The Social Connectedness of Older Adults: A National Profile

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For decades, scholars have wrestled with the assumption that old age is characterized by social isolation. However, there has been no systematic, nationally representative evaluation of this possibility in terms of social network connectedness. In this article, we develop a profile of older adults' social integration with respect to nine dimensions of interpersonal networks and voluntary associations. We use new data from the National Social Life, Health, and Aging Project (NSHAP), a population-based study of non-institutionalized older Americans ages 57 to 85, conducted in 2005 to 2006. Results suggest that among older adults, age is negatively related to network size, closeness to network members, and number of non-primary-group ties. On the other hand, age is positively related to frequency of socializing with neighbors, religious participation, and volunteering. In addition, age has a U-shaped relationship with volume of contact with network members. These findings are inconsistent with the view that old age has a universal negative influence on social connectedness. Instead, life-course factors have divergent consequences for different forms of social connectedness. Indeed, some later-life transitions, such as retirement and bereavement, may prompt greater connectedness. We conclude by urging increased dialogue between social gerontological and social network research.

Much has been made of the prospect of social isolation in later life. Several perspectives depict old age as a time of loneliness and rolelessness. For example, Cumming and Henry (1961) gave a classic warning about older adults' irreversible descent into isolation through voluntary social disengagement. Subsequent work has repeatedly challenged such accounts by portraying aging in later life as an identity struggle, a constant effort to maintain social roles and activity in the face of difficult later-life transitions (Atchley 1989; Moen, Dempster-McClain, and Williams 1992; Neugarten, Havighurst, and Tobin 1968; Thoits 1992). Since this identity struggle is crucial to maintaining mental and physical well-being, social gerontologists conclude that ongoing integration is key to "successful aging" (Rowe and Kahn 1998).

Work on aging has been moving away from conceptualizations of social integration that focus on roles and activities and toward more network-oriented treatments (Antonucci and Akiyama 1995; Crosnoe and Elder 2002; Lang and Carstensen 1994; Morgan 1988; Shaw et al. 2007). Unfortunately, information about older adults' integration through social networks is

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available only in small pieces—through research that is outdated or that examines only a few network measures at a time. Our goal here is to provide a comprehensive, up-to-date description of older adults' social integration from a networks perspective. We develop this profile using new data from the National Social Life, Health, and Aging Project (NSHAP), a population-based study of 3,005 older Americans, ages 57 to 85, conducted in 2005 to 2006. We consider five dimensions of interpersonal social network connectedness (egocentric network size, volume of social interaction with and closeness to network members, and network composition and density), as well as four dimensions of integration in the community (frequency of neighborly socializing, religious participation, volunteering, and organized group involvement), that researchers consider crucial for healthy aging. We also consider the potential roles of health and life-course factors, such as retirement and bereavement, in the associations we analyze.

(HOW AND WHY) ARE OLDER ADULTS SOCIALLY ISOLATED?

The idea that old age is associated with social isolation is not new. Theories of modernization point to the breakdown of the traditional extended family and note the accompanying decline in the status of older adults (Burgess 1960; Cowgill 1986). Scholars such as Townsend (1981) amplify this point, arguing that modern public policies and programs (e.g., early retirement) imply a devaluation of older adults. A classic social-psychological statement, social disengagement theory (Cumming and Henry 1961), holds that older adults' isolation results from a gradual and irreversible abandonment of social roles, narrowing role sets, and the weakening of existing social bonds.

In response to these unflattering accounts, social gerontologists use the life-course perspective (Elder 1985; George 1993) to underscore the implications of later-life challenges for older adults' social integration. Contrary to the image of older adults as either helpless victims of modernization or authors of their own isolation, this line of research portrays older individuals as resilient to potentially isolating events like retirement and bereavement. Activity theory notes that older adults who adjust to later-life transitions by remaining socially active are happier and healthier than those who disengage from social activity (Cavan et al. 1949; Lemon, Bengtson, and Peterson 1972). Similarly, continuity theory argues that people become accustomed to certain social roles and social activities throughout their lives, which older adults actively attempt to maintain through the many transitions they face (Atchley 1989; Rowe and Kahn 1998; Thoits 1992).

Social Networks, Later-Life Transitions, and Successful Aging

As suggested above, social roles and activities are central to treatments of successful aging (Atchley 1989; Baltes and Baltes 1990; Moen et al. 1992; Neugarten et al. 1968; Thoits 1992). Some scholars have broadened the meaning of social integration by combining the emphasis on roles and activities with a concern for social network connectedness (Antonucci and Akiyama 1995; Crosnoe and Elder 2002; Lang and Carstensen 1994; Morgan 1988; Shaw et al. 2007). Social networks are essential to successful aging because they provide embeddedness in systems of norms, control, and trust (Coleman 1988); access to information and other resources; and social support (Antonucci and Akiyama 1995). Such resources are crucial for well-being (House, Landis, and Umberson 1988), among other individual-level outcomes. Although a great deal of work explores the relationship between age and social integration with regard to social roles and activities, it is unclear to what extent age relates to a range of measures of social network connectedness. Furthermore, just how life-course transitions, such as retirement and bereavement, influence this connectedness has yet to be adequately explored.

INTERPERSONAL SOCIAL NETWORKS. There are several aspects of social network connectedness that may contribute to successful aging. Having numerous direct ties to people (i.e., having a large egocentric network) gives people alternative routes to valuable resources, which increases a person's chances of receiving needed support. Those who have larger networks thus tend to have better health (Berkman and Syme 1979), especially when they have frequent interaction with their network members

(Lin, Woelfel, and Light 1985; Terhell, van Groenou, and van Tilburg 2007). Of course, some types of social ties may be more beneficial than others. High quality relationships are associated with better self-esteem and well-being and are more likely to provide older adults with a sense of belonging (Fiori, Antonucci, and Cortina 2006; Wellman and Wortley 1990). Similarly, many researchers highlight the value of kin relations, which are likely to provide unconditional social support (Antonucci and Akiyama 1995; Hurlbert, Haines, and Beggs 2000).

Although often neglected in network-oriented treatments of social integration, the extent of egocentric network members' connectedness to each other is also important for older adults. Higher density networks (those in which one's network members know each other) constitute close-knit social contexts in which one's contacts can triangulate information, share care-giving duties, and pool resources. Network density is associated with greater access to and more frequent activation of informal support, and it may therefore offer unique health benefits (Haines, Hurlbert, and Beggs 1996; Hurlbert et al. 2000; Kelley-Moore et al. 2006).

Research suggests that adults' egocentric social networks shrink as they age (e.g., Marsden 1987; McPherson, Smith-Lovin, and Brashears 2006; cf. Schnittker 2007), even within older adult samples (Ajrouch, Blandon, and Antonucci 2005). On the other hand, most research suggests that age is positively associated with the presence of higher quality relationships. For example, older adults tend to interact more with supportive contacts and to have more kin-centered networks (Marsden 1987; Schnittker 2007; Shaw et al. 2007; cf. McPherson et al. 2006). Furthermore, some scholars argue that older people shed their less meaningful, more superficial relationships as they age because they prefer to surround themselves with emotionally close contacts (Fredrickson and Carstensen 1990). These processes imply that older adults have denser social networks.

Some work suggests that life-course factors play a major role in shaping older adults' egocentric social networks. Although research has found contradictory evidence concerning the effects of bereavement on contact with network members, retirement and poor health appear to decrease contact, especially for men (Ferraro 1984; Hatch and Bulcroft 1992; van Tilburg and van Groenou 2002). Life transitions may also affect network composition. For example, retirement reduces contact with non-family, whereas declines in health often strengthen kin ties due to family members' sense of obligation. At the same time, widowhood eliminates access to perhaps the most rewarding of all social ties. It is thus unclear whether age is positively or negatively associated with access to higher quality contacts among older adults.

COMMUNITY INVOLVEMENT AND VOLUNTARY ASSOCIATIONS. Community involvement and civic engagement are forms of activity that contribute to successful aging. These forms of social integration are also crucial to the development of interassociational networks within a community (Cornwell and Harrison 2004; McPherson 1982). Social network research suggests there is a high level of interdependency between interpersonal network structure and ties to voluntary associations. People who have larger interpersonal social networks are more involved in voluntary associations (McPherson, Popielarz, and Drobnic 1992; Rotolo 2000; Wilson and Musick 1997). Furthermore, voluntary associations and other social groups provide opportunity structures for establishing interpersonal relationships (Feld 1981; McPherson and Smith-Lovin 1987; McPherson, Smith-Lovin, and Cook 2001).

There are, nevertheless, good reasons to distinguish between interpersonal and community-based forms of social connectedness. First, the implications of connectedness to a community for older adults' successful aging may differ from the implications of connectedness in interpersonal networks because the types of social resources available from individuals differ from those available from groups. Second, associational and more interpersonal forms of connectedness may present competing demands for one's time and energy (Sundeen 1990). Finally, the processes that shape older adults' connectedness to a community may differ from those that shape interpersonal networks. Social activity outside the home may require higher levels of commitment to social integration than does interaction with network members (which can take place within one's home and over the

phone), especially for older adults who suffer from debilitating health problems.

For these reasons, it is important to examine older adults' connectedness to a broader community through their involvement with neighbors and various types of organizations. Aside from household members, a person's neighbors are their most proximate social contacts. Having strong ties to neighbors facilitates access to informal aid, reduces a sense of isolation, and may attenuate negative impacts of neighborhood disorder or disadvantage on health (Browning and Cagney 2002; Campbell and Lee 1992; Shaw 2005). In particular, religious participation, organized group involvement, and volunteering are all noted for their health benefits (Benjamins 2004; Ellison et al. 2001; Li and Ferraro 2006; Musick and Wilson 2003; Thoits and Hewitt 2001). Religious institutions may be a particularly effective avenue of integration into a community because they are central in local networks of voluntary associations (Beyerlein and Hipp 2006; Cornwell and Harrison 2004; McIntosh, Sykes, and Kubena 2002).

Most work shows that older adults are more involved in their communities than are younger adults, especially with respect to volunteering and religious participation (Chatters, Taylor, and Lincoln 1999; Miller and Nakamura 1996). Some argue that this has to do with generational differences in values of civic commitment, although others point to life-course factors (Putnam 2000; Rotolo and Wilson 2004; Wilson 2000). With respect to the latter, some see older adults' greater involvement as an adaptive response to narrowing role sets (see Cavan et al. 1949; Lemon et al. 1972). Bereavement and retirement may increase volunteering, but there is mixed evidence for this (Ferraro 1984; Li 2007; Mutchler, Burr, and Caro 2003; Wilson and Musick 1997). Health may also be crucial to formal volunteering (Ainlay, Singleton, and Swigert 1992; Li and Ferraro 2006; Thoits and Hewitt 2001). Overall, then, it is unclear how age relates to community involvement. On one hand, retirement and bereavement reduce competing demands and obligations and may prompt compensatory participation. On the other hand, these transitions reduce social capital and therefore complicate entry into new social groups. Furthermore, health declines may reduce contact with one's community.

In general, the literature suggests that the association between age and social connectedness in interpersonal networks and voluntary associations is complex and depends on several life-course factors. This picture runs counter to the image of universal social isolation offered by early research on disengagement. This impression, though, is based on evidence cobbled together from numerous sources, making it difficult to make definitive or sweeping claims about older adults' social connectedness. Much research focuses on the network connectedness of individuals in general, but most of this work considers adults of all ages. Work that does focus on older adults usually examines only one or two measures of social connectedness at a time (for exceptions, see Adams and Blieszner 1995; Shaw et al. 2007). Researchers rarely examine interpersonal network connectedness and voluntary associations at the same time. In part, this is because wide-ranging, representative data on older adults' social connectedness are scarce. Our goal, then, is to develop a comprehensive profile of both interpersonal and community-based forms of social connectedness from a large sample of non-institutionalized older adults. We examine nine measures of social connectedness using a recent, nationally representative sample of American adults between the ages of 57 and 85. We examine how these measures relate to age, and we assess the extent to which life-course factors shape these relationships.

DATA AND METHODS

We use data from the National Social Life, Health, and Aging Project (NSHAP), a nationally representative, population-based study funded by the National Institutes on Health and conducted by the National Opinion Research Center (NORC) at the University of Chicago. The study consists of interviews with 3,005 non-institutionalized older adults conducted between autumn 2005 and spring 2006. The sample was selected from a multistage area probability design screened by the Institute for Social Research (ISR) for the Health and Retirement Study (HRS). From the HRS sample surplus, NSHAP selected 4,400 potential respondents, ages 57 to 85. The original HRS design oversampled by race and ethnicity. NSHAP retained this design and also oversam-

pled by age and gender to produce approximately equal cell sizes by gender across three age categories. The final response rate was 75.5 percent.

NSHAP collected extensive information about respondents' egocentric social networks and community involvement, as well as partnership history, sexual activity, physical and mental health, health-related behaviors, medication use, and biomeasures.[1] Most of the data for the NSHAP study were collected during a two-hour in-home interview. To minimize the length of the in-home portion of the study, some questions were asked via a paper questionnaire that interviewers left behind for respondents to complete and mail in at their leisure. The return rate for this questionnaire (LBQ) was 84 percent. Table 1 shows measures of social connectedness, life-course factors, and other variables in the analysis.

Social Connectedness

We examine nine forms of social connectedness among older adults. We draw measures of egocentric network connectedness from NSHAP's social network module. Interviewers asked older adults to list people with whom they discuss "things that were important to you."[2] This question elicits names of strong, frequently accessed, long-term contacts (Marin 2004; Ruan 1998)—ties through which normative pressures and social influence are likely to operate (Burt 1984). Respondents could name up to five people and then indicate if they had more than five discussion partners, if applicable. These data provide the basis for our measures of older adults' egocentric network size, volume of contact with network members, emotional closeness to network members, network composition, and network density. We also inquire about the frequency with which respondents engage in four types of community involvement: socializing with neighbors, attending religious services, volunteering, and involvement with organized groups. Table 1 provides the exact wording of the questions.

Life-Course Factors

As discussed above, several life-course factors may affect the relationship between age and social connectedness among community-dwelling older adults. These include retirement, bereavement, and health problems. We include a dichotomous measure of whether a respondent is retired, as well as an indicator of bereavement (specifically, widowhood). We also control for whether respondents have never married. We include two measures of health. The first gauges functional health (the ability to move about and complete everyday tasks), which may be especially relevant to community involvement.[3] The second is an ordinal measure of overall self-rated health, which captures more subjective aspects of well-being that could impact social connectedness (Thoits and Hewitt 2001).

Age

We are mainly interested in age, so we were careful to test alternative operationalizations of age in our analyses. In most analyses, we model

[1] Additional information about the NSHAP study can be found at: http://www.norc.org/NSHAP.

[2] The following name generator was used to identify network members: *From time to time, most people discuss things that are important to them with others. For example, these may include good or bad things that happen to you, problems you are having, or important concerns you may have. Looking back over the last 12 months, who are the people with whom you most often discussed things that were important to you?*

Respondents' interpretations of what is important vary, as does the content of discussion with different alters (Bearman and Parigi 2004; Straits 2000). These variations do not influence many of the characteristics of the networks that they describe (Bailey and Marsden 1999). Research suggests that the survey content that precedes the social-network name generator affects interpretations of the item, as well as the number of alters named (McPherson et al. 2006; Sudman, Bradburn, and Schwarz 1996). NSHAP was designed so that the name generator appeared first, so interview order should not be an issue here.

[3] This is measured using an index ($\alpha = .86$) of self-reported difficulty completing nine ADLS and IADLs. These include: walking one block, walking across a room, dressing, bathing or showering, eating (such as cutting up food), getting in and out of bed, using the toilet (including getting up and down), driving a car during the day, and driving a car at night.

Table 1. Descriptions of Key Variables

Variable		Weighted Mean	SD
Network size	Number of people listed in respondent's core discussion network. Range: 0 to ≥ 6	3.57	1.59
Volume of contact with network alters	R's asked how often they contact each alter. Eight possible responses range from "less than once a year" to "every day." We transform responses to estimates of number of days of contact per year with each alter (e.g., "every day" = 365). We then add estimates across alters to get overall contact volume: range 1 to 1,825.	692.99	354.91
Closeness to alters	Average response to "How close do you feel is your relationship with [name]?" Responses range from "not very close" (1) to "extremely close" (4).	3.16	.54
Primary group members in net	Number of people listed in the network who are spouse, partner, or (step-) children: range 0 to 5.	1.63	1.26
Network density	Proportion of network members that know each other.	.85	.25
Neighborly socializing	"How often do you get together with any of [nearby neighbors who you know by name] just to chat or for a social visit?" Responses range from "hardly ever" (1) to "daily or almost every day" (5).	2.35	1.28
Religious services attendance	"About how often have you attended religious services?" Responses range from "never" (1) to "several times a week" (7).	4.27	2.11
Volunteer work	"In the past 12 months, how often did you do volunteer work for religious, charitable, political, health-related, or other organizations?" Responses range from "never" (1) to "several times a week" (7).	3.20	2.08
Organized group involvement	"In the past 12 months, how often did you attend meetings of any organized group?" Responses range from "never" (1) to "several times a week" (7).	3.66	2.15
Age (in decades)	Age of R divided by 10: range 5.7 to 8.5.	6.80	.79
Female	Whether the respondent is female (yes = 1, no = 0).	.52	.50
Race	Whether the respondent is African American (yes = 1, no = 0).	.10	.38
Ethnicity	Whether the respondent is Hispanic (yes = 1, no = 0).	.07	.31
Education	Whether the respondent attended college (yes = 1, no = 0).	.51	.50
Retirement	Whether the respondent is retired (yes = 1, no = 0).	.59	.48
Widowed	Whether the respondent is widowed (yes = 1, no = 0).	.17	.41
Never married	Whether the respondent was never married (yes = 1, no = 0).	.03	.19
Self-reported health	R's self-rated health. Responses range from "poor" (1) to "excellent" (5).	3.27	1.11
Functional health	R's self-rated ability to complete each of nine activities of daily living on their own. Responses range from "unable to do" (1) to "no difficulty" (4). Each item is standardized to a z-score, then all items are averaged together to form the scale (α = .86): range –5.42 to .39.	.05	.69

Notes: Means incorporate person-level weights with post-stratification adjustments for nonresponse. We calculate estimates for all cases for which data are available.

age linearly. In the case of closeness to network members, age interacts with frequency of contact with network members—as one might expect, given that both closeness and frequency of interactions are correlated measures of tie strength. In the case of contact volume, the cor-

rect functional form of the age effect is curvilinear. We discuss these associations in greater detail below.

CONTROLS

Other factors are likely to influence social connectedness or the relationship between age and social connectedness. Sociodemographic factors include gender, race and ethnicity (measured using indicators of whether a respondent is African American or Hispanic), and education (whether a respondent ever attended college).[4]

ANALYTIC STRATEGY

Our goal is to describe the social connectedness of older adults in the general population and to determine the veracity of the stereotypical image of older adults as isolated. The cross-sectional nature of our data limits our analyses in that we cannot directly assess how life transitions or processes of adaptation unfold over time. The data also make it difficult to develop definitive causal models or to distinguish between age and cohort effects (both of which likely come into play). We therefore do not focus on building causal models.

Multivariate regression techniques are useful, however, for generating refined estimates of social connectedness at different ages. We first regress each of the nine measures of social connectedness on age to get a sense of bivariate associations. We then add controls in the second model. We present adjusted Wald tests that show whether including life-course factors (net of other controls) alters the estimate of the association between age and each measure of social connectedness. This allows us to assess the extent to which associations between age and social connectedness are related to associations between age and other age-related factors, such as health.

The measures of social connectedness lend themselves to different forms of regression. Social network size is measured as a count of the number of people a respondent identifies as discussion partners (capped at "six or more"). We model it using ordered logit regression (Agresti 2002).[5] Volume of interaction with network members is a count of the number of days per year a respondent interacts with network members. Given evidence of overdispersion, we use negative binomial regression for this variable (using network size as the exposure variable). To model respondents' average closeness to network members, we use ordinary least squares (OLS). Poisson can be used for modeling the number of primary group members (network size is the exposure). The number of relationships among network members is overdispersed, so negative binomial is more appropriate (where number of possible ties among network members is the exposure). Measures of neighborly socializing, religious attendance, volunteering, and group involvement are all ordinal, so we use ordered logit regression in each of these cases.[6] Table S1 in the Online Supplement on the *ASR* Web site (http://www2.asanet.org/journals/asr/2008/toc062.html) describes the analysis of each measure, including the type of statistical model

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[4] NSHAP does not measure years of education. It records number of grades completed for those without a high school diploma and number of years of college, if any. Combining these does not translate exactly into total years of education, and doing so creates missing data. The college indicator works as well as other education indicators (e.g., less than high school).

[5] Because the dependent variable has seven possible levels, there are six separate intercepts associated with the cumulative probabilities ($\gamma1$, $\gamma2$, $\gamma3$, $\gamma4$, $\gamma5$, and $\gamma6$) of observing successively larger networks. Most ordered logit models make the assumption that the odds ratio estimates of the independent variable are the same at each intercept (the "proportional odds" assumption). In that case, one simply substitutes a different intercept to calculate odds associated with observing a given level of the dependent variable. Our case, however, violates the proportional odds assumption. We therefore use generalized ordered logit (partial proportional odds) models instead, which allow estimates to vary across levels (Williams 2006).

[6] Likelihood ratio tests suggest that the proportional odds assumption does not hold for models of neighborly socializing (χ^2 (48) = 145.76, $p < .001$) or religious attendance (χ^2 (90) = 203.03, $p < .001$). It does hold, however, for models of volunteering (χ^2 (75) = 82.86, $p = .26$) and organized group involvement (χ^2 (75) = 80.35, $p = .32$). Therefore, for the first two we present generalized ordered logit estimates from partial proportional odds models (using gologit2 in Stata).

Table 2. Log(odds) from Generalized Ordered Logit Regression Models Predicting Older Adults' Social Network Size (N = 2,967)

	Network Size[a]					
Predictor	> 3 people		> 4 people		> 5 people	
Age (in decades)	–.117*	–.150*	–.117*	–.150*	–.117*	–.150*
	(.053)	(.072)	(.053)	(.072)	(.053)	(.072)
Female		.617***		.524***		.489**
		(.082)		(.092)		(.153)
African American		–.505**		–.505**		–.505**
		(.136)		(.136)		(.136)
Hispanic		–.901***		–.901***		–.901***
		(.196)		(.196)		(.196)
Retirement		.294**		.286**		.493**
		(.096)		(.104)		(.151)
Widowhood		–.179*		–.179*		–.179*
		(.084)		(.084)		(.084)
Self-rated health		.065		.065		.065
		(.039)		(.039)		(.039)
Constant	.936*	.031	.256	–.644	–1.577***	–2.668***
	(.370)	(.469)	(.368)	(.466)	(.390)	(.500)

Notes: Standard errors are shown in parentheses. All models are survey-adjusted and include controls for SES, marital history, functional health, and other predictors listed in Table S1 in the Online Supplement.

[a] We use seemingly unrelated estimation to test whether including the life-course measures significantly alters the association between age and network size (using non-generalized, survey-adjusted ordered logit models). Results suggest that the life-course factors do not alter the age estimate: F (1, 49) = .26 (p = .61).

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).

used and a full enumeration of controls used in each case. All models include weights to account for differential probabilities of selection (with post-stratification adjustments for nonresponse) and to take into account the clustering and stratification of the sample design.

FINDINGS

Interpersonal Social Networks

The mean egocentric network size of older adults in our sample is 3.6 people, but the modal network size is 5 people. These are relatively large networks compared to the average network size (2.1) reported for adults of all ages in McPherson and colleagues (2006). Table 2 shows the results of generalized ordered logit models of network size. The β estimate for a given covariate reflects the increment in the log(odds) that a case falls above a given network size that corresponds to a one-unit increment in that variable.[7] We present the estimates predicting larger network sizes, as these levels are most typical of the sample.

The first model (presented in columns 1, 3, and 5) shows that the oldest adults in the sample have the smallest networks. This association remains significant even after including sociodemographic, life-course, and health variables (columns 2, 4, and 6). Compared to people a decade younger (e.g., 85-year-olds versus 75-year-olds), older adults are only about 86 percent as likely to have larger networks ($e^{-.150} = .861$). The probability that a 57-year-old has more than four network members is .60, compared to .49 among 85-year-olds (see Figure 1). These results are consistent with perspectives that predict a decline in interpersonal connectedness in later life. Furthermore, men, African Americans, Hispanics, the never married, and those who have been bereaved tend to have smaller networks. In contrast, retirees, the college educated, and those who have been parents tend to have larger networks. However, life-

[7] Some variables, such as age, race and ethnicity, widowhood, and health, have the same relationship across levels of network size (and thus are constrained to have parallel effects across cutoffs). The estimates of the other coefficients depend on the level of network size being considered.

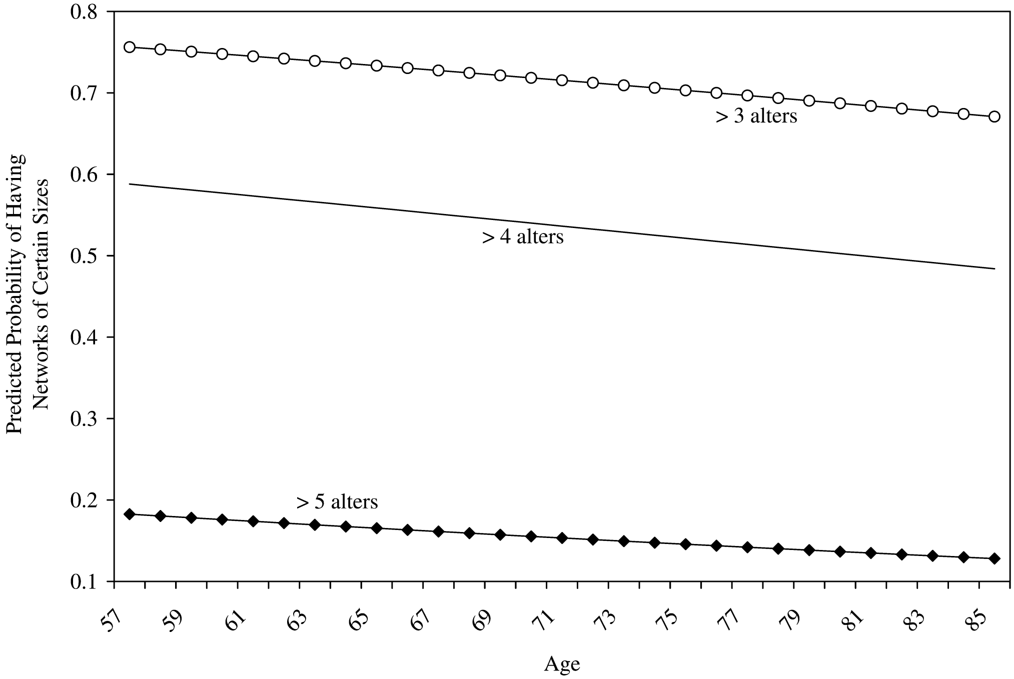

Figure 1. Predicted Network Sizes of Older Adults, by Age

Notes: Predicted values are calculated using generalized ordered logit regression. Covariates are held at their mean values and set to their modal values in the case of categorical predictors.

course and health factors do not significantly alter the association between age and network size, which suggests that other factors may influence why the oldest adults have smaller networks.

Table 3 presents models of the other four forms of interpersonal network connectedness. Columns 1 and 2 present models of volume of contact with network members. These results suggest that age is significantly related to contact volume among older adults. As shown in Figure 2, this relationship is represented by a U-shaped curve.[8] Contact volume declines for those in their late 50s to mid-60s, flattens out for those in their late 60s to early 70s, and finally increases for those in their mid-70s to mid-80s. For example, 57-year-olds have a predicted average of about 196 days of contact per year for each network member, compared to 187 days for 70-year-olds and 198 days for 85-year-olds.

This U-shaped pattern may reflect challenges that older adults face at different ages. Contact volume may decrease through the 50s and 60s because social roles begin to dissipate around this time. Contact volume is lowest for those in their late 60s and early 70s, but it may increase as respondents grow older and they adapt to the loss of social roles, friends, and family members—but there is limited evidence for this. Retirement, bereavement, and health alter the association between age (and age-squared) and contact volume (see Figure 2). The curvilinear relationship becomes less pronounced, suggesting that these factors explain a substantial portion of the association between age and connectedness to network members.

[8] We calculate predicted values for all forms of social connectedness using parameter estimates from the final full models (see Tables S2 and S3 in the Online Supplement, which are expanded versions of Tables 3 and 4, respectively, displaying all parameters). For variables in the equation, we use mean values for continuous variables and we set values for unordered variables to modal categories. Therefore, most figures are based on predicted values for non-African American, non-Hispanic, college-educated women who are currently married and retired.

Table 3. Unstandardized Coefficients from Regression Models Predicting Older Adults' Volume of Contact with and Closeness to Network Members, Network Composition, and Network Density

	Volume of interaction with net members (visits per year)		Closeness to net members		Number of primary group members in network		Network density	
Predictor	(Negative binomial)[a]		(OLS)[b]		(Poisson)[a]		(Negative binomial)[c]	
Age (in decades)	–.456*	–.377	–.057***	–.121***	.059**	.059**	–.006	–.011
	(.210)	(.214)	(.014)	(.032)	(.018)	(.022)	(.007)	(.007)
Age^2	.030	.027						
	(.015)	(.015)						
Female		.069**		.126***		–.120***		–.036**
		(.020)		(.023)		(.031)		(.012)
African American		.131***		.041		–.182**		–.011
		(.033)		(.029)		(.062)		(.020)
Hispanic		.104***		–.074		.186**		–.017
		(.027)		(.038)		(.060)		(.019)
Retirement		–.093***		.066**		.028		.018
		(.022)		(.023)		(.035)		(.012)
Widowhood		.117***		.036		–.166***		.069**
		(.026)		(.028)		(.034)		(.021)
Self-rated health		–.018*		.045**		.019		.010
		(.008)		(.012)		(.012)		(.008)
Constant	7.050***	5.905***	3.540***	3.380***	–1.178***	–1.339***	–.147**	–.664***
	(.726)	(.742)	(.094)	(.230)	(.122)	(.123)	(.050)	(.072)
Δ of age estimate (F)[d]		21.70***		2.25		1.50		7.36**
(d.f.)		(2, 48)		(1, 49)		(1, 49)		(1, 49)
N	2,896		2,896		2, 900		2, 560	

Notes: Standard errors are shown in parentheses. All models are survey-adjusted and include controls for SES, marital history, functional health, and other predictors listed in Table S1 in the Online Supplement.

[a] Number of network members is treated as the exposure variable.

[b] This model also includes an interaction between age and average frequency of interaction with network members.

[c] Number of possible relationships among network members, given network size, is treated as the exposure variable.

[d] Seemingly unrelated estimation test of whether including the life-course factors significantly alters the association between age and connectedness.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).

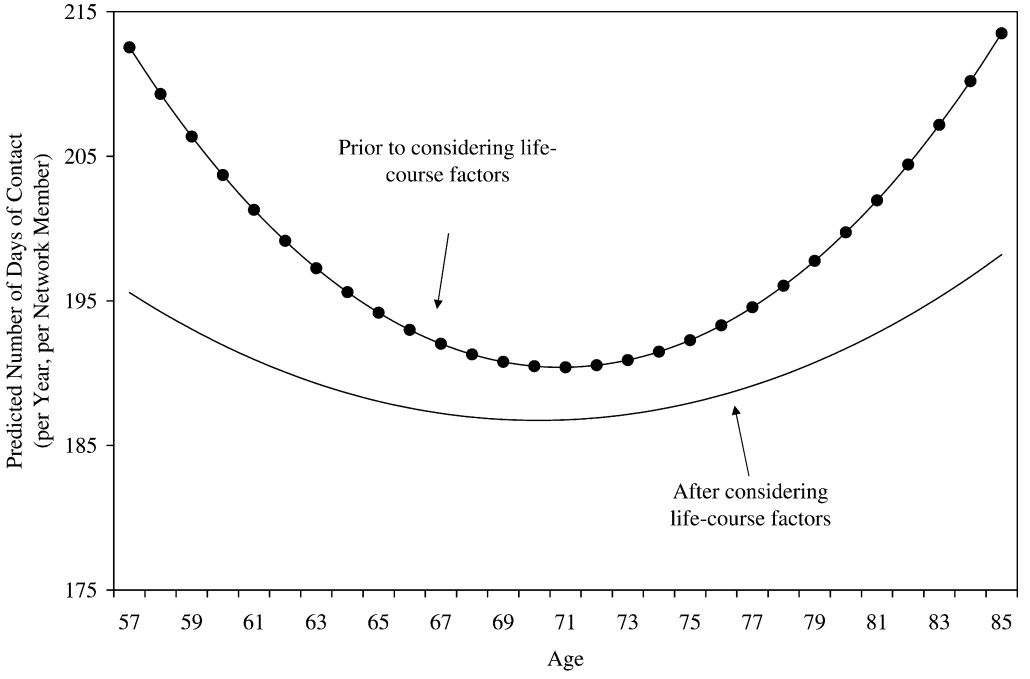

Figure 2. Older Adults' Predicted Volume of Interaction with Network Members, per Year and by Age

Notes: Predicted values are calculated using Poisson regression. Covariates are held at their mean values and set at modal values in the case of categorical predictors.

Other factors also inform older adults' contact with their network members. Contact is greater among women, African Americans, Hispanics, those with less education, and nonretirees. Network structure and composition are also relevant. Older adults whose partners are in their network and who are close to their network members report more contact. Widowed persons and those who are in worse health also report more contact. This may reflect increased monitoring and social support from network members (although we cannot test this directly).

Those who live with a larger proportion of their network members also have more contact with them. It is possible, then, that changes in household composition (e.g., parents moving in with their children) are driving the pattern in Figure 2. This does not appear to be the case, however. In fact, when we do not control for the proportion of coresiding network members, the relationship between age and contact volume flattens. This suggests that the oldest respondents have greater contact with their network members regardless of the extent to which they coreside with them. This further supports an adaptation or compensation model.

The analysis of closeness to network members (columns 3 and 4 in Table 3) shows that the oldest respondents are less close to their network members. A 10-year increment in age is associated with a .06 decrement in closeness to network members. (This is not reflected in the estimate shown in Table 3, which is tied up in an interaction.) Substantively, this is not a large association, but it is enough to question the argument that older adults prefer closer contacts (Fredrickson and Carstensen 1990). Furthermore, this association remains significant when controlling for life-course factors. Overall, women, people with smaller networks, and those who live with many of their network members tend to feel closer to their network members. Retirees, people who have been married, and healthier respondents also tend to feel closer to their network members.

The association between age and closeness depends on older adults' frequency of interaction with their network members. As shown in

Figure 3, the negative association with age is strongest among those who have less frequent interaction (gauged at the 25th percentile) with their network members. In contrast, the negative association is nearly nonexistent among those who have frequent interaction (the 75th percentile). These findings suggest that the oldest adults are not as close to their network contacts when their frequency of contact with them is low. This is in part consistent with the argument that older adults prefer interacting with close network members. This idea is best evaluated at the dyad level, though, which is beyond the scope of this article.

Poisson models of network composition (columns 5 and 6) reveal that older adults tend to have more primary-group members (spouse and children) in their core discussion networks. A 10-year increment in age is associated with a 6 percent increment in the number of network members who are primary relations (calculated as $(e^{.059}-1)*100$). Though modest, this estimate is consistent with the argument that the egocentric networks of the oldest adults are more kin-centered than those of younger adults. We cannot assess whether this pattern reflects preferences for primary-group ties, the loss of irreplaceable friends and other confidants, or other factors. This association, however, remains significant when controlling for life-course and health factors. This suggests that a greater presence of kin among the oldest respondents is not an obligatory care-giving response from their family members. Women, African Americans, and the widowed have fewer primary-group ties. In contrast, those who have been parents or were married have more primary-group ties.

Columns 7 and 8 present negative binomial models of network density (the number of ties present among network members). The results suggest that age is not related to this aspect of older adults' social networks. This finding contradicts socioemotional selectivity theory as it suggests that older adults do not prefer more closely knit social environments. It also suggests

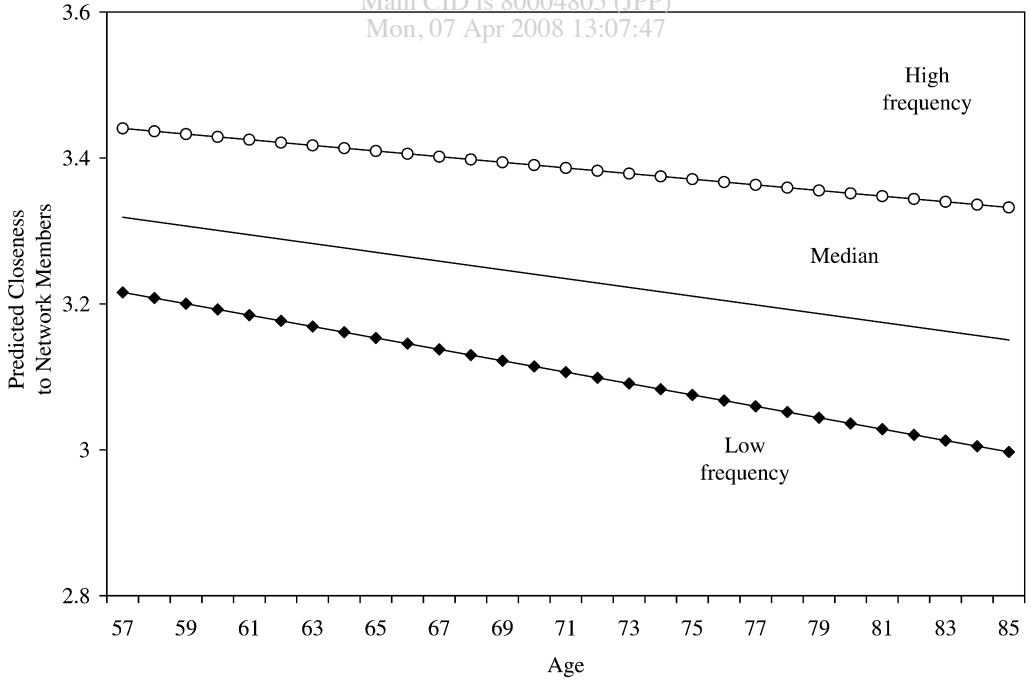

Figure 3. Predicted Levels of Closeness to Network Members among Older Adults, by Age and Degrees of Interaction Frequency with Network Members

Notes: Predicted values are calculated using the OLS regression. Covariates are held at their mean values and set at their modal value in the case of categorical predictors.

that the oldest are just as likely as younger adults to maintain bridges between otherwise disconnected network members. Consequently, this finding has implications for control over network resources (Burt 1992). In terms of life-course factors, widowhood is associated with greater network density. This holds net of the strong association between proportion kin and network density, which suggests that dense networks are not an outgrowth of adaptive responses to widowhood. More than anything else, the density of older adults' social networks appears to be a product of other features of the network. Apart from the expected positive association between proportion kin and network density, respondents whose spouse or partner is embedded within the network tend to have denser networks. So too do respondents who live with their network members and those who report feeling closer to them. Women and less-educated older adults also tend to have denser networks.

Community Involvement and Voluntary Associations

Table 4 presents results of the (generalized) ordered logit models of community involvement. For consistency and ease of interpretation, we present estimates from the portion of each model that predicts at least weekly connectedness to the community.

A key finding is that the oldest adults are the most connected to their communities. A 10-year increment in age is bivariately associated with a 29 percent increment in the odds of socializing with neighbors on a weekly basis. This relationship is no longer significant after controlling for other measures. There is evidence that the presence of alternative social contacts matters for neighborly socializing. Older adults who have fewer network members living in their households tend to have more interaction with their neighbors. The only relevant sociodemographic measure is ethnicity, as Hispanics report more frequent interaction with neighbors than do non-Hispanics. In addition, retirement is positively associated with neighborly socializing. Supplementary analyses show that if we remove retirement and widowhood from the final model, age has a significant relationship with frequency of neighborly socializing. Figure 4 illustrates this and shows the relationship between age and the predicted probability of weekly socializing with neighbors, both before and after controlling for life-course factors. That life-course factors account for the association between age and this form of community involvement may indicate that neighborly socializing is partly associated with life transitions.

Columns 3 and 4 in Table 4 present models of religious participation. Older adults are consistently more involved in this domain of community life as well. From the final model, a 10-year increment in age is associated with a 40 percent increment in the odds of attending religious services at least once a week. The predicted probability of attending religious services weekly is .42 among the youngest respondents and .65 among the oldest (see Figure 4). Supplementary analyses (not shown) reveal that the direction and magnitude of the association are similar before and after controlling for life-course factors. Women, African Americans, those who have more contact with network members, and those with a religious affiliation tend to have greater religious service attendance.

The oldest adults in this sample are also more likely to volunteer frequently (columns 5 and 6). A 10-year increment in age is associated with a 20 percent increment in the odds of weekly volunteering. The predicted probability of an 85-year-old volunteering at least once a week is .29, compared to a .20 probability for a 57-year-old. Women, African Americans, the college educated, people who do not have children, and people who have been married are more likely to volunteer frequently. In addition, those who have larger networks and more interaction with their network members, as well as the retired, are more likely to volunteer frequently. These findings are generally consistent with compensation models of community participation. There also appears to be an important suppressor effect operating. Consistent with recent work, volunteering appears to be dependent on health (Li and Ferraro 2006; Thoits and Hewitt 2001). Because older adults have poorer overall self-reported and functional health, taking these factors into account helps reveal the positive association between age and volunteering.

The final model suggests that the oldest adults are no more likely to participate fre-

Table 4. Log(odds) from (Generalized) Ordered Logit Models Predicting Weekly Neighborly Socializing, Religious Services Attendance, Volunteering, and Organized Group Involvement among Older Adults

Predictor	Neighborly Socializing		Religious Services		Volunteering		Organized Groups	
Age (in decades)	.254***	.078	.263***	.340***	.095	.180**	–.001	.120
	(.054)	(.068)	(.069)	(.084)	(.052)	(.053)	(.060)	(.080)
Female		–.091		.492***		.225*		.176
		(.102)		(.095)		(.093)		(.104)
African American		.200		.760***		.551**		.687***
		(.245)		(.123)		(.150)		(.153)
Hispanic		.450*		.397		–.086		–.006
		(.197)		(.229)		(.167)		(.161)
Retirement		.225*		.039		.209		.010
		(.100)		(.116)		(.110)		(.120)
Widowhood		.240		–.028		–.051		.139
		(.132)		(.107)		(.139)		(.133)
Self-rated health		.027		.021		.176**		.155**
		(.056)		(.061)		(.050)		(.052)
Constant	–1.933***	–2.702***	–2.003***	–3.947***	–1.401***	–3.798***	–.349***	–2.747***
	(.334)	(.575)	(.481)	(.631)	(.376)	(.513)	(.393)	(.531)
Δ of age estimate (F)[a]		12.57***		1.14		.74		.02
(d.f.)		(1, 49)		(1, 49)		(1, 49)		(1, 49)
N	2,257		2,878		2,346		2,344	

Notes: Standard errors are shown in parentheses. All models are survey-adjusted and include controls for SES, marital history, functional health, and other predictors listed in Table S1 in the Online Supplement.

[a] Seemingly unrelated estimation test of whether including the life-course measures significantly alters the association between age and connectedness. This test is unavailable for generalized ordered logit, so it is conducted using binary logit models.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).

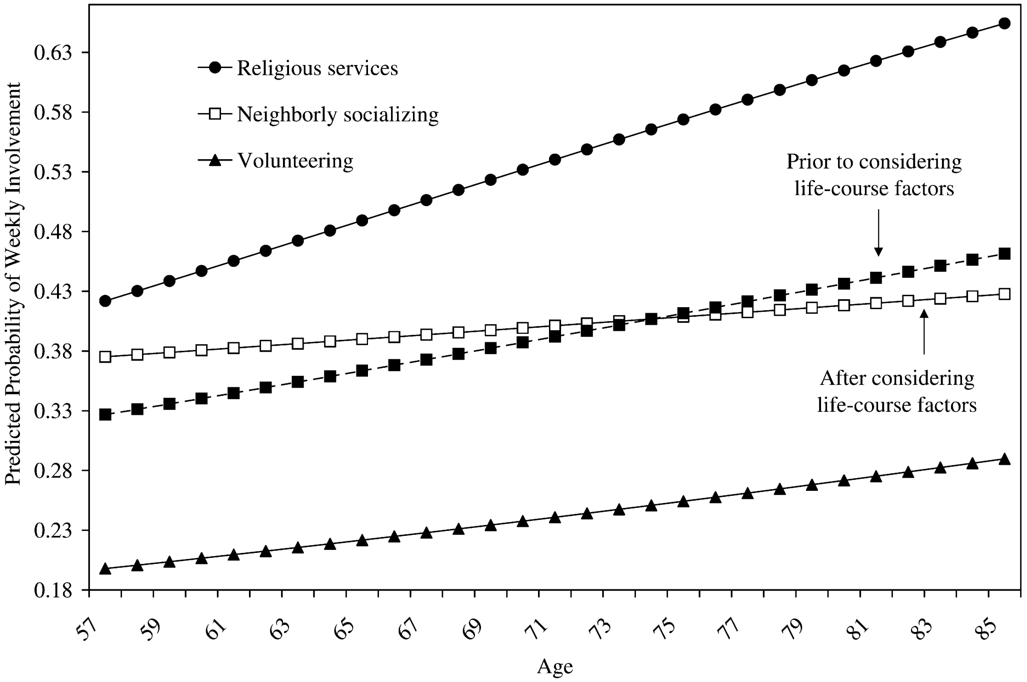

Figure 4. Older Adults' Predicted Probability of Weekly Involvement in Three Community-Oriented Social Activities, by Age

Notes: Predicted values are calculated using (generalized) ordered logit regression. Covariates are held at their mean values and set at their modal value in the case of categorical predictors. Predicted probabilities of weekly socializing with neighbors are presented both prior to and after controlling for bereavement, retirement, and health.

quently in meetings of organized groups than are younger adults (columns 7 and 8). Otherwise, similar factors inform this type of social connectedness as in the case of volunteering. African Americans, the college educated, the childless, and those who have been married tend to participate more frequently in organized groups. Note that the relationship between age and organized group involvement becomes positive when health is included in the model, although the relationship remains nonsignificant. Considering functional health alone significantly alters the association between age and organized group involvement ($F(1, 49) = 4.97$, $p < .05$). These results reiterate the importance of considering health in future models of community-based social connectedness.

CONCLUSIONS

How socially connected are older Americans today? Various theories have asserted that older adults are less integrated than younger adults because modernization marginalizes them and younger generations force them out of social roles. Some theories assert that older adults themselves seek solitude or that they are simply more selective about their social contacts. Other work in social gerontology views older adults as more adaptive because numerous life-course changes force them to struggle for identity and social relevance. This is an important issue because social integration confers numerous benefits that are likely to be particularly valued by older adults—a group that is increasing in size.

Most recent social gerontological work stresses older adults' social integration through social networks in particular. While the theoretical rationale for emphasizing older adults' network connectedness is well established, the extent of older adults' actual network connectedness is not. Our analyses suggest that old age is indeed related to several aspects of social

network connectedness.[9] The oldest have smaller social networks, they are less close to network members, and they have fewer non-primary-group ties than do younger adults. But age has a curvilinear relationship with volume of contact with network members among older adults. There is no significant relationship between old age and network density or organized group activity. Finally, age is positively associated with frequency of neighborly socializing, religious services attendance, and volunteering.[10] We therefore find a more complex and nuanced profile of older adults' social lives than previous theories have anticipated.

Existing approaches do provide a useful starting point for understanding variation in older adults' social network connectedness. These perspectives may be reconciled with each other to the extent that increased connectedness in associational networks can be seen as a response to decreased connectedness in interpersonal networks. This finding mirrors theories that focus on the great amount of adaptation to change that older adults must perform (e.g., Utz et al. 2002). Interpersonal network ties are difficult to control and predict because they are a product of both one's own and one's network members' behaviors and experiences. Older adults often face sudden and irreversible changes to the character of their interpersonal networks, and close social network ties are not easily replaced. In this light, we may better understand the greater involvement of the oldest adults in civic activities not as an outcome of generational differences in commitment to community or civic spirit (Putnam 2000), but as an effort to regain control over their social environments (Baltes and Carstensen 1996).

This insight has important implications for social network research on the link between connections to other individuals and ties to social groups. These two domains of social life are usually regarded as structurally interdependent. People who have larger interpersonal social networks usually are more involved in voluntary associations and other groups that provide opportunity structures for establishing interpersonal relationships. As the compensation model implies, the seeming disconnect between these two domains suggests that life-course factors, such as bereavement, condition the association between interpersonal and associational network connectedness. This possibility has not been thoroughly evaluated in the social networks literature.

At the same time, social gerontological approaches to understanding older adults' social connectedness are less useful for examining some aspects of social network connectedness, such as closeness to network members and network density. This is where the limits of existing frameworks are most noticeable. For instance, the finding that older adults have more primary-group members in their social networks initially lends support to the claim that older adults prefer closer relationships. Yet when we actually analyze older adults' average closeness to their network members, we find that older adults are less close to these network members than are younger adults. This casts doubt on findings that rely on measures of relationship type (e.g., kin versus non-kin) as a proxy for emotional closeness.

The relationships between life-course factors, such as retirement, bereavement, and health, and less-studied aspects of interpersonal social networks are poorly understood. Retirement relates to community involvement much in the same ways as bereavement, but the two factors relate differently to measures of interpersonal network connectedness. The reasons for these differences are unknown. This, we feel, presents an excellent opportunity for sociologists to develop fresh approaches to linking life-course theories and social network research.

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[9] Due to the cross-sectional nature of the NSHAP data, causal inferences should be made with caution. There are some important issues relating to selection processes that need to be taken into consideration. We direct the reader to an extended discussion of these issues in the Online Supplement.

[10] The relationship between age and associational involvement is likely to be conditioned by several factors, including older adults' adaptive responses to later-life transitions, responses of organizations within the community, and health problems. Please see a brief discussion of these factors in the Online Supplement.

within both types of networks. He is also examining how social networks shape older adults' sexual functioning, their designations of medical decision makers, and their survey response behavior. He will be joining the Department of Sociology at Cornell University as an Assistant Professor in autumn 2008.

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***L. Philip Schumm** is a staff statistician in the Department of Health Studies at the University of Chicago. He helped to design several aspects of the NSHAP Wave I instrument, including the social network module. Besides NSHAP, he is also involved in the NIDDK-funded IBD Genetics Consortium, the NIDA-funded East Boston Family Study (EBFS), and several other biological and clinical studies.*

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