

Social Network Types Among Older Adults: A Multidimensional Approach

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Theories of social relations suggest that individuals' personal networks reflect multiple aspects of relationships, and that different constellations are more or less supportive of well-being. Using data from the Berlin Aging Study ($N = 516$; age, $M = 85$ years), we derived network types that reflect information about structure, function, and quality, and we examined their association with well-being. A cluster analysis revealed six network types: diverse-supported, family focused, friend focused-supported, friend focused-unsupported, restricted-nonfriends-unsatisfied, and restricted-nonfamily-unsupported. Well-being was predicted differentially by the six types. Although the oldest-old individuals (85 years of age or older) were overrepresented in the friend-focused-supported and restricted types, age did not moderate the association of types with well-being. A holistic consideration of structure, function, and quality of social networks in old age offers unique insights.

GERONTOLOGICAL research has established that social relations can improve health and increase survival rates, although specific findings are sometimes inconsistent (e.g., Antonucci, 2001; Berkman, Glass, Brissette, & Seeman, 2000; Berkman & Syme, 1979; Seeman, 2000). For example, whereas some researchers have found positive associations between particular social support variables (e.g., instrumental support, contact frequency) and survival (Blazer, 1982; Yasuda et al., 1997), others have found either no association (Hanson, Isacsson, Janzon, & Lindell, 1989) or negative associations (Lund, Modvig, Due, & Holstein, 2000). Inconsistencies may partially stem from the fact that most researchers examine health effects of single aspects of social relationships (e.g., Avlund et al., 2004; Yasuda et al.). Although this variable-centered approach is informative, it ignores multidimensional interactions in the array of attributes that characterize individuals' networks (Antonucci & Akiyama, 1987; Bosworth & Schaie, 1997; Magai, Consedine, King, & Gillespie, 2003). Pattern-centered approaches, which have been used to examine many aspects of heterotypic functioning among older adults (e.g., Gerstorf, Smith, & Baltes, 2006; Magai et al.; Maxson, Berg, & McCleam, 1997; Smith & Baltes, 1997), offer a complementary tool to identify *types* of social networks and investigate their implications for indicators of successful aging. Individual and subgroup differences in family histories and social convoy gains and losses (Kahn & Antonucci, 1980), together with within-network dynamics of dependency and interdependency, closeness, and exchange of support over time (Antonucci; Carstensen, 1993), are likely to contribute to variation in the network types observed in old age.

Existing social network typology studies, conducted primarily with samples of older adults in Europe, North America, and Israel (e.g., Bosworth & Schaie, 1997; Fiori, Antonucci, & Cortina, 2006; Litwin, 1995, 2001; Melkas & Jylhä, 1996; Stone & Rosenthal, 1996; Wenger, 1997), have identified four relatively robust network types and described their associations with well-being: namely, diverse (generally with the highest well-being), family focused, friend focused, and restricted or

socially isolated (generally with the lowest well-being). These four types have primarily been differentiated on the basis of structural features (e.g., network size, frequency of contact). Although our previous research shows that individuals in different types of networks vary in the quality of support received (Fiori et al.), it may also be that individuals with the *same* structural constellation of relations vary on the amount of support they receive or on their satisfaction with that support.

In line with current models of social relations among older adults (e.g., the Convoy Model; Antonucci, 2001; Kahn & Antonucci, 1980), this study uniquely includes a variety of social relations aspects in the derivation of network types. Specifically, we were interested in (a) the range of multidimensional network types that would emerge; (b) whether the distribution of types would differ between the young-old (defined in the present study as individuals between 70 and 84 years of age) and the oldest-old (individuals 85 years of age or older); and (c) the extent to which the types would be associated with concurrent indicators of successful aging (depressive symptoms, subjective well-being, and morbidity).

Conceptual Framework

According to the Convoy Model of social relations (Antonucci, 2001; Kahn & Antonucci, 1980), the "social convoy" provides a protective base and is part of a dynamic network that moves through time, space, and the life course. The protective base is objective (indicated by network structure) and subjective (i.e., perceived function and quality of relationships). The structure, function, and quality of individuals' social convoys contribute significantly to well-being in adulthood and old age. Structural aspects of the social convoy (typically used in studies of network types) include total network size, proximity of network members, marital status, frequency of contact with network members, and participation in social organizations or activities. Function refers to the exchange of different kinds of support (emotional and instrumental) between network members, as well as the proportion of network members considered to be emotionally

close. Subjective evaluations of quality provide insight into individuals' experiences of their networks. In the present study, we propose that *all* of these aspects of social relations in old age must be considered in concert because network types that reflect varied patterns of these components may be differentially associated with well-being.

Several factors are likely to influence the range of multidimensional social network types. On one hand, the Social Convoy Model (Kahn & Antonucci, 1980) suggests that a wide range might be found in a sample of older adults because of variations in social convoy gains and losses (e.g., widowhood), family histories (e.g., marital status, number of children), historical context (e.g., World War II), and within-network dynamics of structure, function, and quality. For example, whereas the network of an older married individual may focus on family (e.g., children, grandchildren), a perennially single individual may either have a smaller or more structurally restricted network as a result of fewer available contacts or lifelong preferences, or a diverse network built on kin and nonkin relationships. Furthermore, the within-network dynamics of structure, function, and quality are complex; for instance, networks with similar structures or levels of support may vary in perceived quality.

On the other hand, it is known that for the majority of older adults, social networks tend to focus on close family and friends, and that structure (i.e., network composition) and function (i.e., support) are often interrelated in specific ways (Adams & Blieszner, 1995; Antonucci, 2001; Johnson & Barer, 1997). Thus, friend-focused networks tend to be high on emotional support, because friends are generally age-peers (Adams & Blieszner), but low on instrumental support (Johnson & Barer), whereas diverse networks are thought to fulfill a variety of functions (Weiss, 1974). Thus, although heterotypy in social relations increases with age, such heterotypy is likely constrained (Consedine, Magai, & Conway, 2004).

Following previous analyses of structural network types (e.g., Fiori et al., 2006; Litwin, 2001), we hypothesized that diverse, family-focused, friend-focused, and restricted network types would emerge. Because we added indicators of function and quality to the empirical derivation of network types, we also expected the range and nature of network types obtained to expand, but in a constrained manner. Specifically, we expected to find heterotypic *restricted* networks. First, restricted networks appear to become more common with age (e.g., Litwin), which is due at least in part to the loss of social partners and reduced contact with network members (Antonucci, 1986). Second, according to Carstensen's (1993) socioemotional selectivity theory, social interactions become increasingly regulated with age as the perceived time left in life becomes more limited. Older adults may actively narrow their social environments in an adaptive process of emotion regulation, limiting their interactions to only the most satisfying ones. Because of individual differences in social convoy gains and losses as well as in emotion-regulation skills and interpersonal dependencies, the types of restricted networks observed in an older sample may differ not only in structure but also in function and quality (e.g., some networks may be restricted primarily as a result of active pruning, whereas others are restricted as a result of deaths in the network). On the basis of

this reasoning, we expected to find a variety of restricted network types varying in function and quality.

The nature of the present sample allows us to distinguish between the young-old and the oldest-old individuals (Baltes & Smith, 2003; Smith, Borchelt, Maier, & Jopp, 2002). According to the Convoy Model (Kahn & Antonucci, 1980), age is one important factor that shapes the social convoy. Our second research question concerned age-group differences in network types. We predicted that the oldest-old individuals (those 85 years or older) would be overrepresented in the restricted network types, because oldest-old individuals are in a period of life characterized by inevitable losses of close partners and age-peers and by increased constraints on controlling exchanges with a diverse network (Baltes & Smith).

Our third research question focused on whether the types identified in this study would be differentially associated with several indicators of well-being. According to the Convoy Model (Antonucci, 2001; Kahn & Antonucci, 1980), the structure, function, and quality of individuals' social convoys all contribute significantly to well-being. Previous research suggests that diverse networks with family and friends and friend-focused networks offer more opportunities for well-being than do restricted networks (e.g., Litwin, 2001). The more restricted a network is (e.g., in terms of potential for support), the more vulnerable is the position of the older adult with respect to well-being (e.g., Johnson & Barer, 1997; Weiss, 1974), even though restricted networks may be preferred. Because of the exploratory nature of this study, we did not generate specific hypotheses. However, we did speculate that young-old individuals in diverse and friend-focused network types would have fewer depressive symptoms, higher subjective well-being, and better physical health than would those in restricted networks, and that a different constellation of networks might contribute to well-being among the oldest-old individuals.

METHODS

Design and Sample

Data are from the Berlin Aging Study (BASE; Baltes & Mayer, 1999). A stratified (by age and sex) sample of 516 older adults aged 70 to 103 ($M = 84.9$, $SD = 8.7$; 50% female) from a locally heterogeneous sample, obtained from city registry records of the former West Berlin, agreed to participate in 14 multidisciplinary assessment sessions. We used Wave 1 data in the present analyses. (As a result of extreme outliers on the social network measures, e.g., network size = 40 to 60+, we eliminated 5 participants in the present study.) Researchers collected the social relations data in face-to-face interviews that lasted approximately 90 minutes; they were conducted between 1990 and 1993 (see Baltes & Smith, 1997; Smith & Baltes, 1999). In order to examine age-cohort differences, we divided the sample into groups of young-old ($n = 255$; age, range = 70–84 years, $M = 70$) and oldest-old ($n = 256$; age, range = 85–103 years, $M = 85$).

Measures

Table 1 provides intercorrelations and descriptive information for all variables used in the present analyses.

Table 1. Means and Percentages, Standard Deviations, and Intercorrelations Among Study Variables ($N = 511$)

Study Variable	<i>M</i> or %	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
Profile variables												
1. Married (%)	30		—									
2. Total network size	10.82	6.64	.23***	—								
3. Proportion in Berlin	0.64	0.26	-.02	-.07	—							
4. Freq. contact: family	4.12	1.78	.32***	.21***	.23***	—						
5. Freq. contact: friends	3.14	1.90	-.08	.26***	.16***	.12**	—					
6. No. of activities	4.18	2.25	.19***	.46***	-.12**	.16***	.19***	—				
7. Proportion: close others	0.30	0.22	.01	-.08	.22***	.19***	-.12**	-.11*	—			
8. Instrumental support	1.34	0.79	-.14**	.01	.04	.11*	.03	-.18***	.00	—		
9. Emotional support	1.46	1.00	.08	.29***	.11*	.24***	.22***	.14**	.01	.19***	—	
10. Satisfaction with family or friends	3.88	0.80	.09	.16***	-.01	.06	.09*	.06	.12**	-.06	.15**	—
Correlates												
Age	85.0	8.65	-.22***	-.33***	-.01	-.16***	-.14**	-.46***	.09*	.38***	-.06	-.06
Female (%)	50		-.50***	-.06	-.03	-.20***	.19***	-.04	-.03	.08	.07	.02
Education (years)	10.75	2.34	.23***	.26***	-.14***	.18***	.08	.29***	-.05	.02	.05	.10*
Outcomes												
Depressive symptoms	5.66	6.10	-.15**	-.05	-.03	-.08	.02	-.11*	-.06	.23***	.20***	-.20***
Subjective well-being	3.56	0.65	.19***	.10*	.00	.09*	.00	.17***	.06	-.20***	-.16***	.23***
Morbidity index	50.00	10.00	-.13**	-.09	.02	-.01	-.05	-.22***	.06	.33***	.06	-.18***
Subjective health	2.91	1.09	.08	.07	-.03	.00	.03	.15**	-.03	-.20***	-.08	.14**
No. of chronic illnesses	3.71	2.23	-.13**	-.07	.00	-.02	-.06	-.21***	.07	.33***	.03	-.15**

Notes: Ranges are as follows: total network size, 0–41; frequency of contact with family, 0–9, and friends, 0–9; number of activities, 1–10; instrumental support, 0–3, and emotional support, 0–3; satisfaction with family–friends, 1–5; depressive symptoms, 0–30; subjective well-being, 1–5; subjective health, 1–5 (poor–excellent). The morbidity index is a standardized *t* score index combining a reverse-coded version of subjective health and number of chronic illnesses (0–11). *SD* = standard deviation.

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

Social network characteristics.—We assessed characteristics of respondents' social networks through the network-mapping procedure developed by Antonucci (1986), in which individuals' network members are placed concentrically in three circles depending on feelings of closeness (see Smith & Baltes, 1999). We then had respondents answer questions concerning the structure, function, and quality of their networks.

We included six structural social network variables in our cluster analysis. We coded marital status as 0 (not married) or 1 (married or living with a partner). Network size was the count of the total number of people mentioned in the circle diagram. We represented proximity of the network by proportion of the individuals making up the network who lived in Berlin. We calculated average frequency of contact with family (defined as partner, children or children-in-law, grandchildren, siblings, parents, and other relatives) from the overall average frequency of contact by telephone, visits, and letters among those family members listed within the first 10 network members in the diagram. We constructed average frequency of contact with friends (defined as friends, neighbors, and acquaintances) in a similar manner. Finally, we assessed the number of activities by showing participants cards, each of which outlined 1 of 12 different categories of activities (e.g., sports or exercise, travel). For each of these categories, researchers asked participants to name activities in which they currently or previously (within the past 12 months) participated.

There were three network variables representing function. First, we derived the proportion of the network that is emotionally close by dividing the number of network members in the inner circle by total network size. We assessed

instrumental support and emotional support by asking participants to name persons who had helped them during the past 3 months in the following areas: (a) practical things, (b) help with errands or shopping, and (c) nursing care (instrumental support); and (d) talking about problems and worries, (e) giving encouragement and reassurance, and (f) providing an exchange of affection (emotional support). Participants could name up to five network members. We calculated the instrumental and emotional support variables on the basis of the *number of different kinds of support* participants received, so each ranged from 0 to 3.

Finally, researchers asked participants to indicate how satisfied they were with their (a) friendships and (b) family life. We combined these items into a mean overall satisfaction with relationships measure, which ranged from 1 (very unsatisfied) to 5 (very satisfied). If information on only one type of relationship (i.e., friends or family) was available, then we used the score for the available item.

Indicators of well-being.—A clinical evaluation (Baltes & Mayer, 1999) of depressive symptoms according to the rating scale by Hamilton (1960) was completed by a gerontopsychiatrist (in Table 1, higher scores represent more depressive symptoms). Cronbach's alpha for the scale is typically $\alpha = 0.70$ or greater (Bagby, Ryder, Schuller, & Marshall, 2004). We obtained a factor score for subjective well-being with a German translation of the Philadelphia Geriatric Center Morale Scale (Lawton, 1975), a 15-item measure with a 5-point scale assessing life satisfaction and satisfaction with aging (Cronbach's $\alpha = 0.85$; Smith et al., 2002; in Table 1, higher scores represent

Table 2. Group Means and Proportions for the 10 Social Relations Variables by Network Type

Variables	Diverse–Supported (<i>n</i> = 66)	Family Focused (<i>n</i> = 96)	Friend Focused–Supported (<i>n</i> = 147)	Friend Focused–Unsupported (<i>n</i> = 75)	Restricted–Nonfriends–Unsatisfied (<i>n</i> = 81)	Restricted–Nonfamily–Unsupported (<i>n</i> = 46)
Structure						
1. Married (proportion)	0.71	1.00	0.00	0.00	0.09	0.04
2. Total network size (<i>M</i>)	22.08	10.07	10.03	10.82	7.38	3.83
3. Proportion in Berlin (<i>M</i>)	0.51	0.70	0.72	0.64	0.67	0.43
4. Freq. contact: family (<i>M</i>)	4.85	5.12	4.43	3.95	4.09	0.34
5. Freq. contact: friends (<i>M</i>)	3.66	2.81	3.83	4.22	1.26	2.45
6. No. of activities (<i>M</i>)	7.12	4.04	3.33	5.42	3.09	2.84
Function						
7. Proportion: close others (<i>M</i>)	0.20	0.35	0.34	0.30	0.38	0.08
8. Instrumental support (<i>M</i>)	1.32	1.16	1.94	0.45	1.46	1.13
9. Emotional support (<i>M</i>)	1.94	1.53	2.00	1.33	0.63	0.57
Quality						
10. Satisfaction family–friends (<i>M</i>)	4.02	4.10	4.06	3.97	3.06	3.99

Notes: Boldfaced numbers indicate defining peaks of the profiles (specifically, approximately 0.5 or >0.5 *SD* above or below the sample mean). Ranges are as follows: total network size, 0–41; frequency of contact with family, 0–9, and friends, 0–9; number of activities, 1–10; instrumental support, 0–3, and emotional support, 0–3; satisfaction with family–friends, 1–5.

greater well-being). Finally, we represented morbidity by an index composed of two measures. (When we treated subjective and objective health as separate indicators rather than combining them into an index, the results for both were identical. Therefore, for purposes of parsimony, we combined these two indicators into a “morbidity” index.) A global subjective rating of the respondent’s present health had responses ranging from 1 (poor) to 5 (excellent). We used diagnoses of physical illnesses according to the ninth revision of the *International Statistical Classification of Diseases* (known as ICD-9) codes to determine the number of diagnosed severe chronic illnesses. We reverse-coded self-rated health, and we standardized and summed this recoded measure and count of chronic illnesses to create a morbidity index. Higher scores indicate greater morbidity (i.e., worse health).

RESULTS

Social Network Types

We used a cluster analysis to examine our first research question regarding the nature and range of network types. The 10 variables that were clustered were standardized to *T* scores to eliminate effects that were due to scale differences (Hair & Black, 2000). We used two clustering techniques (hierarchical and *k*-means) in a similar procedure that was previously used with BASE data (Smith & Baltes, 1997). First, we applied a hierarchical clustering procedure using Ward’s (1963) minimum-variance method in SAS (Version 9.1), and we determined the ideal number of clusters by using multiple criteria available (Milligan & Cooper, 1987). Specifically, we examined the simultaneous elevation of the pseudo-*F* statistic over the pseudo-*T*² statistic, because pseudo-*F* indicates separation among all clusters at the current step, whereas pseudo-*T*² measures the dissimilarity of the two clusters most recently joined. Additionally, we used a peak in Sarle’s cubic clustering criterion as an indication of the ideal number of clusters. In this way, the appropriate number of clusters (six)

was confirmed before the *k*-means iterative partitioning procedure (FASTCLUS in SAS) was performed.

This final *k*-means cluster analysis provided the best six-cluster solution. Characteristics and sizes of these clusters are shown in Table 2, which presents group means and proportions for the 10 social relations variables. Profile peaks, defined as instances in which cluster members scored approximately 0.5 *SD* higher or lower than the sample mean, were used in labeling network types, as were differences in means across clusters. As we expected, and in accord with the literature, we found diverse, family-focused, friend-focused, and restricted network types. Also as we expected, the range of network types was expanded on the basis of the inclusion of indicators of function and quality; specifically, we found two restricted network types distinguished by function and quality and two friend-focused types distinguished primarily by function. We labeled the clusters (network types) as follows: diverse–supported (13%), family focused (19%), friend focused–supported (29%), friend focused–unsupported (15%), restricted–nonfriends–unsatisfied (16%), and restricted–nonfamily–unsupported (9%).

The diverse–supported network type consisted of individuals who were primarily married, had large networks with relatively small proportions of proximal members, above average frequency of contact with both family and friends, and involvement in many activities. Although relatively small proportions of their network consisted of close others, they reported receiving average levels of instrumental support and above average levels of emotional support. Those in the family-focused network type were all married with frequent family contact. The friend-focused–supported network type consisted of individuals who were all unmarried (87% widowed, 5% divorced, 8% never married) and reported having relatively frequent contact with friends and receiving above average levels of emotional and instrumental support. Those in the friend-focused–unsupported network type were all unmarried (72% widowed, 17% divorced, 11% never married), had frequent contact with friends, were involved in relatively numerous activities, and reported receiving below average

Table 3. Network Type Differences by Age Group, Correlates, and Well-Being

Variables	Diverse–Supported (<i>n</i> = 66) 1	Family Focused (<i>n</i> = 96) 2	Friend Focused–Supported (<i>n</i> = 147) 3	Friend Focused–Unsupported (<i>n</i> = 75) 4	Restricted–Nonfriends–Unsatisfied (<i>n</i> = 81) 5	Restricted–Nonfamily–Unsupported (<i>n</i> = 46) 6	Statistic ^a	Post hoc Comparison of Means ^a
Age (% young-old)	88	59	28	77	37	24	$\chi^2(5) = 110.37^{***}$	
Correlates								
Sex (% Female)	30	10	68	73	48	67	$\chi^2(5) = 111.53^{**}$	
Age (years)	78.2 (6.3)	83.4 (8.3)	88.7 (7.6)	79.8 (7.6)	87.7 (7.6)	89.6 (7.8)	$F(5, 505) = 30.68^{**}$	3,5,6 > 1,2,4; 2 > 1,4
Education (years)	12.6 (2.8)	11.1 (2.2)	10.3 (2.2)	10.7 (2.2)	10.1 (2.0)	9.9 (1.5)	$F(5, 505) = 13.67^{**}$	1 > all; 2 > 5,6
Well-being ^b								
Depressive symptoms	48.64 (9.86)	46.92 (7.89)	52.89 (11.13)	47.58 (7.57)	50.78 (10.31)	51.46 (10.76)	$F(5, 499) = 5.82^{***}$	3 > 1,2,4; 6 > 2
Subjective well-being	46.26 (7.66)	47.87 (9.92)	53.04 (11.45)	47.30 (6.90)	51.64 (10.22)	51.60 (8.47)	$F(5, 499) = 6.13^{***}$	3 > 1,2,4; 5 > 4
Morbidity	46.27 (8.31)	48.43 (10.09)	53.86 (9.48)	44.71 (7.54)	52.34 (10.32)	50.79 (10.59)	$F(5, 499) = 7.82^{***}$	3 > 2,4; 5 > 4

Notes: For the variables, standard deviations are shown in parentheses. ^a*F* tests and post hoc comparisons are based on *estimated* means from the model including age group and the Age Group \times Network type interaction (see Table 4). ^bMeans of well-being variables are presented as *T* scores, with higher scores on subjective well-being indicating *worse* subjective well-being, so that all means can be interpreted in the same direction. ^cMultivariate *F* ratio, based on Wilks's lambda.

^{**} $p < .01$; ^{***} $p < .001$.

levels of instrumental support. The restricted–nonfriends–unsatisfied network type consisted of individuals who were primarily unmarried (74% widowed, 14% divorced, 4% never married), had small networks, below average contact with friends, and low activity involvement. They reported below average levels of emotional support and relationship satisfaction. Finally, those in the restricted–nonfamily–unsupported network type were also likely to be unmarried (52% widowed, 13% divorced, 30% never married), had small nonlocal networks, infrequent contact with family, and low activity involvement. They reported having few close others and receiving below average levels of emotional support, yet they were relatively satisfied with their relationships.

Age-Group Differences

To examine our second research question, we conducted a chi-square analysis comparing the distribution of network types among the young-old and the oldest-old individuals. Consistent with our hypothesis, we found that the age groups were differentially represented across the network types; $\chi^2(5) = 110.37$, $p < .001$ (see Table 3). With the exception of the restricted–nonfriends–unsatisfied network type, the differences between observed and expected frequencies were significant as based on standardized residuals. The oldest-old individuals were overrepresented in the restricted network types (restricted–nonfriends–unsatisfied and restricted–nonfamily–unsupported; as we expected) and in the friend-focused–supported network type. In contrast, the diverse–supported and friend-focused–unsupported network types consisted primarily of young-old individuals.

Well-Being by Network Type

Because the indicators of depressive symptoms, subjective well-being, and morbidity were correlated and could be considered to represent a general construct of well-being, we conducted multivariate analyses of variance to address our third research question concerning the association of network types with well-being. With this approach, we could evaluate mean

differences on the three dependent variables simultaneously while controlling for intercorrelations among them (Bray & Maxwell, 1985), and we could protect against an inflated alpha level on subsequent univariate tests. Initially, we examined the main effects of age group (2) and network type (6), and the interaction between the two. We observed a multivariate significance for the main effects of age group, Wilks's $\Lambda = 0.98$, $F(3, 497) = 2.84$, $p < .05$, $\eta^2 = 0.017$, and network type, Wilks's $\Lambda = 0.89$, $F(15, 1,372) = 3.90$, $p < .001$, $\eta^2 = 0.038$, but the interaction term was not significant (see Table 4). A model with gender and education included as covariates did not alter the pattern of effects, so we present only the initial model. Age-group differences in well-being were not of primary interest for the present study, and they were in the direction typically reported in the literature; namely, that the oldest-old individuals had more depressive symptoms, lower subjective well-being, and poorer physical health (although not significant at the univariate level) than did other individuals.

Table 4. Multivariate and Univariate Analyses of Variance by Age Group and Network Type

Group or Type	Multivariate <i>F</i> ratio	Univariate Tests	<i>df</i>	<i>p</i>	η^2
Age group	2.84		3, 497	.04	.017
Depressive symptoms		2.41	1, 499	.12	.005
Subjective well-being		0.10	1, 499	.76	.000
Physical health		2.45	1, 499	.12	.005
Network type	3.90		15, 1372	< .001	.038
Depressive symptoms		5.82	5, 499	< .001	.055
Subjective well-being		6.13	5, 499	< .001	.058
Physical health		7.82	5, 499	< .001	.073
Age group \times Network type	1.50		15, 1372	.10	.015
Depressive symptoms		0.54	5, 499	.75	.005
Subjective well-being		1.98	5, 499	.08	.019
Physical health		0.79	5, 499	.56	.008

Note: The multivariate *F* ratio is based on Wilks's lambda.

Central to the present study is the finding of significant differences in well-being across network types. Univariate analyses revealed significant differences for depressive symptoms, $F(5, 499) = 5.82, p < .001, \eta^2 = 0.055$; subjective well-being, $F(5, 499) = 6.13, p < .001, \eta^2 = 0.058$; and morbidity, $F(5, 499) = 7.82, p < .001, \eta^2 = 0.073$ (see Table 4). Post hoc comparisons using the Bonferroni correction (see Table 3) revealed that individuals in the friend-focused–supported network type had higher levels of depressive symptoms and lower subjective well-being than individuals in the diverse–supported, family-focused, or friend-focused–unsupported network types. Individuals in the restricted–nonfamily–unsupported network type had higher levels of depressive symptoms than individuals in the family-focused network type, and those in the friend-focused–unsupported network type had greater subjective well-being than did those in the restricted–nonfriends–unsatisfied type. Individuals in the friend-focused–supported network type had higher morbidity than individuals in the friend-focused–unsupported or family-focused types, and individuals in the friend-focused–unsupported network type also had lower morbidity than individuals in the restricted–nonfriends–unsatisfied network type. Thus, our speculation was partially supported: Although we did find that individuals in one of the friend-focused network types (friend focused–unsupported) had greater subjective well-being and lower morbidity than individuals in one of the restricted network types (restricted–nonfriends–unsatisfied), we did not find an Age \times Network Type interaction, and we did not anticipate the low functioning of those in the friend-focused–supported network type.

DISCUSSION

In this study, we took a pattern-centered and multidimensional approach to an examination of older adults' social networks. In particular, we expanded structural conceptions of network types to reflect existing models and theories of social relations among older adults (Carstensen, 1993; Kahn & Antonucci, 1980), and we examined the differential distribution of these network types for the young-old and oldest-old individuals. We found network types consistent with our predictions and previous research (diverse, family focused, friend focused, and restricted), as well as network types unique to the sample and the array of network features included. In addition, we found age-group distribution differences by network type, and we confirmed the existence of network-type differences in mental and physical well-being.

Social Network Types

The inclusion of function and quality expanded the multidimensional space of the analysis, compared with earlier studies that primarily examined structural features (e.g., Fiori et al., 2006; Litwin, 2001; Wenger, 1997). Six network types emerged in this study, compared with the four most commonly described in the literature. It should be noted that, in all studies, the types that can be empirically identified are constrained by the particular variables entered into the analysis as well as by the sample composition and selectivity. The fact that we found differentiated types that could be meaningfully interpreted

suggests that the addition of the function and quality dimensions is useful and worthy of further research.

Consistent with previous research, we identified diverse, family-focused, friend-focused, and restricted types. Certain structures are generally associated with certain functions, consistent with predictions based on the Convoy Model (Kahn & Antonucci, 1985). For example, our analyses revealed that individuals within a structurally diverse network also reported receiving relatively high levels of instrumental and, in particular, emotional support (diverse–supported). However, our findings also showed that structure and function are not always correlated; for example, we found supported and unsupported friend-focused network types. Individuals in both network types were primarily widowed women, had on average about 10 people in their networks, and reported frequent contact with friends and relatively less contact with family. However, those in the friend-focused–unsupported network type were more active and reported receiving less instrumental support. This difference is likely due at least in part to age; whereas 77% of those in the unsupported type were young-old individuals, the majority of those in the supported type (72%) consisted of oldest-old individuals, whose increasing levels of dysfunction (Baltes & Smith, 2003) may make them less active and more reliant on their networks for instrumental aid.

Individuals' satisfaction with their relationships was less variable and relatively high across all types. This may reflect a tendency for older adults to report less relationship negativity (Birditt & Fingerman, 2003). In fact, the only network type distinguished by lower relationship satisfaction was the restricted–nonfriends–unsatisfied type. Consistent with our prediction of multiple restricted network types, the restricted–nonfamily–unsupported network type also emerged. This finding expands on our previous research, in which we found nonfriends and nonfamily *structural* restricted network types in a sample of older Americans (Fiori et al., 2006). Our present finding indicates that restricted networks may vary not only in structure but also in function and quality. Although those in both restricted network types reported very low levels of emotional support, unlike those in the nonfriends type, those in the nonfamily type rated their satisfaction relatively high in spite of a smaller network size and a much smaller proportion of close others. Those in the restricted–nonfamily–unsupported type may be content with their small network, infrequent contact with family, and low levels of support, whereas those in the restricted–nonfriends–unsatisfied type may feel disappointed by infrequent contact with or the lack of emotional support from their few but close relationships. In the absence of longitudinal information we can only speculate, but it may be that individuals in the restricted–nonfamily type have always preferred such a network (substantiated by the relatively large proportion of never-married individuals in this type), and that those in the restricted–nonfriends type are disappointed by failed attempts to maximize emotional support from close relationships (Carstensen, 1993).

Age-Group Differences

As predicted, restricted network types were more common among the oldest-old individuals (85 years of age or older) than among the young-old individuals (70–84 years of age), with 63% of the restricted–nonfriends–unsatisfied network type and

76% of the restricted–nonfamily–unsupported network type made up of the oldest-old individuals. Although a cohort effect cannot be ruled out, this finding is consistent with increasing constraints experienced by the oldest-old, which are due at least in part to losses of close partners and age-peers (Baltes & Smith, 2003). Interestingly, whereas only 7% ($n = 17$) of the oldest-old persons were in the friend-focused–unsupported network type and 3% ($n = 8$) in the diverse–supported type, the largest percentage (40%) were in the friend-focused–supported type. This finding highlights the heterogeneity of social networks even into very old age, and it speaks to the importance of the within-network dynamics of compensation (Baltes, 1997) among the mostly widowed women of the friend-focused–supported network type (Morgan, 1989).

Well-Being by Network Type

The network types differed on depressive symptoms, subjective well-being, and morbidity. Interestingly, although the distribution of network types varied by age group, the age group itself did not moderate the association of network types with well-being. However, this may be due to unequal distributions of network types by age as already outlined, resulting in small numbers for several cells and hence low power to detect differences. It may also speak to the strength of the network type in which an individual is embedded. In any case, individuals in the friend-focused–supported network type had higher levels of depressive symptoms and lower subjective well-being than individuals in the diverse–supported, family-focused, or friend-focused–unsupported types, as well as higher morbidity than individuals in the family-focused or friend-focused–unsupported types. Individuals in the friend-focused–unsupported network type had lower morbidity and higher subjective well-being than did those in the restricted–nonfriends–unsatisfied type, and individuals in the restricted–nonfamily–unsupported type had higher levels of depressive symptoms than did those in the family-focused type. The high well-being of individuals in the diverse–supported network type and the low well-being of individuals in the restricted types is consistent with our predictions and previous research (e.g., Litwin, 2001; Wenger, 1996, 1997). More surprising is the low well-being of persons in the friend-focused–supported type, particularly in contrast to persons in the friend-focused–unsupported type.

Past research shows that there are health benefits to being in a friend-focused network (e.g., Adams & Blieszner, 1995; Fiori et al., 2006; Litwin, 2001), in particular for widowed individuals (Morgan, 1989). Individuals in both friend-focused network types in this study were primarily widowed and shared many other similarities. However, as we already mentioned, individuals in the friend-focused–supported type were older, less active, and reported receiving much greater instrumental support than individuals in the friend-focused–unsupported type. Their poor well-being could relate to the need for and receipt of instrumental support. It may be that the poor physical health of those in the friend-focused–supported type led to a greater need for instrumental support, and possibly higher depressive symptoms and a lower sense of well-being. Alternatively, it may be that receiving instrumental support from friends (e.g., as a result of illness) contributes to feelings of helplessness at not being able to reciprocate, or to negative

affect stemming from unsolicited support or dependency (Penninx et al., 1998; Seeman, 2000). Perhaps it is less adaptive for one to be in a friend-focused network when one is at a very old age or when one is functionally impaired.

Limitations and Future Research

Because of the unique nature of the BASE sample, the results of this study should be generalized with caution. The lives and family histories of the participants were directly affected by World Wars I and II and by the post-1945 experiences of these individuals. One consequence of cohort differences in life history is illustrated by the especially high proportion of oldest-old individuals without children in this sample (Hoppmann & Smith, 2007). Also, as we already alluded to, it is difficult to infer causality from our cross-sectional well-being analyses. This issue is made more problematic by the nature of the support variables, which represent received support, irrespective of need. Although the association is likely bidirectional, longitudinal research is needed to explore this possibility. In particular, changes in the dynamics and well-being implications of friend-focused networks with age, or the progression of disease, deserves further research.

Conclusions

One of the major innovations of this study is the pattern-centered approach, with which we address complexities sometimes overlooked in variable-centered research. For example, although married older adults have been found to have better psychological and physical well-being than unmarried individuals (e.g., Berkman & Syme, 1979; Kiecolt-Glaser & Newton, 2001), in the present study the unmarried individuals embedded in a friend-focused network type (friend-focused–unsupported) fared better both psychologically and physically than those unmarried individuals embedded in a restricted network with little friend contact. These results imply that “marital status” cannot be studied in isolation in old age, and that some forms of compensation exist within networks. Clearly, there are a variety of ways in which older adults can adapt and age successfully (Baltes, 1997; Jopp & Smith, 2006; Steverink & Lindenberg, 2006). The pattern-centered approach is one tool to capture such variability.

The second major innovation of this study is the inclusion of function and quality in the derivation of network types, which is consistent with several major models and theories of social relations among older adults (Antonucci, 2001; Carstensen, 1993; Kahn & Antonucci, 1980). Although certain structures appear to be associated with certain functions, we found notable heterogeneity, particularly within the friend-focused and restricted network types. This heterogeneity may stem from differences in the nature of friendships at different ages, the nature of or reasons for network restriction (e.g., purposeful pruning, lifelong restriction, or uncontrollable losses of family or friends), or other life circumstances (e.g., illness).

The heterogeneity of social network types and their differential predictive value speaks to the diversity of life pathways to successful aging. It also implies that identifying those most at risk and tailoring interventions for their particular social support needs represents an important step for practitioners. Litwin and Shiovitz-Ezra (2006) advocate such

network typing by using structural network questions in intake interviews; we argue that at least briefly assessing the functions and quality of older adults' social networks is also important (see also Steverink & Lindenberg, 2006). In sum, this study has practical and theoretical implications for the field of social relations and health among older adults.

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REFERENCES

- Adams, R. G., & Blieszner, R. (1995). Aging well with friends and family. *The American Behavioral Scientist*, 39, 209–224.
- Antonucci, T. C. (1986). Hierarchical mapping technique. *Generations: Journal of the American Society on Aging*, 10(4), 10–12.
- Antonucci, T. C. (2001). Social relations: An examination of social networks, social support, and sense of control. In J. E. Birren & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (5th ed., pp. 427–453). San Diego, CA: Academic Press.
- Antonucci, T. C., & Akiyama, H. (1987). Social networks in adult life and a preliminary examination of the convoy model. *Gerontology*, 42, 519–527.
- Avlund, K., Lund, R., Holstein, B. E., Due, P., Sakari-Rantala, R., & Heikkinen, R.-L. (2004). The impact of structural and functional characteristics of social relations as determinants of functional decline. *Journal of Gerontology: Social Sciences*, 59B, S44–S51.
- Bagby, R. M., Ryder, A. G., Schuller, D. R., & Marshall, M. B. (2004). The Hamilton Depression Rating Scale: Has the gold standard become a lead weight? *American Journal of Psychiatry*, 161, 2163–2177.
- Baltes, P. B. (1997). On the incomplete architecture of human ontogeny: Selection, optimization, and compensation as foundation of developmental theory. *American Psychologist*, 52, 366–380.
- Baltes, P. B., & Mayer, K. U. (Eds.) (1999). *The Berlin Aging Study: Aging from 70 to 100*. New York: Cambridge University Press.
- Baltes, P. B., & Smith, J. (1997). A systemic-wholistic view of psychological functioning in very old age: Introduction to a collection of articles from the Berlin Aging Study. *Psychology and Aging*, 12, 395–409.
- Baltes, P. B., & Smith, J. (2003). New frontiers in the future of aging: From successful aging of the young old to the dilemmas of the fourth age. *Gerontology*, 49, 123–135.
- 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.
- Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*, 109, 186–204.
- Birditt, K. S., & Fingerman, K. L. (2003). Age and gender differences in adults' descriptions of emotional reactions to interpersonal problems. *Journal of Gerontology: Psychological Sciences*, 58B, P237–P245.
- Blazer, D. G. (1982). Social support and mortality in an elderly community population. *American Journal of Epidemiology*, 115, 684–694.
- Bosworth, H. B., & Schaie, K. W. (1997). The relationship of social environment, social networks, and health outcomes in the Seattle Longitudinal Study: Two analytical approaches. *Journal of Gerontology: Psychological Sciences*, 52B, P197–P205.
- Bray, J. H., & Maxwell, S. E. (1985). *Multivariate analysis of variance*. Newbury Park, CA: Sage.
- Carstensen, L. L. (1993). Motivation for social contact across the life span: A theory of socioemotional selectivity. In J. E. Jacobs (Ed.), *Nebraska Symposium on Motivation: Developmental perspectives on motivation* (pp. 209–254). Lincoln, NE: University of Nebraska Press.
- Consedine, N. S., Magai, C., & Conway, F. (2004). Predicting ethnic variation in adaptation to later life: Styles of socioemotional functioning and constrained heterotypy. *Journal of Cross-Cultural Gerontology*, 19, 95–129.
- Fiori, K. L., Antonucci, T. C., & Cortina, K. S. (2006). Social network typologies and mental health among older adults. *Journal of Gerontology: Psychological Sciences*, 61B, P25–P32.
- Gerstorf, D., Smith, J., & Baltes, P. B. (2006). A systemic-wholistic approach to differential aging: Longitudinal findings from the Berlin Aging Study. *Psychology and Aging*, 21, 645–663.
- Hair, J. H., Jr., & Black, W. C. (2000). Cluster analysis. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding more multivariate statistics* (pp. 147–205). Washington, DC: American Psychological Association.
- Hamilton, M. (1960). A rating scale for depression. *Neurosurgery & Psychiatry*, 23, 56–61.
- Hanson, B. S., Isacson, S., Janzon, L., & Lindell, S. (1989). Social network and social support influence mortality in elderly men. *American Journal of Epidemiology*, 130, 100–111.
- Hoppmann, C., & Smith, J. (2007). Life-history related differences in possible selves in very old age. *International Journal of Aging and Human Development*, 64, 109–127.
- Johnson, C. L., & Barer, B. M. (1997). *Life beyond 85 years: The aura of survivorship*. New York: Springer.
- Jopp, D., & Smith, J. (2006). Resources and life-management strategies as determinants of successful aging: On the protective effect of selection, optimization, and compensation. *Psychology and Aging*, 21, 235–265.
- Kahn, R. L., & Antonucci, T. C. (1980). Convoys over the life course: Attachment, roles, and social support. In P. B. Baltes & O. B. Brim (Eds.), *Life-span development and behavior* (Vol. 3, pp. 253–268). New York: Academic Press.
- Kiecolt-Glaser, J. K., & Newton, T. L. (2001). Marriage and health: His and hers. *Psychological Bulletin*, 127, 472–503.
- Lawton, M. P. (1975). The Philadelphia Geriatric Center Morale Scale: A revision. *Gerontology*, 30, 85–89.
- Litwin, H. (1995). The social networks of elderly immigrants: An analytic typology. *Journal of Aging Studies*, 9, 155–174.
- Litwin, H. (2001). Social network type and morale in old age. *The Gerontologist*, 41, 516–524.
- Litwin, H., & Shiovitz-Ezra, S. (2006). Network type and mortality risk in later life. *The Gerontologist*, 46, 735–743.
- Lund, R., Modvig, J., Due, P., & Holstein, B. E. (2000). Stability and change in structural social relations as predictor of mortality among elderly women and men. *European Journal of Epidemiology*, 16, 1087–1097.
- Magai, C., Consedine, N. S., King, A. R., & Gillespie, M. (2003). Physical hardiness and styles of socioemotional functioning in later life. *Journal of Gerontology: Psychological Sciences*, 58B, P269–P279.
- Maxson, P. J., Berg, S., & McClearn, G. (1997). Multidimensional patterns of aging: A cluster-analytic approach. *Experimental Aging Research*, 23, 23–31.

- Melkas, T., & Jylhä, M. (1996). Social network characteristics and social network types among elderly people in Finland. In H. Litwin (Ed.), *The social networks of older people: A cross-national analysis* (pp. 99–116). Westport, CT: Praeger Press.
- Milligan, G. W., & Cooper, M. C. (1987). Methodology review: Clustering methods. *Applied Psychological Measurement*, 11, 329–354.
- Morgan, D. L. (1989). Adjustment to widowhood: Do social networks really help? *The Gerontologist*, 29, 101–107.
- Penninx, B., van Tilburg, T., Boeke, A. J., Deeg, D. J., Kriegsman, D. M. W., & van Eijk, J. Th. M. (1998). Effects of social support and personal coping resources on depressive symptoms: Different for various chronic diseases? *Health Psychology*, 17, 551–558.
- Seeman, T. E. (2000). Health promoting effects of friends and family on health outcomes in older adults. *American Journal of Health Promotion*, 14, 362–370.
- Smith, J., & Baltes, P. B. (1997). Profiles of psychological functioning in the old and oldest old. *Psychology & Aging*, 12, 458–472.
- Smith, J., & Baltes, P. B. (1999). Trends and profiles of psychological functioning in very old age. In P. B. Baltes & K. U. Mayer (Eds.), *The Berlin Aging Study: Aging from 70 to 100* (pp. 197–226). New York: Cambridge University Press.
- Smith, J., Borchelt, M., Maier, H., & Jopp, D. (2002). Health and well-being in the young old and oldest old. *Journal of Social Issues*, 58, 715–732.
- Steverink, N., & Lindenberg, S. (2006). Which social needs are important for subjective well-being? What happens to them with aging? *Psychology and Aging*, 21, 281–290.
- Stone, L., & Rosenthal, C. (1996). Profiles of the social networks of Canada's elderly: An analysis of 1990 General Social Survey data. In H. Litwin (Ed.), *The social networks of older people: A cross-national analysis* (pp. 77–97). Westport, CT: Praeger Press.
- Ward, J. H. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association*, 58, 236–244.
- Weiss, R. (1974). The provisions of social relationships. In Z. Rubin (Ed.), *Doing unto others* (pp. 17–26). Englewood Cliffs, NJ: Prentice-Hall.
- Wenger, G. C. (1996). Social networks and gerontology. *Reviews in Clinical Gerontology*, 6, 285–293.
- Wenger, G. C. (1997). Social networks and the prediction of elderly people at risk. *Aging & Mental Health*, 1, 311–320.
- Yasuda, N., Zimmerman, S. I., Hawkes, W., Fredman, L., Hebel, J. R., & Magaziner, J. (1997). Relation of social network characteristics to 5-year mortality among young-old versus old-old white women in an urban community. *American Journal of Epidemiology*, 145, 516–523.

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