social support and health outcomes, but little research tests whether greater social engagement predicts better health within residential care settings. Bidirectional links between health and social engagement are likely. For example, disability or depression may undermine people's ability to participate in social activities, but there are also numerous reasons, based in theory and previous empirical research, why social engagement may also influence well-being and physical health outcomes**.** Paper 2 focused on evidence linking social engagement to emotional well-being, physical health, sleep quality, pain experience, and change in health over time.

Emotional Well-being

Preliminary evidence suggests that social engagement and coresident relationships are important for well-being in the assisted living context. Social support and participation in activities have been linked to life satisfaction and depression in assisted living residences (Cummings, 2002). Within nine assisted living residences, both having more non-family community ties and having coresident ties were related to greater life satisfaction (Perkins et al., 2013). Non-kin social involvement (in and outside the residence) was also associated with feeling more at home in a purposive sample of nearly 300 residents (Cutchin et al., 2003). In a cross-sectional study of eight assisted living residences, perceived resident and staff friendliness were significant correlates of life satisfaction and depressive symptoms (Park, 2009). Many studies find that support from friends, and specifically coresidents, may be especially important for well-being (Howie, Troutman-Jordan, & Newman, 2014; Street & Burge, 2012; Street, Burge, Quadagno, & Barrett, 2007) with the exception of Perkins and colleagues (2013) who found that having a greater proportion of family ties was most strongly associated with subjective well-being. Additional work is needed to examine whether the relationship between social engagement and well-being is linked in the hypothesized direction.

Physical Health

Given the importance of social integration and social support for health in community samples (see Uchino, 2004 for review), social engagement and new friendship formation in assisted living may be linked to better health and might help delay health decline. Greater social integration and perceptions of relationship quality are associated with a lower risk of mortality across the lifespan (Holt-Lunstad, Smith, & Layton, 2010) and specifically for older adults (e.g., Steptoe, Shankar, Demakakos, & Wardle, 2013). Humans have a fundamental “need to belong” in social networks, similar to the need for safety, shelter, and sustenance (Baumeister & Leary, 1995). Social relationships can buffer the negative effects of stressful life events (Uchino, 2004), but can also be sources of stress (Brooks & Dunkel Schetter, 2011). Given that social relationships may divert energy from competent immune functioning when stress is high and resources are limited (Segerstrom, 2008), we cannot assume without empirical evidence that making new friends in residential care facilities is beneficial for health. A recent study found that in a community-dwelling sample of adults aged 57 to 85, adding new confidants to one’s social network was related to better self-rated health, independent of network losses during the same time (Cornwell & Laumann, 2015). Yet, it is not clear whether this finding generalizes to residential care settings and whether this health link is exclusive to gaining close, rather than more peripheral, social ties.

Sleep quality. There are several reasons to believe that social support might influence sleep. Loneliness and perceptions of social isolation appear to act as cues for lack of safety; social threat signals seem to trigger the same neural and physiological alarm systems that respond to physical survival threats (Eisenberger & Cole, 2012). Sleeping is a very vulnerable state, and evolutionarily it would have been adaptive to wake more easily from sleep when there were more threats in the environment (i.e., when not part of a protective social group). Even in modern times when we are not concerned about predation, general loneliness is associated with poorer self-reported sleep quality (Segrin & Domschke, 2011) and poorer objective sleep efficiency for undergraduates (Cacioppo et al., 2002) and adults from a traditional agrarian community in South Dakota (Kurina et al., 2011). Similarly, insecure marital attachment is linked to poorer subjective sleep quality (Troxel, Robles, Hall, & Buysse, 2007).

Conversely, social support can encourage positive affect and sense of belonging (safety cues), and might attenuate negative effects of stress on sleep (Morin, Rodrigue, & Ivers, 2003). Greater daily experience of positive affect has been linked to fewer self-reported sleep problems in a large sample of adults age 58-72 years, even after controlling for self-rated health (Steptoe, O'Donnell, Marmot, & Wardle, 2008). Having more positive interactions with others had a significant bivariate association with subjective sleep quality and sleep efficiency for middle-aged and older men and women, as well as with sleep latency for the men (Friedman, 2011). Additional multivariable analyses indicate that greater perceived social support availability is associated with less waking after sleep onset for older adults with and without insomnia. Greater social support was especially linked to shorter sleep latency for community-dwelling older adults with insomnia (Troxel, Buysse, Monk, Begley, & Hall, 2010).

Pain experience. Chronic pain is a common issue for older adults; the prevalence estimates vary, but several studies report that a majority of adults over age 60 report a current pain complaint (for review see Gagliese & Melzack, 1997). The biopsychosocial model of pain indicates that a person's experience of pain is influenced not only by the physiology of an injury, but also by emotions, contextual cues, and attention (Gatchel, Howard, & Haggard, 2011). In undergraduate experiments, participants reported less intense acute pain when provided social support by either a friend or stranger (Brown, Sheffield, Leary, & Robinson, 2003). Conversely, perceptions of social exclusion activate the same part of the brain as physical pain (Eisenberger, Lieberman, & Williams, 2003); again, the need to belong is so important that we seem to have a shared neural alarm for physical and social pain (Eisenberger & Leiberman, 2004). Research on acute physical and social pain (i.e., social exclusion) with undergraduates suggests that moderate social rejection is associated with hypersensitivity to pain, but more extreme rejection can lead to numbing the same way that an extreme physical threat can produce analgesia (for review see Bernstein & Claypool, 2012).

Research on chronic pain has also linked loneliness to greater pain in breast cancer survivors; here the relationship appeared to be mediated by immune dysregulation (Jaremka et al., 2013). Low levels of social support (smaller networks and less perceived support) have also been prospectively linked to greater rheumatoid arthritis disability in recently diagnosed outpatients, and lower perceived support was also linked to greater pain at the three- and five-year follow-up time points (Evers, Kraaimaat, Geenen, Jacobs, & Bijlsma, 2003). A study from Spain found that chronic pain inpatients' satisfaction with social support was associated with pain intensity but not disability (López-Martínez, Esteve-Zarazaga, & Ramírez-Maestre, 2008). However, the relationship between social support and pain may be bidirectional; greater pain is associated with more negative social exchanges among non-institutionalized older adults (Mavandadi, Sorkin, Rook, & Newsom, 2007).

Change in health over time. In assisted living research, physical health indicators are typically used as control variables rather than outcomes of interest, likely because of the cross-sectional nature of the existing research. Tighe and colleagues (2008) found that residents who participated in more solitary or group activities stayed at their assisted living residence marginally longer than people who participated in fewer activities even after controlling for baseline health status. However, people who are healthier may have more energy to participate in social activities. Prospective and longitudinal work is needed to tease apart how health influences social engagement and how social engagement might influence subsequent health.

Research Aim

The main goal was to examine the possible health consequences of social engagement (specifically of perceived support availability and social integration). I expected that greater social engagement, both overall and within the residence, would be associated with more positive and less negative emotional well-being, better health and function, better sleep quality, and lower levels of pain intensity. I primarily tested cross-sectional associations, but also explored whether baseline social engagement predicted changes in health and emotional well-being from participants' initial interviews to approximately five months later.

Paper 2 Methods

Participants

Paper 2 utilizes the same sample described in Paper 1 Methods, specifically the 79 assisted and independent living residents who were not reported by staff or medical records to have diagnosed dementia.

Procedure

Most baseline, self-reported data for Paper 2 were collected during the interview described in Paper 1 Methods. At the end of the interview, instructions about wearing the actigraph (i.e., sleep monitor) and how to complete the daily sleep diaries were reviewed in detail with each participant. At the end of the sleep monitoring period, I retrieved the actigraph and daily diaries. Most participants at that time signed a HIPAA release form, authorizing review of their medical record if the residence permitted. Participants were also reminded that they would be re-contacted by phone to complete a brief follow-up interview three to six months later. Participants were compensated for their participation with a summary of their sleep data and the option to receive $30 in gift cards or to donate these gift cards to a selected charity. The summary of participants' sleep information was returned to them within a month once the actigraph data had been processed.[9]

With the help of a trained undergraduate research assistant, I attempted to complete a brief telephone interview (assessing self-rated health, health change, emotional well-being, self-reported sleep quality, and average pain) approximately five months after the interview. If we could not re-contact the participant, I consulted with residence staff or checked facility records to determine whether they had moved to more intensive care or passed away.

---

[9] The summary was a cover letter including a disclaimer that sleep monitors may overestimate sleep, a comparison of their sleep duration and efficiency to another sample of assisted living residents and to recommended levels from the National Sleep Foundation, and tips for healthy sleep from the National Sleep Foundation.

Measures

Social predictors. As in Paper 1, social predictor variables were perceived support availability (i.e., perceived social isolation, companionship availability, and emotional support availability) and social integration (i.e., number of coresident friends, staff friends, total contacts in the residence, and outside friends). In Paper 2, family ties were also included as a measure of social integration. The same concentric circle diagram described in Paper 1 was used generate names of family ties, which were summed across circles.

Health outcomes.

Self-rated Health. Participants responded to the statement, "In general, would you say your health is"; 1 = *excellent* to 5 = *poor.* This item, originally from the 36-item Medical Outcomes Study Short Form (Ware & Sherbourne, 1992) has been found to predict mortality and health care utilization in large epidemiologic studies (e.g., DeSalvo, Fan, McDonell, & Fihn, 2005).

Functional limitations. As described in Paper 1 Methods, functional limitations was measured as a sum of 10 possible limitations in activities of daily living and communication functions (including vision and hearing).

Emotional well-being. To complement past work measuring global life satisfaction (e.g., Cummings, 2002; Park, 2009; Perkins et al., 2013), I measured residents' positive and negative affect. During the interview, participants were presented with a list of "feelings" and were asked, for each, how often they felt this way over the course of a typical week, on a scale from 1 = *never feel this way* to 5 = *feel this way all the time.* These emotions covered the affective circumplex (i.e., happy, calm, sad, bored, enthusiastic, and upset; Posner, Russell, & Peterson, 2005) including low arousal emotions. Older adults increasingly prefer to experience low arousal positive emotions (e.g., calm, relaxed) compared to high arousal positive emotions (e.g., excited; Scheibe, English, Tsai, & Carstensen, 2013), but low arousal emotions are not included in most common brief assessments of affect (e.g., MacKinnon et al., 1999). A positive affect composite ($\alpha = 0.57$) and negative affect composite ($\alpha = 0.56$) were created by averaging the three corresponding affect ratings. The positive and negative affect composites were correlated $r = -0.44$, $p < .001$, but were sufficiently distinct to examine separately.

Self- reported sleep disturbance. During the interview, participants completed the 8-item sleep disturbance scale from PROMIS (Sleep Disturbance Short Form 8b[10], Patient-Reported Outcomes Measurement Information System; Cella et al., 2007), which measures perceptions of sleep quality, how deeply participants sleep, and how restorative sleep felt within the past seven days. This measure was administered both during the initial and follow-up interviews. The PROMIS population norms include both general and clinical populations; the Paper 2 sample mean was close to the population norm. Based on deviation from the population norm mean, 42% of the sample would be considered to have at least “mild” sleep disturbance (at least 0.5 standard deviations above mean; 14% had moderate to severe sleep disturbance at baseline).

Sleep diary. Participants were asked to complete a daily diary for four days asking about wake times (i.e., what time they stopped trying to sleep), bedtimes (i.e., what time they started trying to fall asleep), and fatigue. Fatigue was measured on a 4-point Likert scale from 1 = *very tired* to 4 = *very rested.*

Actigraphy-based sleep disturbance. Participants were asked to wear an actigraph (i.e., sleep monitor) on their dominant wrist for four days and four nights (Ambulatory Monitoring, 26.000-L Octagonal Basic Motionlogger with Light Sensor). The actigraph measured movement

---

[10] This version of the form was recommended when expecting a large amount of variability (and assesses a broader set of subdomains of sleep disturbance).

to estimate when the participant was awake versus asleep. Furthermore, the actigraph included a light sensor that participants were asked to keep uncovered and a button that participants were instructed to press when they got into or out of bed. Nighttime intervals (time between bedtime and rise time for each night) were determined using the movement, light, and button press information from the actigraph, combined with participants' self-reported sleep and wake times from their sleep diary[11]. By visually inspecting the graphical representation of the raw data (one minute epochs), we also identified technical and situational artifacts which should be excluded from analysis (e.g., if a participant removed the watch during the night for more than 10% of the nighttime interval). Action4 software was used to estimate sleep and wake times using the default parameters of the Time Above Threshold validated algorithm.

This information was used to calculate the estimated sleep efficiency (time asleep/time in bed), the number of minutes the participant was awake during the night after first sleep onset, and the number of awakenings for each night. The sleep efficiency, number of awakenings, and number of minutes awake after sleep onset were averaged across intervals for analyses. Sleep efficiency was negatively skewed in this sample, so the natural log of the percent of time participants were awake (time awake/time in bed) was used in analyses.

Studies comparing actigraphy to the gold standard of sleep measurement (polysomnography; PSG) have found good agreement for measurement of nighttime percent sleep and total sleep time. Agreement was less consistent for measures such as waking after sleep onset (ranging from 0.49 to 0.87 depending on the study; Tryon, 1996). Actigraphy is more sensitive to sleep than to awakenings, so it may overestimate sleep, but is considered useful in

---

[11] Two coders (the first author and a trained undergraduate research assistant blind to study hypotheses) estimated the sleep interval start and end times using this information. If there was disagreement a third coder, a professor with additional expertise in actigraphy coding, was consulted to determine the final sleep interval for analysis.

older populations (Sadeh, 2011). Number of awakenings was examined in order to provide more detailed understanding of the residents' sleep disturbance, but the measure was interpreted with greater caution given its lower expected reliability.

Actigraphy data were obtained for 74 participants (*n* = 68 with at least four nights of usable data). Three participants agreed to wear the actigraph but were excluded based on visual artifacts indicating that (a) two of the participants appeared to have not worn the actigraph for at least 90% of the night any night and (b) one participant's actigraph appeared to have a technical malfunction. Three participants declined to wear the actigraph due to concerns about comfort. One participant lost her actigraph when she went to the emergency room during the sleep monitoring period.

Pain. Participants reported their average level of pain on the day of the interview using the present pain intensity response options from the short form of the McGill Pain Questionnaire (e.g., 1 = *no pain,* 6 = *excruciating*; Melzack, 1987). The single item of pain intensity was also included in the daily diaries. In order to improve reliability of the baseline pain data, participants' pain reports from their interview and their sleep diary were averaged. Because not all participants completed the diary, the available subsample size was 67 participants. Pain intensity was also assessed by phone at the follow-up time point. Pain was not normally distributed and the distribution could not be normalized through transformation (too many people reported no pain). Thus these results should be interpreted with caution.

Health trajectory. Health trajectory was assessed by comparing initial and follow-up levels of participants' self-rated health (e.g., 1 = *excellent,* 5 = *poor*). In case there was not enough variability in self-rated health, participants were also asked whether they felt their health was better, the same, or worse than at the initial appointment (3 = *much better,* 0 = *the same,* -3 =

much worse). When the participant was no longer at the same facility, or if we were unable to re-contact the participant by phone, I reviewed the participant's medical chart or asked staff to determine and code whether the participant moved to a more intensive level of care or whether the participant passed away, for participants who had signed a HIPAA release. The available information was used to create a dummy code of whether or not the participant had a major change in health. Reporting during the phone interview a more than slight perceived decline in health (i.e., perceived health change score of -2 or -3), indication in the participants medical record of an increase in care services, or moving (because of health issue) were scored as a major change in health.

Potential covariates. Gender, education (highest level completed: high school vs. at least a four year degree), neuroticism, recent social loss, presence of a suspected sleep disorder, self-reported use of sleep medications at least once a week, a z-score average composite of self-rated health and number of functional limitations, and cognitive impairment were included as covariates for different health outcomes as described in the Data Analysis section.

See Paper 1 for information on demographic and personality measurement. Participants were also asked if they had experienced any *recent social losses* (e.g., death of someone they care about; yes or no). During the interview, participants reported whether they had been diagnosed with any sleep disorders such as sleep apnea or restless legs syndrome (and "if so, which?"). The presence or absence of these sleep disorders were used as covariates in the sleep actigraphy analyses. Similarly, participants reported whether they took any medication to help them sleep (prescribed or over the counter) and how often they took the medication in the past month (*not during the past month, less than once a week, once or twice a week,* or *three or more times a week*). Seventeen percent of the sample reported a suspected or diagnosed sleep disorder such as sleep apnea, and 41% took medication to facilitate sleep at least once a week. To assess health condition, a composite of self-rated health and functional limitations was created by averaging their z-scores.

Cognitive impairment was assessed using the DemTect, a brief cognitive test which can be used to screen for mild cognitive impairment and suspected dementia (Kalbe et al., 2004). The DemTect includes immediate recall, number transcoding, verbal fluency, reverse digit span, and a surprise delayed recall. The DemTect provides instructions for transforming the raw scores based on age and education to generate a final score which has been validated as a screening tool for mild cognitive impairment and dementia. Four participants were not able to complete all tasks to generate a score due to visual, audio, or physical limitations.

Data Analysis

Emotional well-being. Positive and negative affect can be experienced concurrently, so relationships with positive and negative affect were examined separately. When there was a significant bivariate association between social support and positive or negative affect, I adjusted for recent social loss and neuroticism and also tested associations with the component positive and negative emotions. Recent social loss was included because having been recently widowed, or having lost a close friend, could impact social support and promote sadness. Neuroticism and getting nervous easily may reflect social anxiety, which could disrupt social relationship formation and also manifest in more negative and less positive emotion.

Self-rated health. When there were significant bivariate associations with self-rated health, I adjusted for gender, education, and neuroticism. Past research has observed gender differences in self-rated health and mortality (e.g., Macintyre, Hunt, & Sweeting, 1996) and men also tend to be less socially engaged within assisted living residences (Mitchell & Kemp, 2000;

Park et al., 2009). Education was included as a proxy for socio-economic status (SES) because higher SES is related to better health (Adler et al., 1994) and past work indicated that participants with higher SES are socially advantaged in residential care communities (Stacey-Konnert & Pynoos, 1992; Kemp et al., 2012). Finally, higher neuroticism has been linked to worse health (Lahey, 2009) and could also be related to a negative bias in social self-reports.

Functional limitations. When there were significant bivariate associations between perceived support and functional limitations, I controlled for gender (men are more likely to have hearing loss than women as they age; Moscicki, Elkins, Baum, & McNamara, 1985) and neuroticism.[12]

Sleep disturbance. Gender, cognitive impairment (any vs. none), the self-rated health and functional limitation composite, use of sleep medications at least once a week, and presence of a suspected sleep disorder were included as covariates when a bivariate association with self-reported or objective sleep disturbance was significant. Gender, pre-clinical cognitive impairment, health conditions, and sleep medication have been linked prospectively to risk of sleep disturbance in older adults (Smagula, Stone, Fabio, & Cauley, 2016)[13].

Health at follow up. Baseline social engagement was tested as a predictor of emotional well-being and physical health at the follow-up time point, adjusting for baseline levels of the outcomes of interest. Diagnostics were used to test for indication that regression to the mean may have contributed to the association, such as if the outcome at baseline was significantly

---

[12] I did not include education as a covariate in the perceived support analyses because I expected social status (and corresponding attractiveness as a potential social partner) to be related to social integration more than to relationship quality (and perceived support). Even if education was included as a covariate in these analyses it did not change the substantive conclusions.

[13] Depression is also linked to sleep disturbance. Given that this link may specifically be between depression (not just negative affect) and sleep disturbance, and given constraints based on limited degrees of freedom, I did not include average negative affect as a covariate in the model. Moreover, in additional exploratory analyses, there was little indication that including negative affect would have changed the conclusions.

associated with the amount of change in the outcome at the follow up. Second, if no regression to the mean was present, reversing the baseline and follow-up scores in the model (i.e., reversing time codes) should yield the same absolute value for the coefficient but the reverse direction of association. When there is regression to the mean, the magnitude changes and the direction may not reverse (Campbell & Kenny, 2002).

Table 10.

Paper 2 Sample Descriptives

Variable	Mean	*SD*	Range
Predictor variables			
Perceived social isolation (winsorized)	8.65	2.93	4 – 16
Perceived companionship availability	14.95	3.20	7 – 20
Perceived emotional support availability	15.97	4.00	5 – 20
Number of coresident friends (winsorized)	5.63	6.70	0 – 28
Number of staff friends (winsorized)	2.53	3.51	0 – 13
Total number of contacts in the residence (winsorized)	19.46	17.19	0 – 83
Number of outside friends (winsorized)	4.24	4.52	0 – 18
Number of family ties (winsorized)	9.30	5.10	0 – 21
Number of close family ties	3.75	1.59	0 – 5
Neuroticism	2.25	0.91	1 – 4.5
Health outcome variables			
Self-rated health	2.72	0.99	1 – 5
Functional impairment (winsorized; *N* = 74)	2.84	1.99	0 – 8
Average positive affect (*N* = 78)	3.79	0.56	2 – 5
Average negative affect (*N* = 77)	2.35	0.60	1.00 – 3.67
Average diary fatigue (*N*=67)	2.51	0.70	1 – 4
Self-reported sleep disturbance	22.35	7.38	9 – 40
% night awake (*N* = 72)	13.51	9.80	2.31 – 49.78
Total minutes sleep time (*N* = 72)	455.24	81.99	231.5 – 629.75
Number of awakenings (*N* = 72)	8.35	6.09	1 – 38
Average pain (*N* = 68)	1.99	0.81	1 – 4
Self-rated health at follow up (*N* = 63)	2.98	0.90	1 – 5
Average positive affect at follow up (*N* = 62)	3.66	0.72	2 – 5
Average negative affect at follow up (*N* = 61)	2.38	0.61	1 – 4
Self-reported sleep disturbance at follow up (*N* = 62)	19.61	6.70	9 – 40
Pain at follow up (*N* = 62)	2.01	0.98	1 – 4.5

Note. Unless otherwise noted within the table, *N* = 79. Although raw scores are presented here for ease of interpretation, analyses with percent of the night awake and number of awakenings utilized natural logged values and analyses with self-reported sleep disturbance at follow up utilized a square-root transformation.

Table 11

Summary of Intercorrelations between Baseline Health-related Measures

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1. Self-rated health	—									
2. Functional impairment	0.16	—								
3. Average positive affect	0.10	0.06	—							
4. Average negative affect	-0.33**	-0.09	-0.37***	—						
5. Average diary fatigue	-0.31*	-0.19	-0.29*	0.38**	—					
6. Self-reported sleep disturbance	0.26*	0.12	0.10	-0.36**	-0.34**	—				
7. % night awake	0.05	0.21	-0.06	-0.11	-0.13	0.15	—			
8. Total minutes sleep time	0.11	0.10	0.10	-0.09	0.05	0.09	-0.39***	—		
9. Number of awakenings	0.18	0.33**	0.11	-0.19	-0.06	0.21	0.73***	0.11	—	
10. Average pain	0.21	-0.03	0.02	-0.11	-0.30*	0.10	0.26*	-0.20	0.10	—

Note. All presented results are Spearman's rho. * *p* ≤ .05, ** *p* ≤ .01, *** *p* ≤ .01.

Table 12

Summary of Intercorrelations between Follow-up Health-related Measures

Measure	1	2	3	4	5	6
1. Self-rated health	—					
2. Perceived change in health	-0.23	—				
3. Average negative affect	0.11	-0.06	—			
4. Average positive affect	-0.35**	0.32*	-0.52***	—		
5. Self-reported sleep disturbance	0.25*	-0.18	0.46***	-0.40**	—	
6. Pain	0.20	-0.07	0.05	-0.15	-0.03	—

Note. All presented results are Spearman's rho. * *p* ≤ .05, ** *p* ≤ .01, *** *p* ≤ .01.

Paper 2 Results

Emotional Well-being

Perceived support availability. ***Perceived social isolation***. Greater perceived isolation was related to more frequent negative affect, 95% CI [0.01, 0.11], but was not significant over and above neuroticism and social loss, $b = 0.05$, $SE = 0.02$, $p = .057$. Specifically, greater perceived isolation was related to feeling bored more often, 95% CI [0.02, 0.23] (Table 13). Greater perceived isolation was related to less frequent positive affect, 95% CI [-0.12, -0.03], even after controlling for neuroticism and social loss, $b = -0.06$, $SE = 0.01$, $p = .004$, 95% CI [-0.09, -0.03]. Perceived social isolation was related to frequency of enthusiasm, 95% CI [-0.22, -0.03], and happiness, 95% CI [-0.16, -0.09], but not how often people felt calm.

Table 13

Unadjusted Associations between Social Support and Subcomponents of Baseline Emotional Well-being

Well-being outcome	Social isolation	Companionship	Emotional support	Total contacts in residence
Average negative	0.06 (.02)* $R^2 = .08$	-0.06 (0.02)* $R^2 = .10$	-0.01 (0.01)	-.01 (0.002)* $R^2 = .02$
Upset	0.03 (0.01)†	-0.04 (0.02)†		-0.003 (0.002)
Sad	0.03 (0.02)†	-0.04 (0.04)		-0.004 (0.003)
Bored	0.12 (0.04)* $R^2 = .13$	-0.09 (0.03)* $R^2 = .09$		-0.01 (0.005)
Average positive	-0.07 (0.02)** $R^2 = .15$	0.06 (0.02)* $R^2 = .10$	0.02 (0.004)*** $R^2 = .03$	0.01 (0.002)* $R^2 = .04$
Enthusiastic	-0.13 (0.04)* $R^2 = .18$	0.07 (0.02)* $R^2 = .07$	0.02 (0.02)	0.01 (0.01)
Happy	-0.12 (0.02)*** $R^2 = .28$	0.11 (0.03)** $R^2 = .25$	0.05 (0.01)** $R^2 = .10$	0.01 (0.003)** $R^2 = .07$
Calm	0.03 (0.03)	-0.01 (0.02)	-0.01 (0.02)	0.003 (0.01)

Note. All results are unstandardized betas and clustered robust standard errors from single-level models, $N = 78$ for all analyses with the exception of those predicting average negative affect and how often participants felt sad when $N = 77$. † $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Companionship availability. Greater perceived companionship availability was related to less frequent negative affect, 95% CI [-0.11, -0.01], even over and above neuroticism and social loss, *b* = -0.06, *SE* = 0.02, *p* = .005. Specifically, greater companionship availability was associated with feeling bored less often, 95% CI [-0.17, -0.01] (Table 13). Greater companionship availability was also related to more frequent positive affect, 95% CI [0.02, 0.09], even adjusting for neuroticism and social loss, *b* = 0.06, *SE* = 0.02, *p* = .006, 95% CI [0.02, 0.09]. Greater companionship availability was related to more frequent enthusiasm, 95% CI [0.01, 0.13], and happiness, 95% CI [0.05, 0.17], but not how often people felt calm.

Emotional support availability. Emotional support availability was highly skewed (50% of the sample had a score of at least 17 out of 20). It was not related to frequency of negative affect, but was related to frequency of positive affect, 95% CI [0.01, 0.03], even after adjusting for neuroticism and social loss, *b* = 0.03, *SE* = 0.01, *p* = .005, 95% CI [0.01, 0.05]. Specifically, greater emotional support availability was related to more frequent happiness, 95% CI [0.03, 0.08] (Table 13).

Social integration. ***Integration within the residence***. Number of coresidents and staff friends were not related to emotional well-being (Table 14). Having fewer total contacts in the residence was weakly associated with lower average negative affect, 95% CI [-0.01, -0.0004], even after controlling for neuroticism and social loss, *b* = -0.01, *SE* = 0.002, *p* = .033, 95% CI [-0.01, -0.001]. The associations between total number of contacts in the residence and each negative emotion individually were not significant (Table 13). Total contacts in the residence was associated with average positive affect, 95% CI [0.0003, 0.01], even controlling for neuroticism and recent social loss, *b* = 0.01, *SE* = 0.003, *p* = .033, 95% CI [0.001, 0.01]. Specifically, having more contacts in the residence was related to feeling happy more often, 95% CI [0.004, 0.02].

Integration outside the residence. Neither the number of friends from outside the residence, nor the number of family members, were related to participants' emotional well-being (Table 14).

Health and function

Self-rated health. The distribution of self-rated health in this sample was roughly normally distributed, *M* = 2.72, *SD* = 0.99, with "good" being the modal response (34%) but more people reporting better than worse health. Perceived support and social integration were not related to health in regression models (Table 14)[14]. The regression residuals were not normally distributed so ordinal logit models were also tested, but the conclusions were the same.

Functional limitations. Greater perceived isolation was associated with number of functional limitations, 95% CI [0.01, 0.10] (see Table 14). Notably, this association was driven by three participants with a high number of functional limitations, and was not significant if these cases were excluded. The association was also not significant after adjusting for gender, education, and neuroticism. Emotional support availability was not related to number of functional limitations (Table 14).[15]

The only social integration measure associated with number of functional limitations was number of coresident friends. Having more coresident friends was associated with fewer functional limitations, 95% CI [-0.06, -0.003]. This association was significant after controlling for gender and neuroticism, *b* = -0.03, *SE* = 0.01, *p* =.018, 95% CI [-0.06, -0.005] and was not driven by outliers.

---

[14] More family members included in one's inner circle was associated with better health, *b* = -0.22, *SE* = 0.05, *p* = .004, 95% CI [-0.34, -0.10]. Moreover, after adjusting for gender, education, age, and neuroticism, having more close family ties remained related to better health, *b* = -0.20, *SE* = 0.06, *p* = .013, 95% CI [-0.35, -0.06].

[15] Excluding the participant with the most functional limitations, greater emotional support availability was associated with fewer functional limitations, *b* = -0.04, *SE* = 0.02, *p* = .025, 95% CI [-0.08, -0.01], *N* = 71.

Self-reported sleep

None of the social support or integration measures were related to average fatigue, measured in the sleep diary. However, there were significant associations between social engagement and self-reported sleep disturbance (Table 14).

Perceived support availability. Perceived social isolation accounted for 6% of variance in self-reported sleep disturbance over the past week. Specifically, perceiving greater social isolation was associated with greater sleep disturbance, 95% CI [0.06, 1.18]. However, after accounting for covariates, perceived social isolation was no longer related to self-reported sleep disturbance, *b* = 0.39, *SE* = 0.28, *p* = .20. Neither companionship nor emotional support availability were associated with self-reported sleep disturbance.

Social integration. None of the measures of social integration within the residence or number of outside friends were related to self-reported sleep disturbance. Number of family ties accounted for a small but significant portion of variance (1%) in self-reported sleep. Including more family members in one's social network was associated with reporting less sleep disturbance, 95% CI [-0.28, -0.06], even after accounting for covariates, *b* = -0.21, *SE* = 0.07, *p* = .023, 95% CI [-0.38, -0.04], *N* = 70.

Actigraph-based sleep quality

Perceived support availability. Perceived social isolation and emotional support availability were not related to the average percent of the night the participant was awake, total sleep time, or the average number of awakenings in single-level models.

Perceived companionship availability may have some association with sleep disturbance. Companionship availability was not related to the percent of time participants were awake at night or average minutes of sleep at night (Table 14). However, companionship availability accounted for 7% of variance in the average number of awakenings at night; participants who reported having companionship available more frequently woke up less often during the night, 95% CI [-0.08, -0.03]. Although there were extreme, influential cases in this analysis as well, they did not change the conclusion. Adjusting for gender, use of sleep medication, and presence of suspected sleep disorder did not change the findings; however, the association was no longer significant after controlling for cognitive status and the health composite[16], *b* = -0.04, *SE* = 0.02, *p* = .12, 95% CI [-0.09, 0.01], *N* = 65.

Social integration. Number of coresident friends, staff friends, and number of family ties were not related to the average percent of the night the participant was awake, the average number of minutes of sleep, or the average number of awakenings in single-level models. Total number of contacts in the residence was not related to percent of the night awake or the number of awakenings, but did account for 4% of variance in total minutes of sleep. Having more contacts in the residence was associated with fewer minutes of sleep, 95% CI [-1.65, -0.16], even after accounting for covariates, *b* = -1.14, *SE* = 0.39, *p* = .022, 95% CI [-2.06, -0.22].

The number of friends from outside the residence was more consistently associated with sleep disturbance. Having more outside friends accounted for 6% of variance in sleep efficiency; having more outside friends was related to spending a lower percent of the night awake on average, 95% CI [-0.07, -0.01] (Table 14). One participant stood out as an outlier, but excluding the participant only strengthened the association.[17] Having more outside friends was associated with a lower percent of time awake over and above gender, cognitive status, the health

---

[16] Including either cognitive status *or* the health composite on its own did not change the model, but including both together made the association between companionship availability and number of awakenings marginal. This may have been due to smaller sample size when including both these covariates (*N* = 65 with vs. *N* = 71 without).

[17] This participant was extreme based on their number of outside friends and active involvement outside the residence (28 outside friends, but 18% of the night awake). Excluding this participant strengthened the association even more; *b* = -0.05, *SE* = 0.02, *p* = .012, 95% CI [-0.09, -0.02], R^2 = .09

composite, sleep medication use, and presence of suspected sleep disorders, *b* = -0.05, *SE* = 0.01, *p* = .002, 95% CI [-0.07, -0.02].

Number of outside friends also accounted for a small amount of variance in total minutes asleep (3%). Having more outside friends was related to more minutes of sleep, 95% CI [1.41, 4.72], even after adjusting for covariates, *b* = 2.94, *SE* = 1.19, *p* = .042, 95% [0.14, 5.75]. However, number of outside friends was not associated with number of awakenings.

Pain intensity

None of the social engagement measures were related to the average pain self-reports (see Table 14).

Table 14

Unadjusted, Cross-sectional Correlations between Social Support and Health Outcomes

Health outcome	Perceived social isolation	Companionship availability	Emotional support availability	Coresident friends	Staff friends	Total contacts in residence	Outside friends	Family members
Self-rated health (N = 79)	0.05 (0.05)	0.001 (0.04)	-0.004 (0.02)	-0.02 (0.01)	-0.02 (0.01)	-0.004 (0.002)	-0.01 (0.01)	-0.05 (0.03)
Functional limitations (N = 74)	0.06 (0.02)*$_{a,b}$	0.01 (0.02)	-0.03 (0.02)	-0.03 (0.01)*	0.004 (0.02)	-0.005 (0.005)	-0.01 (0.02)	0.008 (0.01)
Average negative affect (N = 77)	0.06 (0.02)* $_{a}$	-0.06 (0.02)*	-0.01 (0.01)	-0.002 (0.004)	-0.01 (0.01)	-0.005 (0.002)*	0.01 (0.02)	-0.004 (0.01)
Average positive affect (N = 78)	-0.07 (0.02)**	0.06 (0.02)*	0.02 (0.004)***	0.0001 (0.008)	0.02 (0.01)†	0.01 (0.003)*	0.01 (0.01)	0.01 (0.01)
Fatigue (N = 67)	-0.05 (0.03)	0.01 (0.04)	0.01 (0.03)	-0.006 (0.02)	-0.03 (0.02)	0.0001 (0.004)	0.001 (0.02)	0.002 (0.01)
Self-reported sleep disturbance (N = 79)	0.62 (0.24)*$_{a}$	-0.31 (0.29)	-0.10 (0.19)	0.10 (0.11)	-0.08 (0.15)	-0.01 (0.03)	-0.06 (0.20)	-0.17 (0.05)*
Percent of time awake (ln; N= 72)	0.0001 (0.02)	-0.02 (0.02)	-0.03 (0.02)	-0.01 (0.02)	0.02 (0.02)	0.002 (0.003)	-0.04 (0.01)*	-0.02 (0.01)
Total minutes sleep time (N = 72)	2.89 (3.63)	-3.71 (4.26)	0.82 (1.84)	-0.63 (1.91)	-1.00 (1.64)	-0.90 (0.31)*	3.07 (0.70)**	1.64 (0.96)
Number of awakenings (N = 72)	0.03 (0.02)	-0.06 (0.01)***$_{a}$	-0.04 (0.02)	-0.01 (0.02)	0.01 (0.02)	-0.002 (0.003)	-0.03 (0.02)	-0.01 (0.02)
Average pain (N = 68)	-0.05 (0.05)	0.02 (0.04)	-0.01 (0.04)	0.01 (0.02)	0.04 (0.02)	0.002 (0.005)	-0.03 (0.02)	-0.02 (0.02)

Note. All displayed results are unstandardized betas and standard errors. $_{a}$ = not robust after controlling for covariates, $_{b}$ = driven by small number of extreme values. Single-level model results in white, multilevel model results in grey. See Table 13 for more detail about subcomponents of emotional well-being. ln = the natural log of percent of time awake was used as a normalized dependent variable. † $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Table 15

Social Engagement at Baseline and Health at Follow-up, Controlling for Baseline Measure of the Outcome

	Perceived support availability			Social integration				
Health outcome	Perceived social isolation	Companionship availability	Emotional support availability	Coresident friends	Staff friends	Total contacts in residence	Outside friends	Family members
Self-rated health (N = 63)	0.03 (0.04)	-0.01 (0.03)	-0.01 (0.03)	-0.02 (0.01)**$_{b}$	-0.02 (0.02)	-0.01 (0.003)*$_{a,b}$	-0.01 (0.01)†	-0.03 (0.02)
Sleep disturbance (N = 62)	0.04 (0.02)†	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.005)	-0.002 (0.02)	-0.004 (0.001)*$_{a}$	0.02 (0.01)	0.02 (0.01)†
Positive Affect (N = 62)	-0.005 (0.03)	0.02 (0.03)	0.01 (0.03)	0.01 (0.01)	0.01 (0.02)	0.003 (0.004)	0.004 (0.01)	0.01 (0.02)
Negative Affect (N = 60)	0.01 (0.01)	0.01 (0.01)	0.02 (0.01)*$_{a}$	0.01 (0.01)	0.03 (0.02)	0.002 (0.003)	-0.02 (0.01)	-0.003 (0.01)
Pain (N = 62)	-0.04 (0.03)	0.01 (0.02)	0.004 (0.02)	-0.01 (0.01)	-0.07 (0.03)*	-0.01 (0.005)*$_{a}$	0.01 (0.03)	-0.01 (0.02)

Note. All displayed results are unstandardized betas and clustered robust standard errors from single-level models. Self-rated health is scored from 1 = *excellent*, to 5 = *poor*, thus negative coefficients indicate better health. $_{a}$ = driven by small number of extreme values, $_{b}$ = regression to mean appeared to contribute. † $p \leq .10$, * $p \leq .05$, ** $p \leq .01$.

Table 16

Social Engagement at Baseline and Health at Follow-up, Controlling for Baseline Self-Rated Health

	Perceived support availability			Social integration				
Health outcome	Perceived social isolation	Companionship availability	Emotional support availability	Coresident friends	Staff friends	Total contacts in residence	Outside friends	Family members
Perceived change in health since interview (N = 63)	-0.002 (0.04)	0.06 (0.05)	0.06 (0.06)	0.04 (0.02)	0.08 (0.04)†	0.01 (0.01)†	0.05 (0.03)†	0.01 (0.01)
Increased care needed (N = 74)	0.19 (0.12)	-0.09 (0.10)	-0.10 (0.12)	0.01 (0.06)	-0.01 (0.09)	-0.03 (0.02)	-0.17 (0.15)	-0.08 (0.04)†

Note. All displayed results are unstandardized betas and clustered robust standard errors from single-level models. † $p \leq .10$.

Changes in health at follow up

Self-rated health. On average participants reported worse health at their follow-up interview (*M* = 2.98, *SD* = 0.90) than they had during the initial interview (*M* = 2.72, *SD* = 0.99), paired *t*(62) = -3.29, *p* = .002. Perceived support measures were not associated with self-rated health at the follow-up interview and there were only weak associations with social integration (Table 15).

Social integration inside residence. Some measures of social integration were linked to change in health over time. For example, the more coresidents a participant included in their social network at baseline, the healthier they perceived themselves to be at the follow-up interview, even after controlling for baseline health, 95% CI [-0.04, -0.01].

Reporting more total contacts in the residence was related to better health at the follow-up even controlling for baseline health, 95% CI [-0.02, -0.001]. However, this association was driven by some of the more extreme values; excluding two of the participants who reported an especially high number of contacts in the residence, the association between number of contacts and health at the follow up was marginal.

Social integration outside residence. There was little evidence linking social integration outside of the residence to health over time. Participants who reported more friends from outside the residence tended to have better health at the follow up even after controlling for baseline health, but the relationship was not statistically significant, *p* = .08, 95% CI [-0.03, 0.002].[18]

Potential artifacts. These effects appeared to be due in part to regression to the mean. Better health (health score closer to 1) at baseline was associated with larger changes in health at the follow up, *b* = -0.43, *SE* = 0.13, *p* =.014, 95% CI [-0.75, -0.12]. Moreover, if time codes in

---

[18] The results were significant in an ordinal logit model with clustered robust standard errors, *b* = -0.04, *SE* = 0.02, *p* = .032, 95% CI [-0.08, -0.004].

the significant models were reversed (predicting baseline health from the social outcome and the health score at follow up), the social engagement variables were reversed in direction, but were smaller in magnitude. This suggested that the effect may not be entirely due to regression to the mean, but that this artifact likely contributed to the observed differences.

Perceived change in health. On average, participants perceived their health to have stayed the same or gotten only slightly worse since the initial interview, $M = -0.19$, $SD = 0.95$, with responses ranging from having “gotten better” to have “gotten much worse” ($N = 63$).

None of the perceived support or social integration measures were associated with perceived health change since the initial interview (Table 16). People with more staff friends, more total contacts in the residence, and more outside friends only tended to perceive that their health had improved since the initial interview, adjusting for baseline overall self-rated health.

Likelihood of major health decline. Fourteen participants had a major decline in health or moved. Controlling for baseline self-rated health, none of the social support or integration measures were associated with likelihood of a major health change requiring increased care (Table 16). Participants who included more family members in one’s social network at baseline only tended to be less likely to have a major change in health or care.

Self-reported sleep disturbance. Having more contacts in the residence was associated with a decrease in sleep disturbance over time (Table 15), but this association was driven by an extreme, influential participant with a high number of contacts and a large improvement in sleep (which was likely due to improvement in pain management through medication). If this case was excluded, the relationship was no longer significant. Change in self-reported sleep disturbance at the follow up was not associated with any other measures of perceived support or social integration.

Moreover, change in sleep disturbance over time was associated with the baseline sleep disturbance score such that the higher the baseline disturbance score, the larger the decline (or the lower the baseline disturbance score, the more positive change), so these may also be artifacts of regression to the mean.

Emotional well-being. The sample had similar average positive affect at the follow up (Table 10); however, examining the difference in each participants' positive affect at baseline and follow up, there was a small (*M* = -0.15, *SD* = 0.57) but statistically significant decline in positive affect within subjects, paired *t*(61) = -2.09, *p* = .041. Yet, none of the social measures were related to change in positive affect from the baseline to the follow-up interview (Table 15).

The sample had similar average negative affect at the follow up (Table 10). Moreover, there was no significant difference in each participants' negative affect at baseline and follow up, paired *t*(59) = -1.14. Only greater emotional support availability was related to greater negative affect at follow up controlling for baseline levels in a single level model (Table 15). However, this finding was not robust excluding the participant who scored highest on negative affect at follow up.

Pain. The average reported pain at follow up was mild (*M* = 2.01, *SD* = 0.98, *N* = 62), and overall participants' pain at follow-up did not differ from their baseline pain, paired *t*(61) = 0.25, *p* = 0.81. Although the average difference was small (*M* = 0.04) there was a lot of variability (*SD* = 1.28). Notably, pain was not normally distributed, and could not be normalized through transformation (too many people reported no pain). Thus these results should be interpreted with caution.

None of the measures of perceived support were related to change in pain over time (Table 15). The number of coresident friends was not related to change in pain, but greater number of staff friends and total number of contacts in the residence were both related to reporting less pain at the follow-up interview. The relationship between number of staff friends and lower pain at follow up (over and above baseline pain) was not driven by any outliers. If the time codes were reversed, the coefficient sign changed but magnitude was similar (*b* = 0.10), indicating that the effect was not just due to regression to the mean. The relationship between the total number of contacts in the residence and change in pain was less robust; it appeared to be driven by two participants with extreme residuals. However, reversing the time codes yielded the same magnitude coefficient with the sign reversed (*b* = 0.01), which indicates that the relationship is not just due to regression to the mean. The measures of social integration outside the residence (number of outside friends and family ties) were not related to change in pain at the follow-up.

Paper 2 Discussion

Two primary patterns of results emerged from this examination of links from perceived support and social integration to emotional well-being and physical health. Greater perceived support availability was related to more positive emotional well-being, and greater social integration outside the residence was related to sleep. Beyond these sets of findings, social engagement and health were not as consistently linked (Tables 13 - 16). The observed associations between social engagement and physical health also tended to be small.

Emotional well-being at baseline. The strongest set of associations was between perceived support availability and emotional well-being. People who felt isolated more often reported less frequent positive affect (especially high arousal positive affect like happiness and enthusiasm). Similarly, people who reported having companionship available more often reported more frequent positive affect (specifically happiness) and less frequent negative affect (specifically boredom). Having more frequently available emotional support was related to feeling happy more often, but was not related to negative affect. Some people might have reported greater perceived availability of emotional support because they were frequently seeking support for bad days, while others may have experienced negative affect because they did not have emotional support available.

Among the social integration measures, only total number of contacts in the residence was related to emotional well-being. When participants knew more people in the residence who helped them feel like they were part of a community, they reported positive affect (specifically happiness) more often and negative affect slightly less often. This was a smaller effect than observed for perceived social isolation or companionship availability, and may have emerged because total contacts in the residence was associated with perceived companionship availability. When companionship availability and total contacts in the residence were both included as predictors of emotional well-being, only companionship availability was significantly associated with the measures of positive and negative affect.

Health and function at baseline. None of the primary perceived support and social integration measures were related to self-rated health at baseline. Having more coresident friends was consistently associated with having fewer functional limitations. However, someone would need at least 33 additional coresident friends in order to be expected to have one fewer functional limitation; this was a small effect. Moreover, it is reasonable to expect reverse directionality; functional impairment (especially communication impairment) may act as a barrier to social relationships with other residents (Palmer, Newsom, & Rook, 2016).

Sleep at baseline. There were few consistent relationships between social support or integration and sleep disturbance. Having more family ties was related to less self-reported sleep disturbance, but family ties were not related to objective sleep disturbance. The most consistent finding for objective sleep disturbance was that participants with more outside friends on average spent a smaller percent of the night awake and spent more minutes asleep per night. Even this effect was small, having one additional outside friend would be expected to correspond to approximately 3 additional minutes of sleep. Moreover, number of outside friends was not related to self-reported sleep disturbance.

Having more outside contacts could be related to greater physical activity and stimulation during the day which could promote sleep quality (lack of exercise is associated with sleep problems; Foley, Ancoli-Israel, Britz, & Walsh, 2004). However, if greater activity and stimulation from social contact improved health, friendships within the residence and family ties should also be linked to sleep. Given that they were not, it appears more likely that residents who objectively sleep better may have more energy and be better able to maintain outside friendships. Better objective sleep may not be related to family ties because family relationships are more stable than voluntary outside friendships.

Given past literature linking loneliness and sleep quality, I had expected that perceived social isolation would be most strongly related to sleep disturbance. Although feeling isolated more often was related to greater self-reported sleep disturbance, the association was weak and not robust controlling for health or cognitive status. Compared to previous studies, the current sample differs in that residents know that there are staff members in the building whose job is to keep them happy and healthy. Even if people feel that “people are around me but not with me”, and may not be satisfied with the quality of their relationships, they may still feel an implicit level of safety within this kind of setting. Thus it may be harder to detect perceived social isolation serving as a signal of threat compared to community dwelling older adults (e.g., McHugh & Lawlor, 2013).

Pain intensity at baseline. Less perceived support availability and social integration was expected to be related to greater pain intensity based on previous work identifying a shared neural alarm for physical and social pain (Eisenberger & Leiberman, 2004). However, there were no significant cross-sectional associations. This is likely because of the low frequency of pain in this sample (75% reported no or mild pain at the interview). Residents with more chronic pain may not have volunteered to participate; future research on pain in this setting could specifically target and recruit residents experiencing pain. Moreover, given that much of the past research linking social support or loneliness to pain has been in chronic pain samples, it may be easier to detect differences in that population than in a sample with low rates of pain.

Health at follow up. There were no robust links between baseline perceived support or social integration and average positive or negative affect at the follow-up time point after controlling for baseline affect. Having more coresident friends at baseline was associated better health at the follow-up time point, controlling for baseline health. However, the association was small and appeared to be at least partially due to regression to the mean. There was also little evidence of links between social engagement at baseline and change in sleep disturbance. Having more staff friends at baseline was related to reporting less intense pain at the follow up, controlling for baseline pain intensity; however this was not part of a larger pattern of results.

The follow-up interview provided pilot data. Although most follow-up interviews were conducted approximately five months after the first interview, 10% of participants were reached approximately four months after the first interview or sooner, and 10% of participants were reached approximately six months after the first interview or later. In addition, we were not able to re-contact all participants and we specifically were less able to re-interview participants who had more functional impairment at baseline. Because of phone interview time limitations, we only asked about health at the follow up, yet changes in social support over time may also have been related to health.

Summary. Given the number of statistical tests, it was most prudent to focus on the patterns of results across the analyses. Perceived support availability was most consistently related to positive affect. Perceived support availability reflects attitudes towards one's social network and this appeared to also relate to general emotional experience. The links between perceived support, social integration, and physical health outcomes were less consistent. A set of analyses linked number of outside friends to objective sleep disturbance. Given that other measures of social integration were not associated with objective sleep disturbance, it appeared that greater sleep disturbance may undermine residents' ability to maintain outside friendships. New friendship formation, as indexed by friendships with residents and staff, was not consistently associated with better psychological or physical health in contrast to the link between new confidants and health observed by Cornwell and Laumann (2015). The current study was primarily cross sectional, in contrast with their longitudinal design, and measured total accumulated new friendships in the facility rather than focusing on addition of close confidants.

Ideally, future research should study social support and health longitudinally to understand their interrelationships over time and whether social support is related prospectively to health or whether the relationship is reversed or bidirectional. Intervention research designed to facilitate new friendship formation in residences (or to help maintain outside relationships) would allow researchers to test whether improvements in social support and integration in the residence is related to improvements in emotional well-being, functional limitations, and sleep or whether differences in these health outcomes predict efficacy of the intervention.

Overall Discussion

This dissertation was designed to identify potential predictors and consequences of social support and integration in residential care communities. Paper 1 found new links between endorsement of self- and resident-directed age stereotypic characteristics and social engagement within the residence. Age stereotypes accounted for 10-42% of variance in perceived support availability and social motivation, accounting for the most variance in perceived social isolation.

Paper 2 found substantial associations between perceived support availability and emotional well-being (perceived support availability accounted for 3-28% of variability depending on the specific support availability and affect measurement). People with more outside friends had slightly less objective sleep disturbance, but other significant links between social engagement and physical health did not cohere into consistent patterns or were not robust to outliers or potential confounds.

A primary weakness of this study was its reliance on a relatively small sample which may not be representative of all assisted living residents. With the limited sample size, some statistical models may have been underpowered and others may have been overfit. The participants were likely more socially active than residents who did not volunteer to participate[19] and may have also been healthier. Residents who felt ill sometimes backed out of participating. This restriction of range would have made it more difficult to detect effects, which may have contributed to the small, less consistent links between social support and health in this sample. The associations in a sample with a greater range of social engagement and health outcomes may be larger than

---

[19] In this sample 82% of participants included coresident friends, while Perkins et al. (2013) found only 29% of assisted living residents included other residents in their network. This is may be due to using a smaller volunteer vs. large scale purposive sample and/or to interviewing CCRC residents and not only assisted living. Stacey-Konnert and Pynoos (1992) more similarly found 72% of their randomly selected CCRC residents socialized regularly with others in their community.

those observed here. With greater resources in the future, using purposive sampling to collect data from a range of residences would facilitate greater generalizability across residential care communities.

Oversampling lower income residences may also be necessary given that it was more difficult to get permission for research from them. More affluent residential care communities were usually eager to participate in and facilitate research because they expected this kind of partnership to reflect well on the residence. Moreover, these more affluent residential care communities were often chains, which facilitated making connections with other similar residences in the area. Conversely the lower income residences seemed wary of allowing research in the residence and/or lacked the infrastructure to facilitate research. When there are fewer staff members, there may not be any staff who have time to talk to a researcher about proposed studies or to help identify residents eligible to participate.

Social integration and functional impairment appeared to vary the most across residences (compared to perceived support availability or social motivation). Identifying facility level information predicting greater social integration could have interesting, practical policy implications. However, facilities differed in what information they collected and had available regarding resident demographics and staffing information. Collecting pilot data to determine what information is most universally collected and available, and establishing even stronger staff partnerships, would facilitate future facility data collection.

Due to resource and time constraints, the study was correlational and primarily cross-sectional. Thus the directionality of the associations is unclear. Having more perceived support may affect people’s perceptions of their own and other residents’ aging. However, there is logical support for the hypothesized direction. For example, if social engagement affected age stereotypes, social engagement would be expected to affect perceptions of sociability and loneliness more than the other age stereotypes. Similarly, it is more difficult to explain why greater motivation to make new friends would lead to different perceptions of oneself and other residents than the reverse.

A primary strength of this study is its use of quantitative methodology. Most work in the residential care domain has been qualitative, which allows researchers to understand the experiences of residents who may not be able to complete quantitative measures accurately. However, qualitative data provide only one piece of the puzzle. Using multiple methods provides the opportunity for triangulation, refinement, and stronger support for conclusions from these past qualitative interviews. For example, by using quantitative methods, we could see whether a construct that has emerged from interviews (age stigma) is salient in a different sample and we could assess the strength of the relationship between a given construct and measures of social support, integration, and motivation.

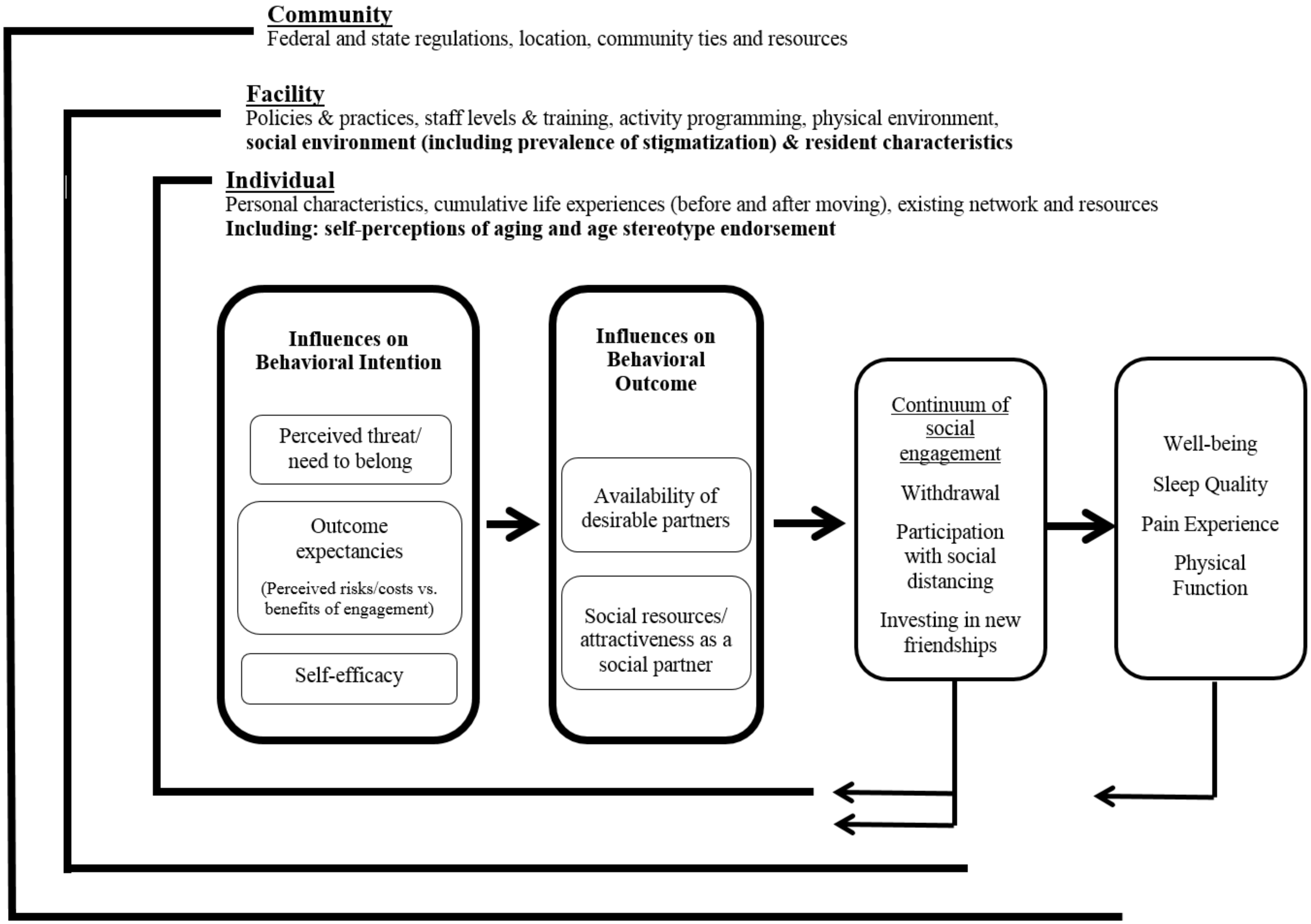
Another key strength is that Paper 1 showed the importance of differentiating between positive and negative age stereotype endorsement. There has been increasing attention to domain specificity in recent years (Kornadt & Rothermund, 2015), and there has been some differentiation between attention to gains vs. losses with age (Diehl & Wahl, 2010). The current study extended this work to age stereotypes and illustrated the need to avoid treating age stereotypes as ranging from positive to negative when people can simultaneously hold positive and negative age stereotypes (about themselves and others).

A key strength of Paper 2 is that it extended work linking social support and sleep from community samples to the residential care setting. This was an important first step, but also highlighted that the strength of the associations may be smaller than previously observed in community samples. Thus, future work linking social support to health in residential care settings should recruit larger samples with a wider range of social engagement within the residence. Future work could also directly test whether the magnitude of specific social support-health associations differ for older adults in and outside of institutional settings.

More generally, an important next step is to identify mechanisms showing *why* age stereotypes are related to social engagement as observed in this dissertation. For example, it would be useful to directly test whether social self-efficacy mediates the relationships as theorized. Designing interventions to shift age stereotypes or promote social adjustment in residential care communities would help test the hypothesized direction of effects and allow for further exploration of mechanisms. Moreover, these kinds of interventions would have the potential to improve assisted and independent living residents' quality of life.

Appendix

Figure 1. Conceptual model of social adjustment in assisted and independent living residences.



References

Abbott, K. M., Bettger, J. P., Hampton, K., & Kohler, H. P. (2012). Exploring the use of social network analysis to measure social integration among older adults in assisted living. *Family & Community Health*, *35*, 322–33. doi:10.1097/FCH.0b013e318266669f

Adler, N., Boyce, T., Chesney, M., Cohen, S., Folkman, S., Kahn, R., & Syme, S. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist, 49*, 15-24. doi:10.1037/0003-066X.49.1.15

Assisted Living Federation of America (2013). *Assisted living*. Retrieved from http://www.alfa.org/alfa/Assisted_Living_Information.asp

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211. doi: 10.1016/0749-5978(91)90020-T

Antonucci, T. C. (1986). Hierarchical mapping technique. *Generations, 10*, 10-12.

Babyak, M. A. (2004). What You See May Not Be What You Get: A Brief, Nontechnical Introduction to Overfitting in Regression-Type Models. *Psychosomatic Medicine, 66*, 411–421. doi:10.1097/01.psy.0000127692.23278.a9

Ball, M. M., Whittington, F. J., Perkins, M. M., Patterson, V. L., Hollingsworth, C., King, S. V., & Combs, B. L. (2000). Quality of life in assisted living facilities: Viewpoints of residents. *Journal of Applied Gerontology*, *19*, 304–325. doi:10.1177/073346480001900304

Ball, M. M., Perkins, M. M., Whittington, F. J., Connell, B. R., Hollingsworth, C., King, S. V, … Combs, B. L. (2004). Managing decline in assisted living: The key to aging in place. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences, 59*, S202–12. doi: 10.1093/geronb/59.4.S202

Ball, M. M., Perkins, M. M., Whittington, F.J., Hollingsworth, C., King, S. V., & Combs, B. L. (2005). *Communities of care: Assisted living for African American elders*. Baltimore: The Johns Hopkins University Press.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497-529.

Bernstein, M. J., & Claypool, H. M. (2012). Social exclusion and pain sensitivity why exclusion sometimes hurts and sometimes numbs. *Personality and Social Psychology Bulletin*, *38*, 185-196.

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine, 51*, 843–857. doi:10.1016/S0277-9536(00)00065-4

Brooks, K. P., & Dunkel Schetter, C. (2011). Social negativity and health: Conceptual and measurement issues. *Social and Personality Psychology Compass, 5*, 904-918.

Brown, J. L., Sheffield, D., Leary, M. R., & Robinson, M. E. (2003). Social support and experimental pain. *Psychosomatic Medicine*, *65*(2), 276-283.

Burge, S., & Street, D. (2010). Advantage and choice : Social relationships and staff assistance in assisted living. *Journal of Gerontology: Social Sciences, 65B,* 358–369. doi:10.1093/geronb/gbp118.Advance

Cacioppo, J. T., Hawkley, L. C., Bernston, G. C., Ernst, J. M., Gibbs, A. C., Stickgold, R., & Hobson, J.A. (2002). Do lonely days invade the nights? Potential social modulation of sleep efficiency. *Psychological Science, 13,* 384–387.

Campbell, D. T., & Kenny, D. A. (1999). A Primer on Regression Artifacts. New York: The Guilford Press.

Carstensen, L. L. (1991). Selectivity theory: Social activity in life-span context. *Annual Review of Gerontology and Geriatrics, 11*, 195–217.

Carstensen, L. L. (1992). Social and emotional patterns in adulthood: Support for socioemotional selectivity theory. *Psychology & Aging, 7*, 331–338. doi: 10.1037/0882-7974.7.3.331

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist, 54*, 165-181. doi: 10.1037/0003-066X.54.3.165

Cella, D., Gershon, R. C., Lai, J-S., & Choi, S. W. (2007). The future of outcomes measurement: Item banking, tailored short-forms, and computerized adaptive assessment. *Quality of Life Research, 16*(S1), 133-41.

Centers for Medicare & Medicaid Services (2014). *MDS 3.0 RAI Manual*. Retrieved from http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/NursingHomeQualityInits/MDS30RAIManual.html

Cohen, S. (2004). Social relationships and health. *American Psychologist, 59*, 676–684. doi:10.1037/0003-066X.59.8.676

Cornwell, B., & Laumann, E. O. (2015). The health benefits of network growth: New evidence for a national survey of older adults. *Social Science Medicine, 125*, 94-106. doi:10.1016/j.socscimed.2013.09.011

Cuddy, A.J.C., & Fiske, S.T. (2002). Doddering, but Dear: Process, Content, and Function in Stereotyping of Older Persons. In T. Nelson (Ed.), *Ageism: Stereotyping and Prejudice Against Older Persons* (pp. 3 – 26). Cambridge, MA: MIT Press.

Cummings, S. M. (2002). Predictors of psychological well-being among assisted-living residents. *Health & Social Work, 27*, 293–302. doi: 10.1093/hsw/27.4.293

Cutchin, M. P., Owen, S. V, & Chang, P. F. J. (2003). Becoming “at home” in assisted living residences: Exploring place integration processes. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *58,* S234–43. doi: 10.1093/geronb/58.4.S234

DeSalvo, K. B., Fan, V. S., McDonell, M. B., & Fihn, S. D. (2005). Predicting mortality and healthcare utilization with a single question. *Health Services Research, 40,* 1234-1246.

Diehl, M. K., & Wahl, H. W. (2010). Awareness of age-related change: Examination of a (mostly) unexplored concept. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *65*, 340-350.

Dobbs, D., Eckert, J. K., Rubinstein, B., Keimig, L., Clark, L., Frankowski, A. C., & Zimmerman, S. (2008). An ethnographic study of stigma and ageism in residential care or assisted living. *The Gerontologist, 48*, 517–526.

Eisenberger, N. I., & Cole, S. W. (2012). Social neuroscience and health: Neurophysiological mechanisms linking social ties with physical health. *Nature Neuroscience*, *15*, 669-674.

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt? An fMRI study of social exclusion. *Science*, *302*(5643), 290-292. doi: 10.1126/science.1089134

Eisenberger, N. I., & Lieberman, M. D. (2004). Why rejection hurts: a common neural alarm system for physical and social pain. *Trends in Cognitive Sciences*, *8,* 294-300.

Evers, A. W., Kraaimaat, F. W., Geenen, R., Jacobs, J. W., & Bijlsma, J. W. (2003). Pain coping and social support as predictors of long-term functional disability and pain in early rheumatoid arthritis. *Behaviour Research and Therapy, 41*, 1295-1310.

Foley, D., Ancoli-Israel, S., Britz, P., & Walsh, J. (2004). Sleep disturbances and chronic disease in older adults: Results of the 2003 National Sleep Foundation Sleep in America Survey. *Journal of Psychosomatic Research, 56*, 497–502. doi:10.1016/j.jpsychores.2004.02.010

Friedman, E. M. (2011). Sleep quality, social well-being, gender, and inflammation: an integrative analysis in a national sample. *Annals of the New York Academy of Sciences, 1231*, 23–34.

Gagliese, L., & Melzack, R. (1997). Chronic pain in elderly people. *Pain, 70*, 3-14.

Gatchel, R. J., Howard, K., & Haggard, R. (2011). Pain: The biopsychosocial perspective. In R.J. Contrada & A. Baum (Ed.), *The Handbook of Stress Science: Biology, Psychology, and Health.* New York: Springer Publishing Company, LLC.

Heckhausen, J., & Brim, O. G. (1997). Perceived problems for self and others: Self-protection by social downgrading throughout adulthood. *Psychology and Aging, 12*, 610–619. doi: 10.1037/0882-7974.12.4.610

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: a meta-analytic review. *PLoS Medicine*, *7,* e1000316. doi:10.1371/journal.pmed.1000316

Howie, L. O., Troutman-Jordan, M., & Newman, A. M. (2014). Social support and successful aging in assisted living residents. *Educational Gerontology, 40*, 61–70. doi: 10.1080/03601277.2013.768085

Hubbard, G., Tester, S., & Downs, M. G. (2003). Meaningful social interactions between older people in institutional care settings. *Ageing and Society, 23*(1), 99–114. doi:10.1017/S0144686X02008991

Hummert, M.L., Gartska, T.A., Shaner, J.L., & Stahm, S. (1994). Stereotypes of the elderly held by young, middle-aged, and elderly adults. *Journal of Gerontology: Psychological*

Sciences, 49, P240-P249.

Jang, Y., Park, N. S., Dominguez, D. D., & Molinari, V. (2014). Social engagement in older residents of assisted living facilities. *Aging & Mental Health, 18*, 642-647. doi: 10.1080/13607863.2013.866634

Jaremka, L. M., Fagundes, C. P., Glaser, R., Bennett, J. M., Malarkey, W. B., & Kiecolt-Glaser, J. K. (2013). Loneliness predicts pain, depression, and fatigue: Understanding the role of immune dysregulation. *Psychoneuroendocrinology*, *38*, 1310-1317.

Kahn, R. L., & Antonucci, T. C. (1980). Convoys over the life course: Attachment, roles, and social support. In P. B. Baltes & O. G. Brim (Eds.), *Life-span Development and Behavior* (pp. 253–286). San Diego, CA; Academic Press.

Katz, S., Downs, T.D., Cash, H.R., Grotz, R.C. (1970). Progress in development of the index of ADL. *The Gerontologist*, *10*, 20–30.

Keller-Cohen, D., Fiori, K., Toler, A., & Bybee, D. (2006). Social relations, language and cognition in the “oldest old.” *Ageing and Society*, *26*, 585. doi:10.1017/S0144686X06004910

Kelley, H. H., & Thibaut, J.W. (1978). *Interpersonal relations: A theory of interdependence*. New York: Wiley.

Kemp, C. L. (2008). Negotiating transitions in later life: Married couples in assisted living. *Journal of Applied Gerontology*, *27*, 231–251. doi:10.1177/0733464807311656

Kemp, C. L., Ball, M. M., Hollingsworth, C., & Perkins, M. M. (2012). Strangers and friends : Residents’ social careers in assisted living. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 67, 491-502. doi:10.1093/geronb/gbs043.

Kornadt, A. E., & Rothermund, K. (2012). Internalization of Age Stereotypes Into the Self-Concept via Future Self-Views: A General Model and Domain-Specific Differences. *Psychology and Aging, 27*, 164–172. doi:10.1037/a0025110

Kornadt, A. E. & Rothermund, K. (2015). Views on aging: Domain-specific approaches and implications for developmental regulation. *Annual Review of Gerontology and Geriatrics, 35*(1), 121-144. doi:10.1891/0198-8794.35.121

Kornadt, A. E., Voss, P., & Rothermund, K. (2015). Hope for the best, prepare for the worst? Future self-views and preparation for age-related changes. *Psychology and Aging*. doi:10.1037/pag0000048

Kurina, L. M., Knutson, K. L., Hawkley, L. C., Cacioppo, J. T., Lauderdale, D. S., & Ober, C. (2011). Loneliness is associated with sleep fragmentation in a communal society. *Sleep, 34*, 1519–1526. doi:10.5665/sleep.1390

Lahey, B. B. (2009). Public health significance of neuroticism. *American Psychologist, 64*, 241–256. doi:10.1037/a0015309

Lemon, B. W., Bengtson, V. L., & Peterson, J. A. (1972). An exploration of the activity theory of aging: Activity types and life satisfaction among in-movers to a retirement community. *Journal of Gerontology, 27,* 511–23. doi: 10.1093/geronj/27.4.511

Levy, B. (2009). Stereotype embodiment: A psychosocial approach to aging. *Current Directions in Psychological Science*, *18*, 332-336.

Levy, B. R., Kasl, S. V., & Gill, T. M. (2004). Image of aging scale. *Perceptual and Motor Skills, 99*, 208–10. doi:10.2466/PMS.99.5.208-210

Levy, B. R., Pilver, C., Chung, P. H., & Slade, M. D. (2014). Subliminal strengthening improving older individuals’ physical function over time with an implicit-age-stereotype intervention. *Psychological Science, 25*, 2127-2135.

Levy, B. R., Slade, M. D., & Kasl, S. V. (2002). Longitudinal benefit of positive self-perceptions of aging on functional health. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 57*, P409–P417.

Levy, B. R., Slade, M. D., May, J., & Caracciolo, E. A. (2006). Physical recovery after acute myocardial infarction: Positive age self-stereotypes as a resource. *The International Journal of Aging and Human Development, 62*, 285-301.

Levy, B.R., Zonderman, A.B., Slade, M.D., & Ferrucci, L. (2011). Memory shaped by age stereotypes over time. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 67*, 432-436. doi: 10.1093/geronb/gbr120

Liang, J., & Bollen, K. A. (1983). The structure of the Philadelphia Geriatric Center Morale Scale: A reinterpretation. *Journal of Gerontology, 38*, 181–189.

Lieberman, M. D. (2007). Social Cognitive Neuroscience: A Review of Core Processes. *Annual Review of Psychology, 58*, 259–289. doi:10.1146/annurev.psych.58.110405.085654

López-Martínez, A. E., Esteve-Zarazaga, R., & Ramírez-Maestre, C. (2008). Perceived social support and coping responses are independent variables explaining pain adjustment among chronic pain patients. *The Journal of Pain, 9*, 373-379.

Macintyre, S., Hunt, K., & Sweeting, H. (1996). Gender differences in health: Are things really as simple as they seem? *Social Science and Medicine, 42*, 617–624. doi:10.1016/0277-9536(95)00335-5

Mackinnon, A., Jorm, A. F., Christensen, H., Korten, A. E., Jacomb, P. A., & Rodgers, B. (1999). A short form of the Positive and Negative Affect Schedule: Evaluation of factorial validity and invariance across demographic variables in a community sample. *Personality and Individual Differences*, *27*, 405-416.

Mavandadi, S., Sorkin, D. H., Rook, K. S., & Newsom, J. T. (2007). Pain, positive and negative social exchanges, and depressive symptomatology in later life. *Journal of Aging and Health*, *19*, 813-830.

McHugh, J. E., & Lawlor, B. A. (2013). Perceived stress mediates the relationship between emotional loneliness and sleep quality over time in older adults. *British Journal of Health Psychology*, *18*, 546–555. doi:10.1111/j.2044-8287.2012.02101.x

Melzack, R. (1987). The short-form McGill pain questionnaire. *Pain*, *30*, 191-197.

Menkin, J. A., Guan, S. A., Araiza, D., Reyes, C. E., Trejo, L., Choi, S. E., Willis, P., Kotick, J., Jimenez, E., Ma, S., McCreath, H., Chang, E., Witarama, T., & Sarkisian, C. A. (in press). Racial/ethnic differences in expectations regarding aging among older adults. *The Gerontologist.*

Menkin, J. A., Robles, T. F., Gruenewald, T. L., Tanner, E. K., & Seeman, T. E. (2016). Positive expectations regarding aging linked to more new friends in later life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences.* doi:10.1093/geronb/gbv118

Mitchell, J. M., & Kemp, B. J. (2000). Quality of life in assisted living homes: A multidimensional analysis. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *55*, P117–27. doi: 10.1093/geronb/55.2.P117

Morin, C. M., Rodrigue, S., Ivers, H. (2003). Role of stress, arousal, and coping skills in primary insomnia. *Psychosomatic Medicine, 65*, 259–267.

Moscicki, E. K., Elkins, E. F., Baum, H. M., & McNamara, P. M. (1985). Hearing loss in the elderly: an epidemiologic study of the Framingham Heart Study Cohort. Ear Hear, 6(4), 184–190.

Moss, S. Z., & Moss, M. S. (2007). Being a man in long term care. *Journal of Aging Studies*, *21*(1), 43–54. doi:10.1016/j.jaging.2006.05.001

Palmer, A. D., Newsom, J. T., & Rook, K. S. (2016). How does difficulty communicating affect the social relationships of older adults? An exploration using data from a national survey. Journal of Communication Disorders, 62, 131–146. doi:10.1016/j.jcomdis.2016.06.002

Park, N. S. (2009). The relationship of social engagement to psychological well-Being of older adults in assisted living facilities. *Journal of Applied Gerontology*, *28,* 461–481. doi:10.1177/0733464808328606

Park, N. S., Knapp, M. A, Shin, H. J., & Kinslow, K. M. (2009). Mixed methods study of social engagement in assisted living communities: Challenges and implications for serving older men. *Journal of Gerontological Social Work*, *52*(8), 767–83. doi:10.1080/01634370903285541

Park, N. S., Zimmerman, S., Kinslow, K., Shin, H. J., & Roff, L. L. (2010). Social engagement in assisted living and implications for practice. *Journal of Applied Gerontology, 31*, 215–238. doi:10.1177/0733464810384480

Perkins, M. M., Ball, M. M., Whittington, F. J., & Hollingsworth, C. (2012). Relational autonomy in assisted living: A focus on diverse care settings for older adults. *Journal of Aging Studies, 26*, 214–225. doi:10.1016/j.jaging.2012.01.001.Relational

Perkins, M. M., Ball, M. M., Kemp, C. L., & Hollingsworth, C. (2013). Social relations and resident health in assisted living: An application of the convoy model. *The Gerontologist, 53*, 495–507. doi:10.1093/geront/gns124

Perkinson, M. A., & Rockemann, D. D. (1996). Older women living in a continuing care retirement community : Marital status and friendship formation. *Journal of Women & Aging*, *8*, 159–177. doi:10.1300/J074v08n03_11

Pikhartova, J., Bowling, A., & Victor, C. (2015). Is loneliness in later life a self-fulfilling prophecy? *Aging & Mental Health*. doi:10.1080/13607863.2015.1023767

Pinquart, M., & Sörensen, S. (2001). Influences on loneliness in older adults: A meta-analysis. *Basic and Applied Social Psychology, 23*, 245–266. doi:10.1207/S15324834BASP2304_2

Posner, J., Russell, J. A., & Peterson, B. S. (2005). The circumplex model of affect: An integrative approach to affective neuroscience, cognitive development, and psychopathology. *Developmental Psychopathology*, *17,* 715–734.

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, *41*(1), 203-212.

Rosenstock, I. M. (1966). Why people use health services. *The Milbank Memorial Fund Quarterly*, *44,* 94-127. doi: 10.2307/3348967

Rosenstock, I. M. (1990). The health belief model: Explaining health behavior through expectancies. In: Glantz, K. et al. *Health Behavior and Health Education: Theory, Research, and Practice* (pp. 39-62). San Francisco: Jossey-Bass.

Sadeh, A. (2011). The role and validity of actigraphy in sleep medicine: An update. *Sleep Medicine Reviews, 15*, 259–267. doi:10.1016/j.smrv.2010.10.001

Sandhu, N. K., Kemp, C. L., Ball, M. M., Burgess, E. O., & Perkins, M. M. (2013). Coming together and pulling apart: Exploring the influence of functional status on co-resident relationships in assisted living. *Journal of Aging Studies*, *27*, 317–29. doi:10.1016/j.jaging.2013.07.001

Sarkisian, C. A., Shunkwiler, S. M., Aguilar, I., & Moore, A. A. (2006). Ethnic differences in expectations for aging among older adults. *Journal of the American Geriatric Society, 54,* 1277-1282. doi:10.1111/j.1532-5415.2006.00834.x

Scheibe, S., English, T., Tsai, J. L., & Carstensen, L. L. (2013). Striving to feel good: Ideal affect, actual affect, and their correspondence across adulthood. *Psychology and Aging, 28*, 160-171. doi: 10.1037/a0030561

Segerstrom, S.C. (2008). Social networks and immunosuppression during stress: Relationship conflict or energy conservation? *Brain, Behavior, and Immunity, 22,* 279-284.

Segrin, C., & Domschke, T. (2011). Social support, loneliness, recuperative processes, and their direct and indirect effects on health. *Health Communication, 26,* 221–232. doi:10.1080/10410236.2010.546771

Shippee, T. P. (2009). “But I am not moving”: Residents’ perspectives on transitions within a continuing care retirement community. *The Gerontologist, 49*, 418–27. doi:10.1093/geront/gnp030

Shippee, T. P. (2012). On the edge: Balancing health, participation, and autonomy to maintain active independent living in two retirement facilities. *Journal of Aging Studies, 26*(1), 1–15. doi:10.1016/j.jaging.2011.05.002

Smagula, S. F., Stone, K. L., Fabio, A., & Cauley, J. A. (2016). Risk factors for sleep disturbances in older adults: Evidence from prospective studies. *Sleep Medicine Reviews, 25*, 21–30. doi:10.1016/j.smrv.2015.01.003

Stacey-Konnert, C., & Pynoos, J. (1992). Friendship and social networks in a continuing care retirement community. *Journal of Applied Gerontology*, *11*, 298–313. doi:10.1177/073346489201100304

StataCorp. (2015). *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

Steptoe, A., O'Donnell, K., Marmot, M., & Wardle, J. (2008). Positive affect, psychological well-being, and good sleep. *Journal of Psychosomatic Research*, *64*, 409-415.

Steptoe, A., Shankar, A., Demakakos, P., & Wardle, J. (2013). Social isolation, loneliness, and all-cause mortality in older men and women. *Proceedings of the National Academy of Sciences*, *110*, 5797-5801. doi: 10.1073/pnas.1219686110

Street, D., Burge, S., Quadagno, J., & Barrett, A. (2007). The salience of social relationships for resident well-being in assisted living. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *62*, S129–34.

Street, D., & Burge, S. W. (2012). Residential context, social relationships, and subjective well-being in assisted living. *Research on Aging*, *34*, 365–394. doi:10.1177/0164027511423928

Thomas, P. A. (2012). Trajectories of social engagement and mortality in late life. *Journal of Aging and Health*, *24*, 547–568. doi:10.1177/0898264311432310

Tighe, S.K., Leoutsakos, J.-M.S., Carlson, M., Onyike, C.U., Samus, Q., Baker, A., . . . Lyketsos, C.G. (2008), The association between activity participation and time to discharge in the assisted living setting. International Journal of Geriatric Psychiatry, 23, 586–591.

Tompkins, C. J., Ihara, E. S., Cusick, A., & Park, N. S. (2012). “Maintaining connections but wanting more”: The continuity of familial relationships among assisted-living residents. *Journal of Gerontological Social Work, 55,* 249–61. doi:10.1080/01634372.2011.639439

Troxel, W., Buysse, D., Monk, T., Begley, A., & Hall, M. (2010). Does social support differentially affect sleep in older adults with versus without insomnia? *Journal of Psychosomatic Research, 69,* 459-466. doi: 10.1016/j-jpsychores.2010.04.003

Troxel, W. M., Robles, T. F., Hall, M., Buysse, D. J. (2007). Marital quality and the marital bed: examining the covariation between relationship quality and sleep. *Sleep Medicine Review, 11,* 389–404.

Tryon, W. W. (1996). Nocturnal activity and sleep assessment. Clinical Psychology Review, 16(3), 197-213.

Uchino, B. N. (2004). *Social Support and Physical Health: Understanding the Health Consequences of Relationships.* New Haven, CN: Yale University Press.

Umberson, D. (1992). Gender, marital status and the social control of health behavior. Social *Science & Medicine, 34*, 907–17.

Van Tilburg, T. (1992). Support networks before and after retirement. *Journal of Social and Personal Relationships, 9,* 433–445. doi:10.1177/0265407592093006

Ware, J., Jr., & Sherbourne, C.D. (1992) The MOS 36-Item Short-Form Health Survey (SF-36): Conceptual Framework and Item Selection. *Medical Care, 30,* 473-483.

Williams, K. N., & Warren, C. A. B. (2009). Communication in assisted living. *Journal of Aging Studies*, *23*(1), 1–21. doi:10.1016/j.jaging.2007.09.003.Communication

Wood, V., & Robertson, J. F. (1978). Friendship and kinship interaction: Differential effect on the morale of the elderly. *Journal of Marriage and Family*, *40*, 367–375. doi: 10.2307/350767

Wrzus, C., Hänel, M., Wagner, J., & Neyer, F. J. (2013). Social network changes and life events across the life span: a meta-analysis. *Psychological Bulletin*, *139*(1), 53–80. doi:10.1037/a0028601

Yamasaki, J., & Sharf, B. F. (2011). Opting out while fitting in: How residents make sense of assisted living and cope with community life. *Journal of Aging Studies*, *25*(1), 13–21. doi:10.1016/j.jaging.2010.08.005