

# Social Network Changes and Life Events Across the Life Span: A Meta-Analysis

Cornelia Wrzus  
Max Planck Institute for Human Development,  
Berlin, Germany

Martha Hänel  
Leuphana University

Jenny Wagner  
Humboldt University

Franz J. Neyer  
Friedrich-Schiller University

For researchers and practitioners interested in social relationships, the question remains as to how large social networks typically are, and how their size and composition change across adulthood. On the basis of predictions of socioemotional selectivity theory and social convoy theory, we conducted a meta-analysis on age-related social network changes and the effects of life events on social networks using 277 studies with 177,635 participants from adolescence to old age. Cross-sectional as well as longitudinal studies consistently showed that (a) the global social network increased up until young adulthood and then decreased steadily, (b) both the personal network and the friendship network decreased throughout adulthood, (c) the family network was stable in size from adolescence to old age, and (d) other networks with coworkers or neighbors were important only in specific age ranges. Studies focusing on life events that occur at specific ages, such as transition to parenthood, job entry, or widowhood, demonstrated network changes similar to such age-related network changes. Moderator analyses detected that the type of network assessment affected the reported size of global, personal, and family networks. Period effects on network sizes occurred for personal and friendship networks, which have decreased in size over the last 35 years. Together the findings are consistent with the view that a portion of normative, age-related social network changes are due to normative, age-related life events. We discuss how these patterns of normative social network development inform research in social, evolutionary, cultural, and personality psychology.

*Keywords:* social network, life-span psychology, life event, cross-cultural, meta-analysis

“Network size is the most basic characteristic of friendship network structure, but we still do not have a clear sense of what the typical size of networks is, or of how it varies across adult age” (Ueno & Adams, 2006, p. 153). Ueno and Adams (2006) drew this conclusion about friendship networks. Yet, the typical size of other social networks and how they vary across adult age are also unclear, despite the importance to anybody interested in social relationships. Numerous studies state that social networks change across the life span. The two prevailing developmental theories, socioemotional selectivity and social convoy theory, predict similar network changes but attribute these to different causes. Using

meta-analytical methods, we aim to quantify the size and composition of social networks as they change from adolescence to old age, and seek to explain normative network changes through the occurrence of normative life events.

## Different Types of Social Networks

Social networks comprise a person’s social relationships, that is, “the set of people with whom an individual is *directly involved* [emphasis added]” (C. S. Fischer, 1982, p. 2), such as family members, friends, and acquaintances. Direct involvement implies that there is a social relationship between the individual and the network partner that is characterized by repeated interactions between the dyad members and a mental representation of the relationship as such (Baumeister & Leary, 1995). Repeated interactions distinguish social relationships from single interactions and zero acquaintances (Baumeister & Leary, 1995; Duck, 1988; Hinde, 1979), whereas mental representations imply that the relationship partners view and report their association as a relationship (Baldwin, 1992). This definition distinguishes social networks in the current meta-analysis from approaches that focus on the maximum number of persons an individual knows at least by name (Hill & Dunbar, 2003; Killworth, Johnsen, Bernard, Shelley, & McCarty, 1990). Furthermore, the definition distinguishes social networks from social groups: Members of social groups can, but

---

This article was published Online First May 28, 2012.

Cornelia Wrzus, Max Planck Institute for Human Development, Berlin, Germany; Martha Hänel, Department of Psychology, Leuphana University, Lüneburg, Germany; Jenny Wagner, Department of Psychology, Humboldt University, Berlin, Germany; Franz J. Neyer, Department of Psychology, Friedrich-Schiller University, Jena, Germany.

We thank Thomas Kessler, Kristin Mitte, and Margund Rohr for their valuable comments on earlier versions of this article. We are grateful to Julia Delius and Grace O’Malley for editorial assistance.

Correspondence concerning this article should be addressed to Cornelia Wrzus, Max Planck Institute for Human Development, Lentzeallee 94, 14195 Berlin, Germany. E-mail: wrzus@mpib-berlin.mpg.de

do not have to, entertain social relationships (e.g., Asendorpf & Banse, 2000; Baumeister & Leary, 1995). Group belonging can occur without (repeated) interaction (see, e.g., research using the minimal group paradigm: Brewer, 1979; Tajfel, Billig, Bundy, & Flament, 1971). Finally, groups are often performance oriented and share goals (Sherif, 1966), whereas this does not necessarily characterize social networks such as friendship or family networks (Baumeister & Leary, 1995; Duck, 1988; Hinde, 1979).

There are different types of social networks that can be distinguished by the kinds of relationships they include. The term *global network*, or directly “social network,” comprises all existing social relationships of an individual with family members, spouses, friends, coworkers, neighbors, society fellows, etc., and thus conceptualizes social networks most comprehensively (Allan, 2006; C. S. Fischer, 1982; Milardo, 1989). The *personal network* describes a subnetwork of closer, personal relationships in the global network such as family members, friends, and other close confidants (van der Poel, 1993). Personal networks are sometimes termed support networks, as they are often seen as a resource for people’s health and well-being through the exchange of support among closer network members (Allan, 2006; Hammer, 1983). Other types of networks that also focus on subnetworks of the global network are the *friendship network*, the *family network* (e.g., siblings, parents, children, and spouse), and the *work-related network* (e.g., coworkers and supervisors). Studies focusing exclusively on more peripheral relationships within people’s global networks, such as with neighbors or professional helpers, are scarce (Imamoğlu, Küller, Imamoğlu, & Küller, 1993; Tracy, 1990). More often peripheral relationships are studied as a part of global networks.

The size of social networks is an important characteristic because it indicates social resources. Social resources often bear beneficial effects for people’s health, well-being, and accomplishment of life tasks (Bastani, 2007; Carstensen, 1991; Granovetter, 1973; Kahn & Antonucci, 1980; Pinguat & Sörensen, 2000). The assessed social network size can vary with the assessment method and several other methodological factors such as sample representativeness or gender distribution (Bien, Marbach, & Neyer, 1991; Cross & Madson, 1997; Kogovšek, & Ferligoj, 2005). The strength of meta-analyses is to incorporate studies with varying methods because these effects can be analyzed in moderator analyses (Rosenthal, 1991). We explain the included method effects in detail in the section The Present Meta-analysis.

In addition to the overall size of the global network, the number of relationships in specific subnetworks such as family or work-related networks is important because distinct relationships can fulfill different functions (e.g., Cronenwett, 1985a; Neyer, Wrzus, Wagner, & Lang, 2011). Individuals’ global networks sometimes lack relationships in specific subnetworks. Whether coworkers or friends are part of global networks can vary between individuals and also within individuals over the life course. For example, if a person is active in the labor market, coworkers are more likely in his or her global network. Thus, personal circumstances are an influencing factor for social networks and their change (Lang, 2004). Two major theories address changes in social networks over the life course: socioemotional selectivity theory (Carstensen, 1991) and social convoy theory (Kahn & Antonucci, 1980).

## Changes of Social Networks Over the Life Course

The two prevalent theories on the life-span development of social relationships, socioemotional selectivity and social convoy theory, predict similar changes but attribute these changes to different causes. Socioemotional selectivity theory describes how social goals, and with them social relationships, change over the entire life course due to shifts in perspectives on how much time one has left to live (Carstensen, 1991, 1992, 1995). During adolescence and young adulthood, when remaining life time seems unlimited, *information acquisition* goals are relatively more prevalent compared with other life periods. People focus on gathering knowledge and information from diverse relationships and sources, which is achieved best in large networks with diverse relationship partners. After young adulthood and throughout the rest of adult life, when remaining life time is perceived as increasingly limited, *emotion regulation* goals become increasingly important. People emphasize emotional aspects of relationships and focus on close relationships, such as those with family members, with expected pleasant interactions that most likely satisfy emotion regulation goals. Accompanying decreases in network size in older adulthood are assumed to be actively sought and not merely passively experienced because of deaths of network members (Carstensen, Isaacowitz, & Charles, 1999; Lang & Carstensen, 1994). Decreases especially in peripheral, but less in close and familial relationships support these assumptions (Lang, 2000; Lang, Staudinger, & Carstensen, 1998). For example, in a longitudinal study, Carstensen (1992) analyzed interviews conducted with 50 participants at the age of 18, 30, 40, and 52 years. Carstensen reported that interaction frequency with acquaintances and friends decreased starting from young adulthood onward, whereas interaction frequency with family members and closeness to family and friends increased once middle adulthood was reached. Apart from this study, the assumptions on social network changes over the life course have not been tested satisfactorily, as empirical support primarily exists for network changes in old age (Lang & Carstensen, 1994; Lang et al., 1998).

Social convoy theory holds that people maintain a network of social relationships that escorts them over the life course like a convoy, that is, like a group of fellow travelers on the road of life (Kahn & Antonucci, 1980). Relationships in this convoy differ in levels of closeness and dependency on social circumstances and are therefore differently affected by changes in a person’s circumstances. That is, relationships with people in the innermost circle of the convoy, such as spouses and the core family, should be highly stable throughout the life span (Antonucci & Akiyama, 1987; Kahn & Antonucci, 1980). Relationships in the periphery of the convoy, such as acquaintances, coworkers, and neighbors, are assumed to be less stable. These relationships may end with changes in external circumstances such as changes in social roles or location (Kahn & Antonucci, 1980). For late adulthood, two studies provide first support for convoy theory: Close, core relationships remained stable, whereas peripheral relationships decreased in number and contact frequency (Antonucci & Akiyama, 1987; Guiaux, van Tilburg, & Broese van Groenou, 2007). Studies testing the life-span assumptions of the social convoy theory comprehensively are not available.

In sum, both theories concur that more peripheral, less close relationships continuously decrease in number during adulthood,

whereas close relationships with family and close friends persist throughout the life course. As a motivational theory, socioemotional selectivity theory predicts this pattern of decrease and stability on the basis of increased salience of emotion regulation goals due to a limited future time perspective. Social convoy theory predicts a similar pattern of network changes but attributes changes to altering circumstances, such as those induced by life events. Peripheral relationships are more vulnerable to changing circumstances, whereas family and other close relationships are mainly more enduring. Thus, both theories differ regarding the assumed underlying mechanisms of change and therefore the importance they attribute to situational circumstances. We argue that life events represent such altering circumstances that affect social relationships and work concurrently with, and in the same direction of, motivational changes.

### Life Events Can Change Social Networks

Compared with daily incidents, life events are far-reaching occurrences that necessitate, or take place with, changes in behavioral patterns (Filipp, 1990; Holmes & Rahe, 1967). The diversity of biological, social, and physical events can be classified as *normative* (i.e., of high probability for most people at a certain age, such as marriage or entering the labor market) or *nonnormative* (i.e., experienced only by few, such as winning the lottery or a car accident, or of low probability, such as war). In addition, normative life events vary in time of occurrence during the life course (Brim & Ryff, 1980): Examples are school entry, puberty, marriage, parenthood, labor market entry, retirement, and widowhood.<sup>1</sup> Most research focuses on normative life events, and we also include nonnormative life events with a moderate occurrence probability, such as relocation, divorce, and death of a relative (Filipp, 1990). Since the effects of life events on social networks are heterogeneous, we next introduce the events addressed in this meta-analysis one by one.

### Normative Life Events

Most researchers classify *puberty* as a life event involving major biological and social changes, whereas adolescence is defined as a period in life (Brim & Ryff, 1980; Filipp, 1990). During puberty, adolescents' emotional and behavioral autonomy from parents usually increases (Hofer & Pikowski, 2002; Kreppner, 1993). Establishing social ties outside their core family with friends and first romantic partners helps adolescents to accomplish this developmental task of achieving autonomy and satisfying emotional needs more independently of the core family. Furthermore, large and diverse social networks are assumed to better fulfill needs for information acquisition (Carstensen, 1995). Thus, during puberty, the global network of adolescents should expand due to an increasing number of relationships with peers and other nonrelatives (Feiring & Lewis, 1991; J. L. Fischer, Sollie, & Morrow, 1986).

*Marriage* is assumed to extend the spouses' social networks because in-laws and partners' friends join the network (D. R. Brown & Gary, 1985; Hurlbert & Acock, 1990; M. P. Johnson & Leslie, 1982)—often already during the first months of romantic relationships. Yet, spouses' networks are seldom simply the sum of both partners' networks because selection occurs based on similarities with the new network partners (Sprecher & Felmlee,

2000). This takes place because of active assortment as predicted by similarity–attraction theory (Byrne, 1971; Byrne, Griffitt, & Stefaniak, 1967) as well as social homogamy (McPherson, Smith-Lovin, & Cook, 2001; Watson et al., 2004). Social homogamy ensures that we are more likely to meet other people of similar sociodemographic background, for instance, regarding education or age at work or during leisure activities. From these people, we actively select more similar relationship partners because interactions with them are assumed to be pleasant due to similar interests and activities as well as confirmation of one's own views (Byrne, 1971).

Becoming parents, that is, the *transition to parenthood*, often reduces social networks (Bost, Cox, Burchinal, & Payne, 2002). This occurs partly for structural reasons (e.g., less available free time, different daily routines) and partly due to psychological processes. These processes include, for example, an increased focus on the child and the romantic partner, as well as diverging interests with childless affiliates (Bernardi, 2003). Social comparison theory (Festinger, 1954) would predict that parents-to-be compare themselves with friends and others regarding attitudes toward children and continue relationships with agreement concerning children, but discontinue relationships where relationship partners disagree in relevant attitudes (Bernardi, 2003; Heider, 1958). Strongest reductions occur in less close, peripheral relationships, whereas family relationships are assumed to be stable, and contact with family members may even increase (Power & Parke, 1984).

Entering the labor market, that is, *job entry*, expands access to new persons who may eventually enter the global social network as coworkers or even as new friends (Morrison, 2002). Physical proximity, belonging to the same social group, and social homogamy—factors all fulfilled at work—have been shown to increase the chances of forming new relationships (Back, Schmukle, & Egloff, 2008; Festinger, Schachter, & Back, 1950; McPherson et al., 2001). In contrast, existing friendships can diminish due to decreasing (time) resources (Shaver, Furman, & Buhrmester, 1985; Sollie & Fischer, 1988) or social comparison processes that lead to discontinuation of dissimilar friendships (Festinger, 1954; Heider, 1958). In sum, the global social network should increase due to the inclusion of coworkers, whereas friendship networks are assumed to experience gains and losses simultaneously.

The *loss of a spouse* reduces the network not only on account of that loss, but also by losing acquaintances, friends, and family members, as mourning tends to be accompanied with some temporary social withdrawal (Antonucci et al., 2001; Zettel & Rook, 2004). This life event presumably exerts its strongest effects briefly after its occurrence, and after several months people usually regain a status similar to before the loss of the spouse (Zettel & Rook, 2004).

<sup>1</sup> In this meta-analysis we focus on changes in social networks starting from adolescence because children's networks are often not self-reported but are described by the parents instead. Since we focus on adolescence and beyond, we do not include school entry as a life event. In addition, we do not describe effects of retirement on social networks because we found only one study providing sufficient inclusion information.

## Nonnormative Life Events

The loss of a spouse is expected at a certain age, whereas the *death of a relative*, such as a child or sibling, is a nonnormative life event that is often unexpected and can occur at any time during the life course (e.g., due to an accident or an illness). Research regarding effects of this life event on social networks is still scarce but generally suggests profound effects on all domains of personal and social functioning, among them social relationships (Lehman, Wortman, & Williams, 1987; Murphy, Lohan, Dimond, & Fan, 1998). Similar to the loss of a spouse, we expect a (temporary) decrease in acquaintances and friends when people withdraw from extended social contacts and focus on close relationships (Murphy et al., 1998).

*Divorce* is an especially stressful, nonnormative life event that reduces a person's social networks through the partial loss of in-laws and spouse's friends, but also through a focus on close, supportive relationships at the cost of more peripheral relationships (R. A. Caldwell, Bloom, & Hodges, 1983; Daniels-Mohring & Berger, 1984; Hughes, 1988; Rands & Milardo, 1988; Sprecher, Felmlee, Schmeekle, & Shu, 2006).

*Relocation* strongly affects social networks because most extrafamilial relationships are maintained with people living and working within the same city or area (Bloem, van Tilburg, & Thomése, 2008). Contact with these people declines with increasing residential distance (M. A. Johnson, 1989; Neyer & Lang, 2003). Thus, social network size decreases when a person moves to a different area. Some of the existing relationships can no longer be maintained as before, since visits and shared activities are no longer easily achieved (Jerusalem, Hahn, & Schwarzer, 1996; South & Haynie, 2004).

In sum, normative life events differ in their effects on social networks. Whereas some events expand specific social networks, others decrease their size. In contrast, nonnormative life events seem to mainly reduce the size of social networks. Peripheral, less close relationships are among the first to dissolve, whereas close, long-lasting relationships such as those with family members are less likely to be affected (Lang, 2004).

## The Present Meta-Analysis

We aim to integrate existing theories on social network changes across the life span by showing that age-related social network changes as proposed by socioemotional selectivity theory correspond to life-event-related social network changes as suggested by social convoy theory.

Thus, in Research Aim 1, we address the size of different types of social networks and their change at a certain age. We assume that the size of the global social network and the personal network first increase during adolescence and young adulthood by incorporating extrafamilial relationships to satisfy needs for information acquisition. During and after middle adulthood, people are assumed to focus less on large, diverse social networks and instead narrow their networks to relationships with close others, such as family members (Carstensen, 1995; Carstensen et al., 1999; Lang, 2004). These changes should be largely evident in changes of friendships and work relationships following the predictions of socioemotional selectivity theory on changes in peripheral relationships. For the family network, we assume high stability of size throughout the life span as proposed by social convoy theory.

With Research Aim 2, we want to test whether these network changes are related to normative and nonnormative life events. We assume that age-related network changes (i.e., changes unrelated to the occurrence of life events) are congruent with the effects of life events occurring normatively in these specific life periods. For instance, we hypothesize that puberty affects social networks in a way that is similar to what is observed in Research Aim 1 for the teenage period. Another example of what we expect to find is that the effect of losing a spouse, which mainly occurs in late adulthood, should be similar to the observed normative network changes (unrelated to life events) for people aged 60 and older.

In addition, we address three domains of moderator effects. Study results can be affected by biases regarding (a) the sample, (b) the measurements, and (c) the time of assessment (Nesselroade & Jones, 1991). We examine effects of the sample with regard to the gender distribution, the nationality, and the sample recruitment. We hypothesize that samples with larger proportions of women report larger network sizes because women often score higher on measures of communion and relationship orientation, which is also expressed in larger social networks (Cross & Madson, 1997; Diehl, Owen, & Youngblade, 2004; Moore, 1990). Furthermore, samples from countries with more pronounced individualistic values should report larger global networks compared with less individualistic countries. Individualism–collectivism is, among other things, related to being more or less open to persons outside the family (Hofstede, 1980; Oyserman, Coon, & Kimmelmeier, 2002; Triandis, Bontempo, Villareal, Asai, & Lucca, 1988). Being more open to extrafamilial persons should result in maintaining larger social networks in countries with more pronounced individualistic values. We therefore used individualism–collectivism scores published by Hofstede (1980) and Oyserman et al. (2002) to study how country differences in individualistic–collectivistic values affect average network sizes. In addition, we explore the differences between convenience samples, student samples, and more representative, general population-based samples. We exclude psychiatric samples because psychiatric disorders affect social relationships strongly but differently depending on the kind of disorder (Brugha, 2007; Goldberg, Rollins, & Lehman, 2003).

With regard to measurement effects of the network assessment, free-recall procedures are more cognitively demanding than recognition procedures (Anderson & Bower, 1972). We therefore assume that free-recall procedures lead to smaller networks than guided recall or recognition procedures, often employed in standardized interviews or quantitative instruments (Bernard et al., 1990; Sudman, 1985).

To study effects of time, we test whether social networks, particularly personal and family networks, decreased in size over recent decades as currently suggested (McPherson, Smith-Lovin, & Brashears, 2006, 2009; Phillipson, 1997). We also address whether longitudinal and cross-sectional studies differ in reported effect sizes of network change. Differences between both types of studies can occur because age effects in longitudinal studies stem from within-person change and possibly period effects, whereas age effects in cross-sectional studies stem from (unobserved) within-person change and possibly from cohort and period effects (Lindenberger, von Oertzen, Ghisletta, & Hertzog, 2011; Molenaar & Campbell, 2009; Nesselroade, Schaie, & Baltes, 1972). Among longitudinal studies, we propose that the study duration affects network changes differently. For age-related changes, we assume

that long-ranging studies capture larger changes in network size: Both increases early in life and decreases later in life cumulate over time, leading to larger increases or decreases of network size in longer studies, respectively. With respect to changes related to life events on the other hand, we assume that the largest effects can be observed shortly after the event. Over time, people's social network sizes likely return to the size maintained before the event occurred because old relationships are rekindled and people usually gain the functional status they held before the life event (Terhell, Broese van Groenou, & van Tilburg, 2007; Zettel & Rook, 2004).

## Method

### Study Selection

An extensive literature search was conducted in 2008–2009 and updated in 2012 using the databases PsycINFO, Web of Science/Social SciSearch, Science Direct, Psychology and Behavioral Science Collection (including Dissertation Abstracts via EBSCO), and also PSYINDEX to retrieve German publications. No restriction was set regarding the earliest year of publication. Furthermore, we searched in the journal *Social Networks* for studies from 1978 to 2012. We used a routine procedure of two steps. First, we looked for publications on social networks, excluding neurological networks. Keywords were *network*, *personal network*, and *social relationship* with exclusion terms *mind*, *brain*, *semantic*, and *neural*. Second, we searched for publications focusing on social networks and life events. For this search we combined keywords for networks (*network*, *personal network*, *social relationship*, and *close relationship*) and life events (*life-event*, *normative transition*, *transition*, *puberty*, *marriage*, *parenthood*, *entering work life*, *retirement*, *widowhood*, *death*, *divorce*, *relocation*, and *move*), yielding 48 combinations in all. English and German terms were used.

This search yielded 5,423 hits, from which we read abstracts to decide on the suitability for the aims of the meta-analyses. This preselection resulted in 916 articles, 68 books or book chapters, and 126 dissertations to read. From these, we excluded 702 articles, 65 books or book chapters, and 71 dissertations from the final analyses because

- they did not report statistics on either network size or age of sample ( $k = 285$  articles,  $k = 55$  books,  $k = 18$  dissertations), or
- they did not assess any kind of social network because they focused, for example, on parent–child relationships ( $k = 277$  articles,  $k = 8$  books,  $k = 30$  dissertations), or
- they focused on unsuitable samples, such as psychiatric patients or animal samples ( $k = 140$  articles,  $k = 2$  books,  $k = 23$  dissertations).

For dissertations not retrievable through ProQuest or the Internet, we tried to contact the authors and found no contact information ( $k = 18$ ) because the dissertations dated back to 1969, or did not receive an answer ( $k = 28$ ). This left 214 articles, three books, and nine dissertations to code, which amounted to 277 studies. The number of studies slightly exceeded the number of sources because some articles and books reported on more than one study or sample. They were therefore included as separate studies.

### Coding of Effect Sizes and Study Characteristics

For each study we coded study characteristics (see Table 1) and effect sizes related to the size and change of specific social networks. For example, if a study reported having interviewed college students once before they entered the labor market and again 3 months later and asked them to name people that would provide emotional and/or functional support, we coded the study as longitudinal with two measurement points, as employing a student sample and using an interview procedure for the assessment of a

Table 1  
Coded Study Characteristics

Variable	Description and coding options
General information	
Author and reference	Full reference recorded
Type of publication	1 = journal article, 2 = book, 3 = dissertation
Sample size	Number of participants
Predictors	
Sample age	Mean, standard deviation, minimum, maximum, 1 = 11–18 years, 2 = 18–30 years; 3 = 30–45 years, 4 = 45–60 years, 5 = 60–80 years, 6 = older than 80 years
Life event	1 = puberty, 2 = marriage, 3 = parenthood, 4 = job entry, 5 = loss of a spouse, 6 = death of a relative, 7 = divorce, 8 = relocation, 9 = no life event
Network type	1 = global network, 2 = personal network, 3 = family, 4 = friends, 5 = coworker, 6 = other acquaintances
Moderators	
Percentage of male participants	1 = less than 5%, 2 = between 5% and 40%, 3 = between 40% and 60%, 4 = between 60% and 95%, 5 = more than 95%
Sample type	1 = general population based, 2 = convenience (recruited from homes for elderly, counseling offices, etc.), 3 = students
Country of sample	Country name recorded
Network assessment	1 = interview, 2 = standardized instrument (e.g., questionnaire), 3 = using free recall (e.g., request to name up to 20 friends)
Design type	1 = cross-sectional, 2 = longitudinal (for longitudinal studies, the number of assessment points and the total time span were coded)

personal network. In addition, we noted all further available information describing the study and the sample and recorded the observed effect sizes at the first measurement occasion as well as those reflecting the change accompanying the life event job entry. Some studies did not apply longitudinal designs to study effects of life events on network change, but rather compared a group of participants who had recently experienced this life event with a control group that had not. The groups were matched in age and further study-relevant variables. In the meta-analytic procedure section, we describe how those effect sizes and longitudinal effect sizes were integrated.

Procedures to assess social networks differed in the involvement of the interviewer and the cues provided for the participant to remember relevant persons. We thus distinguished three categories: (a) In interviews, the interviewer asked participants about relationships related to the study purpose, such as positive as well as ambivalent relationships. The interviewer often prompted the participants to think of different relationship categories such as family, friends, and neighbors. (b) In standardized instruments, participants answered questionnaires, where they had to name people they engage with in specific activities (e.g., having meals, doing sports, talking to at work), for example. Alternatively, participants imagined themselves in the middle of three concentric circles that represented relationships differing in closeness and categorized their relationship partners into the circles (Antonucci, 1986). (c) In free-recall procedures, participants were not given cues but asked either to name people who belonged to a specific relationship category or to count the number of people they have contact with, they could rely on for help, or who are important to them. All these operationalizations have in common that people name relationship partners they are directly involved with and whom they represent as relationship partners because they are explicitly asked for these—thus, they match the definition of social relationships, which together constitute a social network.

We developed a precise coding manual with examples and coded all studies using the manual. Studies often included information on different subnetworks; for instance, on family as well as friendship networks (see theoretical background on Different Types of Social Networks and Table 1). The different networks were included as individual effect sizes for the same study and analyzed separately.

**Coding of effect sizes: Size of social networks and change in size.** We coded three types of effect sizes related to social network size: average network size, change in network size, and change in network size related to a life event. First, average network size was coded as the average number of people reported for a certain network unrelated to life events. If a study focused on longitudinal change, the size at the first measurement occasion was used. Furthermore, a few additional effect sizes were derived from quasi-experimental studies that compared two groups with only one experiencing a life event. Here the average network size of the control group, which was matched in age and other study-relevant characteristics, was used to code the average network size. Second, longitudinal change in network size unrelated to life events was either directly extracted from the text (either as Cohen's  $d$  or as unstandardized mean difference) or computed from network sizes reported for two time points. When the study contained more than two time points, the first and the last assessment were used for computing the network change and total study duration, and the

number of assessments was recorded. Third, change in network size related to life events was coded either as Cohen's  $d$  or as an unstandardized mean difference. This change could either be a pre-post test change associated with a life event or mean differences in network sizes between a control group and a subgroup that experienced the life event. Together with mean differences, we recorded standard deviations and the size of subsamples for cross-sectional studies, or standard deviations, stability coefficients, number of assessments, and time between the assessments for longitudinal studies.

Some cross-sectional studies ( $k = 24$ ) reported a correlation between age and network size. We transformed the correlation into Cohen's  $d$  using the formula  $d = 2r/\sqrt{1-r^2}$  (Rosenthal, 1991) and recorded the age range of the sample.

**Double coding.** We double-coded 10% of the articles to assess coding quality. The average interrater reliability of .90 suggested a high agreement on recorded variables. Disagreements observed during double coding and unclear information found during coding of the remaining studies were resolved after the computation of the interrater reliability.

**Missing data.** Seventy-five studies did not report the average age but only minimum and maximum age of the sample. The minimum and the maximum age allowed us to code the appropriate age category (see Table 1), if the age range did not exceed the range of the category by more than 5 years. The mean of the age category was used to replace missing average sample age. When studies did not report standard deviations (43%) or stability coefficients of network sizes (73% of longitudinal studies), these values were imputed with multiple regression (Allison, 2000; Lipsey & Wilson, 2001; Lüdtke, Robitzsch, Trautwein, & Köller, 2007).<sup>2</sup> Missing data for moderators were coded as missing.

## Meta-Analytic Procedure

The primary effect sizes in this meta-analysis were, first, the arithmetic mean indicating an average network size and, second, Cohen's  $d$  as the standardized mean difference of network sizes due to age-related change or to change related to the occurrence of life events. In total, there were 491 arithmetic means on network sizes and 134 Cohen's  $d$  effect sizes relating to change associated with either age or life events. Both required different statistical procedures, as explained next.

**Average network size: Arithmetic mean.** Although the arithmetic mean is seldom used in meta-analyses, it is a valid effect size that can be aggregated if the arithmetic means measure effects on a common metric (Hunter & Schmidt, 2004; Lipsey & Wilson, 2001). This applied to the average network size because the common metric was the number of people.

We analyzed how average network sizes varied with the age of the sample (Research Aim 1) using metaregression with random

<sup>2</sup> Missing standard deviations and stability coefficients were imputed through multiple regression based on network type and sample age. Additional predictors, such as sample size and assessment type, did not enhance the quality of the imputation. Regression-based imputation was preferred over replacing missing values with average values because descriptive statistics of imputed values are more similar to descriptive statistics of "original" values containing missing values.

effects, applying the formulas and macros provided by Lipsey and Wilson (2001) for SPSS. Regression weights were computed from sample size and standard deviations of network size (Lipsey & Wilson, 2001, p. 72). To test the predicted nonlinear increase–decrease course of both global and personal networks, we applied a combined exponential growth-and-decline formula as it is used in research on cognitive development over the life span (Buchwald, 2007; Cerella & Hale, 1994; Li et al., 2004). Specifically, we first estimated regression parameters using the formula network size =  $a * e^{(-b * \text{age})} + c * e^{(d * \text{age}-1)} + 1$  in nonlinear regression models separately for each network type. The regression parameters are  $a$ ,  $b$ ,  $c$ , and  $d$ , and  $e$  stands for the exponential function. The first summand of the regression formula describes nonlinear growth as a function of age, and the second summand describes nonlinear decline as a function of age. After estimating the regression parameters  $a$ ,  $b$ ,  $c$ , and  $d$ , we then transformed the age variable by computing a new age variable using these parameters obtained from the nonlinear regression. This enabled us to continue within the linear model of metaregression (J. Cohen, Cohen, West, & Aiken, 2003; Lipsey & Wilson, 2001). We did not fit quadratic change models because those results strongly depend on the age range of the sample (Fjell et al., 2010). Linear age effects were preferred to nonlinear age effects for reasons of parsimony if the model provided a similar or better model fit compared with the model including the nonlinear age effect.

Effects of moderators were tested by stepwise inclusion. The independence assumption of effect sizes was met because subnetworks, such as family networks and friendship networks, which partly stemmed from the same studies, were analyzed in separate regression models.

**Change in social networks.** First, Cohen's  $d$  was computed as  $ES = (M_2 - M_1)/SD_{\text{pooled}}$ , where  $M_2$  and  $M_1$  are either the means at two assessment points in a single-sample pre–post contrast or the means of a two-group contrast, and  $SD_{\text{pooled}}$  is the pooled standard deviation (Lipsey & Wilson, 2001). We computed unbiased effect sizes that account for heightened effect sizes in small samples (Hedges, 1981) using the formula  $ES_{\text{unbiased}} = [1 - 3 / (4df - 1)] * d$ . Standard errors and weights (i.e., inverse of the squared standard error) were computed with formulas provided by Lipsey and Wilson (2001). As in previous meta-analyses (e.g., Lim & Dinges, 2010), we finally converted effect sizes from between-person studies using the formula  $ES_{\text{WP}} = ES_{\text{BP}} / \sqrt{2(1 - r)}$  to combine them with effect sizes from within-person studies (Morris & DeShon, 2002). The test–retest correlation in longitudinal studies ranged from .30 to .62. The transformed effect sizes were highly similar to the observed effect sizes ( $r = .97$ ,  $p < .01$ ).

For the general analyses of network changes related to age (Research Aim 1) or to life events (Research Aim 2), as well as for later moderator analyses, we chose a mixed-effects model. This model assumes that the variance of effect sizes is due to fixed (e.g., age, moderators) and random effects. It was preferred to the fixed-effects model, which postulates that only independent variables, moderators, and sampling error contribute to variability in effect sizes. Since the mixed-effects model has been criticized for being overly strict under some conditions (Overton, 1998), we additionally analyzed all data with fixed-effects models; we draw attention to those cases where findings

diverged in the Results section. We computed Cochran's  $Q$  statistic, which tests the heterogeneity or variance between studies relative to the overall variance, in SPSS using the formulas by Lipsey and Wilson (2001). Significant values of  $Q$  indicate that effect sizes differ significantly, and these differences might be explained by moderators. In addition, we computed  $I^2$ , which describes the percentage of overall variance arising from heterogeneity between studies (Higgins, Thompson, Deeks, & Altman, 2003; Huedo-Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006).

## Publication Bias

To rule out that the findings are skewed due to selective study inclusion (i.e., publication bias), we followed a twofold procedure suggested by Ferguson and Brannick (2012). First, for analyses on network change, we report critical  $k$  (see Tables 3 and 5), which is the number of studies with null findings necessary to reduce the observed effect size to  $|0.10|$ , that is, an effect size with negligible practical relevance. This approach is stricter than a conventional file-drawer analysis because fewer studies are needed to reduce an effect to a specified small size compared with reducing an effect to 0.00 (Hunter & Schmidt, 2004). Table 3 shows that for social network changes related to age, findings were more robust for effects found in old age compared with young adulthood. This is attributable to the relatively larger number of studies in late life, whereas for the smaller number of studies in young adulthood only three to seven studies with null findings were needed to reduce the size of the observed effects to a Cohen's  $d$  of  $|0.10|$ . For average social network size, we did not expect a publication bias because network size was not tested for statistical significance per se, and thus study publication was rather independent of the reported social network sizes. Furthermore, it seemed implausible to compute critical  $k$ s, that is, the number of studies reporting network sizes of 0 to reduce the observed average network to a trivial magnitude.

As a second approach, we computed Egger's test, which is a statistical analogue to a funnel plot to test whether effect sizes depend on the study's sample size, for instance, with smaller studies reporting larger effects (Sterne, Egger, & Smith, 2001). The test is a weighted regression of the effect size on the standard error, weighted by the inverse variance (Egger, Smith, Schneider, & Minder, 1997; Sterne, Gavaghan, & Egger, 2000). We observed no significant bias for studies on age-related network changes (bias = 0.15,  $p = .91$ , 95% CI  $[-2.63, 2.94]$ ) or for studies on life-event-related network changes (bias = 1.84,  $p = .11$ , 95% CI  $[-0.44, 4.12]$ ).

In sum, publication bias seemed to be absent in the current meta-analysis. We deliberately did not include gray articles (i.e., unpublished work other than dissertations) because including these has been shown to possibly enhance publication bias (Ferguson & Brannick, 2012). This seems to occur because unpublished work is often not representative regarding both quality and results. Unpublished work can even be prone to selection bias if it mainly comes from the research group conducting the meta-analysis or a related research group (Ferguson & Brannick, 2012).

## Results

### Description of Included Studies

The total number of participants was 177,635, with on average 641.3 participants per study ( $SD = 1,685.1$ ).<sup>3</sup> The number of participants and the number of studies both varied by age of participants. Figure 1 shows that relatively few studies ( $k = 25$ ) were conducted with participants aged 45–60 years; however, many studies were carried out with participants older than 60 years ( $k = 98$ ). Additionally, studies with participants older than 60 years were, on average, of larger sample size ( $M = 813.7$ ,  $SD = 1,206.9$ ) than studies from any other age group,  $F(4, 257) = 5.99$ ,  $p < .01$  (all post hoc comparisons with Tukey  $ps < .05$ ).

The average age of the samples ranged from 10.3 to 85.9 years ( $M = 46.8$ ,  $SD = 22.9$ ). Most samples were about equally distributed on gender: Fifty-five percent of the studies included 40%–60% men. Also, 59% of all studies recruited participants from the general population, 27% were convenience samples (e.g., from retirement homes), and 14% of all studies drew on student samples. The majority of studies were conducted with either North American (53%) or European samples from diverse countries (34%).<sup>4</sup> Also, studies adopted different methods to assess networks: Forty percent of all studies used interviews, 35% employed standardized instruments such as the Social Convoy Questionnaire (Kahn & Antonucci, 1980), 25% used a free-recall procedure (e.g., participants “named up to 20 friends”), and one study was not codable because of missing information. Finally, 28% of all studies had a longitudinal design, whereas the remaining 72% were cross-sectional. The longitudinal studies consisted of 3.2 measurement points on average ( $SD = 1.6$ ; range: 2–10) and lasted on average 3.1 years ( $SD = 3.5$ ; range: 0.1–17).

### Age-Related Differences and Change in Social Networks

To address Research Aim 1, we first analyzed age differences in the average sizes of global social networks and subnetworks, and

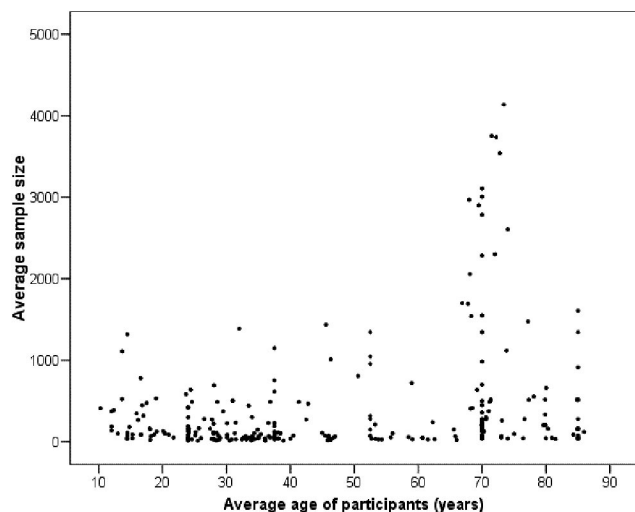


Figure 1. Distribution of sample size by average sample age of studies.

then compared age-related longitudinal change in social networks by age groups.

**Linear and nonlinear age differences.** The reported average network size per study was regressed on the average sample age separately for each network type. We analyzed the assumed increase during adolescence and young adulthood and decrease in the period leading to old age of the global and the personal network using a combined exponential growth-and-decline function (Cerella & Haie, 1994). For each network type, we compared whether the combined growth-and-decline function fitted the age differences in network sizes better than a model assuming a linear association between sample age and average network size.

Table 2 shows that regarding the global networks, the combined exponential growth-and-decline function described the age-related differences in network size somewhat better than the linear model ( $\Delta$  Akaike information criterion (AIC) =  $-3.31$ , 4% more explained variance). The nonlinear function illustrates that adolescents named fewer social network partners than young adults with an estimated change point of 24.6 years. Beyond that age, the global network became smaller. The decrease slowed down beginning around 60–65 years (see Figure 2A).

The change in size of personal networks and friendship networks was more parsimoniously and slightly better described by models assuming a linear association between sample age and average network size ( $\Delta$ AIC<sub>personal network</sub> = 3.66;  $\Delta$ AIC<sub>friend</sub> = 0.63; see Table 2 and Figures 2B and 2D). The two types of networks showed moderately strong negative associations with participants' average age: Both personal and friendship networks became smaller by almost one person per age decade (unstandardized regression coefficients for change per year  $b_{\text{personal}} = -0.09$ ,  $SE = 0.02$ ,  $p < .001$ ;  $b_{\text{friend}} = -0.08$ ,  $SE = 0.01$ ,  $p < .001$ ).

As expected, the size of family networks showed no significant age differences across the life span (see Table 2 and Figure 2C). This result is especially noteworthy because of the large number of studies ( $k = 106$ ). This could have produced quite a heterogeneous pattern, but in fact all reported average network sizes ranged between about two and 11 persons ( $M = 6.1$ ,  $SD = 3.4$ ), with only two studies reporting more than 15 people in family networks.

Few studies addressed work-related networks and networks of other acquaintances (e.g., neighbors, professional helpers), and they were spread unevenly over the life course (see Figures 2E and 2F). The illustration of average network sizes shows that coworkers were almost exclusively studied when participants were be-

<sup>3</sup> Three studies contained more than 10,000 participants (Kramer & Vaquera, 2011; South & Haynie, 2004; Stansfeld, Fuhrer, & Shipley, 1998). The average number of participants was still 475.5 when these three large studies were excluded, and 34 studies included more than 1,000 participants each.

<sup>4</sup> The following countries provided studies (number of studies in parentheses, in descending order): United States (131); the Netherlands (34); Germany (30); United Kingdom (10); Canada (9); Japan (7); China and Israel (6); France (5); Australia, Austria, and India (4); Mexico, Norway, and Turkey (3); Indonesia, Korea, Mali, Sweden, and Switzerland (2); Bangladesh, Cameroon, Finland, Ireland, Italy, Portugal, Tanzania, and Vietnam (1).



Table 2  
*Prediction of Network Size Change Over the Life Span Using a Linear Change Model (Model 1) and a Nonlinear Change Model (Model 2) for Different Social Networks*

Network	Sample age				Model 1: Linear decline		Model 2: Combined exponential growth-and-decline function		Change point (years)
	<i>k</i>	<i>M</i>	<i>SD</i>	Range	Model fit	Age β	Model fit		
Global	99	51.67	23.87	12–86	$Q(1, 97) = 26.64, p < .001, R^2 = .10$	-.32**	$Q(1, 97) = 32.78, p < .001, R^2 = .14$	24.6	
Personal	125	48.95	22.25	12–86	$Q(1, 123) = 28.53, p < .001, R^2 = .09$	-.29**	$Q(1, 123) = 30.43, p < .001, R^2 = .09$	none	
Family	113	45.67	21.67	12–85	$Q(1, 111) = 0.83, p = .363, R^2 = .005$	-.07	$Q(1, 111) = 0.80, p = .372, R^2 = .005$	none	
Friends	103	38.51	22.50	10–85	$Q(1, 101) = 48.59, p < .001, R^2 = .14$	-.37**	$Q(1, 101) = 49.51, p < .001, R^2 = .14$	none	
Coworkers	14	40.86	15.10	24–70	$Q(1, 12) = 0.15, p = .702, R^2 = .01$	.10	$Q(1, 12) = 0.12, p = .725, R^2 = .01$	none	
Other acquaintances	24	45.38	21.38	19–80	$Q(1, 22) = 5.19, p = .023, R^2 = .08$	-.29*	$Q(1, 22) = 12.04, p = .001, R^2 = .18$	54.0	

Note. *k* = number of studies included.  
 \*  $p < .05$ . \*\*  $p < .01$ .

tween 30 and 40 years of age.<sup>5</sup> Other acquaintances were important (or were studied more often) in young and old adulthood. No significant linear or nonlinear age effects were observed for work-related networks (see Table 2). For networks of other acquaintances, age differences in network size were somewhat better described by a nonlinear, U-shaped function compared with a linear regression ( $\Delta AIC = -1.44$ , 10% more explained variance). However, the low number of studies has to be kept in mind when interpreting these results.

**Age-related change in social networks.** Studies on changes in network size were almost exclusively carried out in two age groups: young and old adulthood. Eight studies were conducted with adolescents and young adults, with an average sample age of 22.9 years; 24 studies focused on old adulthood with an average sample age of 74.6 years; and two studies used samples with an average age of 34.2 and 38.2 years. We therefore compared network changes separately for these three age groups: We computed average effect sizes, tests of significance, and tests for heterogeneity of effect sizes per age group and network type. In Table 3, we combined cross-sectional ( $k = 23$ ) and longitudinal ( $k = 30$ ) effect sizes on network changes with age. Preliminary analyses showed that effect sizes did not differ significantly between longitudinal and cross-sectional studies (see also Moderator Analyses). The nonsignificant values for  $Q$  and the mostly small or even 0 values for  $I^2$  in Table 3 already suggested high homogeneity of effect sizes within each network type and age group, with effect sizes for personal networks in old age being the only exception.

In adolescence and young adulthood, global, personal, and friendship networks expanded significantly by about a quarter of a standard deviation, whereas these networks shrank for people older than 65 years (see Table 3). As expected, the size of the family network did not change significantly in either age group. The change of the global and personal network in two studies with participants in their early 30s was not significantly different from 0. This could suggest a plateau comparable to the nonlinear change found for global networks in the cross-sectional analyses before. Figure 3 shows the observed effect sizes for all longitudinal studies in adolescence and young adulthood and old age included in the meta-analysis.

Taken together, the cross-sectional regression analyses and the analyses of network changes in young, middle, and old adulthood

largely supported our assumptions and draw a coherent picture of the global network increasing in adolescence and young adulthood, reaching a plateau in the mid-20s to early 30s, and shrinking thereafter together with the number of named friends. Both approaches found no significant changes in the size of the family network.

We now turn to the second aim of the study, examining how life events relate to changes in social networks and whether these changes are similar to age-related changes.

### Life-Event-Related Change in Social Networks

Altogether, 41 studies provided information on network changes related to life events. Table 4 shows that specific life events have been studied more often in some age periods than in others,  $\chi^2(35) = 242.06, p < .001$  (Fischer–Yates exact test for asymmetric distributions  $p < .001$ ; Agresti & Wackerly, 1977). For instance, the loss of a spouse was studied with participants older than 60 years on average. Even nonnormative life events have been connected to specific times in life; for example, effects of divorce on social networks have been studied only with samples ranging in average age from 30 to 45. Only relocation was studied in several age periods. In addition, compared with other life stages with one life event, young adulthood and early midlife both appeared to be rather unstable, with several events, such as job entry, marriage, parenthood, and divorce, taking place at the same time (see Table 4).

Longitudinal studies provided 74% of the effect sizes on life-event-related network changes, whereas the remaining 26% (21 effect sizes) are the result of two-group contrasts. In these studies, one group of participants had experienced the life event, whereas the control group had not. Effect sizes were transformed as described in the Method section to make them comparable. The effect of the study design is addressed in Moderator Analyses.

Effect sizes of change in social networks differed with life events (see Table 5). (1) During puberty the size of the personal networks increased. The number of friends also slightly increased,

<sup>5</sup> One article focused on coworker networks before retirement (Imamoğlu et al., 1993).

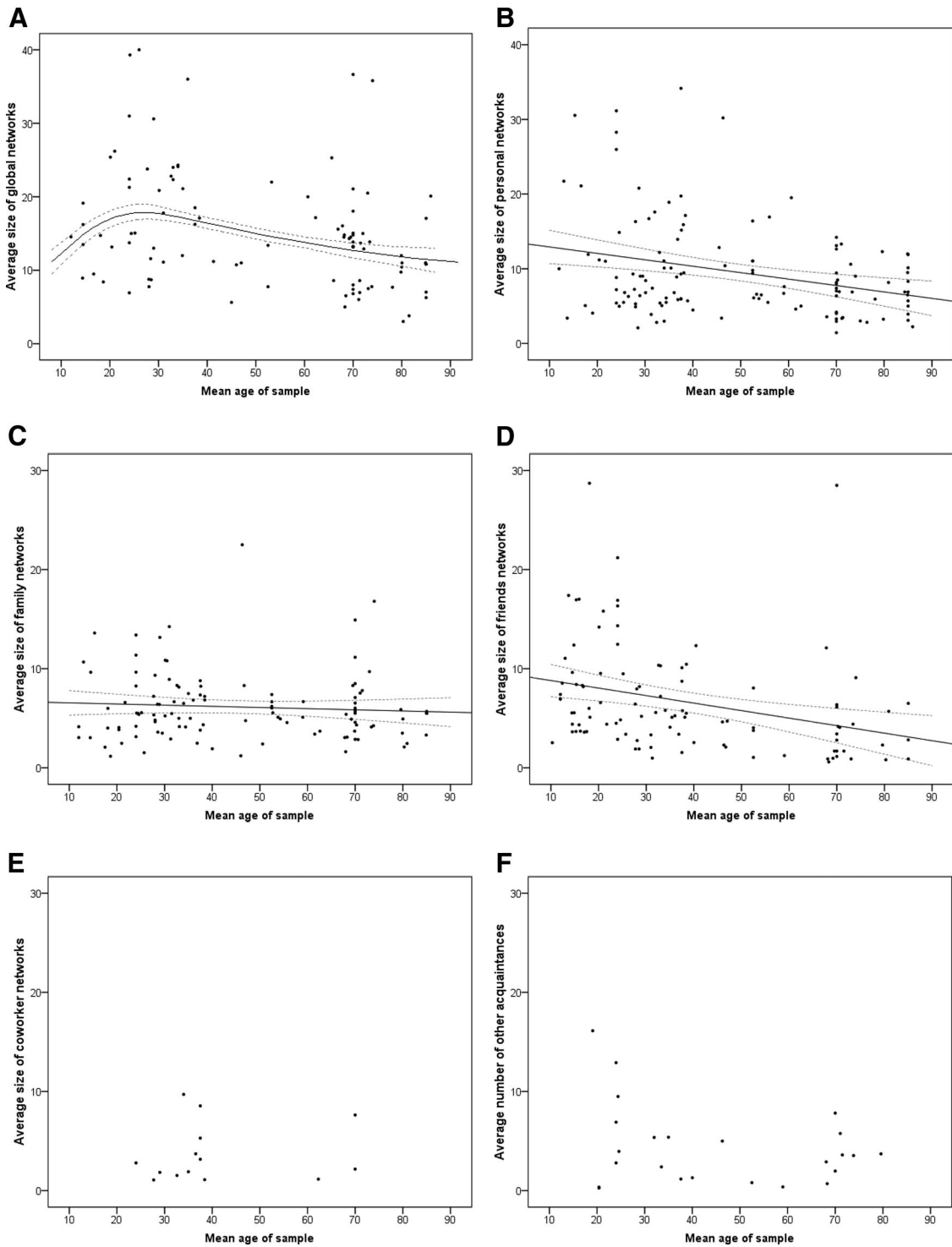


Figure 2. Average observed network sizes by average sample age: global network (A), personal network (B), family network (C), friendship network (D), coworker network (E), other acquaintances (F). Regression lines and the corresponding 95% confidence intervals are depicted for networks with sufficient data points (A–D).

Table 3  
Average Network Changes in Specific Social Networks

Network	<i>k</i>	<i>d</i>	<i>SE</i>	95% CI	<i>Q</i>	<i>I</i> <sup>2</sup>	<i>k</i> <sub>critical</sub>
Global							
Younger than 30	4	0.235*	0.11	[0.02, 0.44]	4.26	29.6	5
Middle age	1	-0.408	0.31	[-1.03, 0.21]			
Older than 65	15	-0.354**	0.06	[-0.48, -0.23]	15.24	8.1	38
Personal							
Younger than 30	3	0.250*	0.12	[0.01, 0.49]	2.97	32.7	5
Middle age	1	-0.161	0.37	[-0.53, 0.21]			
Older than 65	6	-0.337**	0.09	[-0.52, -0.16]	13.71*	63.5	15
Family							
Younger than 30	4	0.067	0.10	[-0.12, 0.26]	1.90	0	
Older than 65	7	-0.031	0.08	[-0.19, 0.13]	4.83	0	
Friendship							
Younger than 30	5	0.245**	0.10	[0.05, 0.44]	1.78	0	7
Older than 65	4	-0.193*	0.10	[-0.39, -0.00]	0.55	0	4
Other acquaintances							
Younger than 30	1	0.370**	0.05	[0.32, 0.42]			3
Older than 65	2	-0.513**	0.19	[-0.89, -0.14]	0.01	0	8

Note. *k* = number of studies included; CI = confidence interval; *Q* = Cochran's *Q* test of heterogeneity between studies; *I*<sup>2</sup> = percentage of overall variance that is attributable to heterogeneity between studies (values smaller than 0 were set to 0; Higgins et al., 2003); *k*<sub>critical</sub> = number of studies with null findings necessary to reduce the observed effect size to |0.10|.

\* *p* < .05. \*\* *p* < .01.

under assumptions of a fixed-effects model. Closer examination of studies showed that four longitudinal studies found increases in friendship network sizes, whereas one cross-sectional study and one longitudinal study looking at opposite-sex friendships found slight decreases in network sizes. Importantly, the size of the family network did not change significantly. (2) All effects of marriage were statistically significant only under the assumptions of a fixed-effects model, but not under the assumptions of a

mixed-effects model. Closer inspection of the three studies on changes in friendship networks showed that two studies found larger networks for married participants as compared with single participants, but one study reported the opposite effect. Since all studies were cross-sectional, rather balanced in gender composition, and moderately large (>150 participants), no clear prioritization of effect sizes was possible. (3) A number of longitudinal studies focused on people experiencing the transition to parenthood and found significant decreases in the sizes of personal, family, and friendship networks. The decrease of friendship networks was significantly different from 0 only under the assumptions of a fixed-effects model. (4) Entering the job market increased the number of coworkers strongly. Increases in global networks, friendship networks, and networks of other acquaintances were statistically significant under the assumptions of a fixed-effects model. (5) Experiencing the loss of a spouse significantly decreased the personal network and also slightly reduced the family network, this effect being significant under the assumptions of a fixed-effects model.

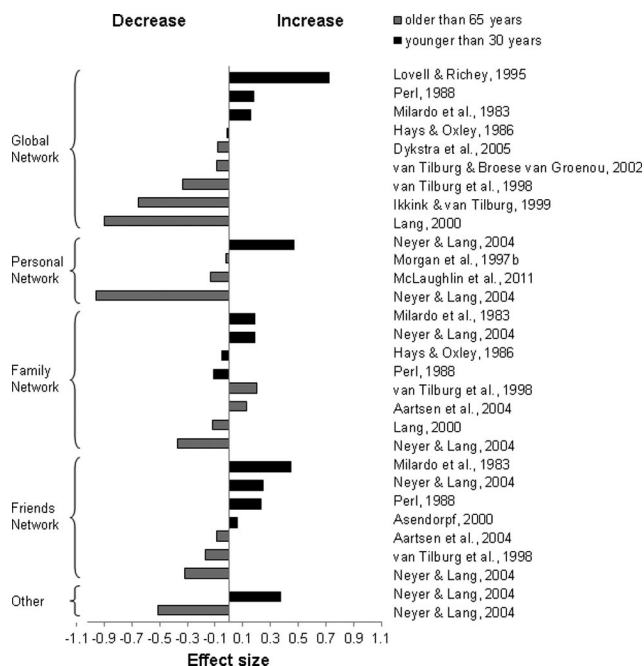


Figure 3. Observed effect sizes for longitudinal, age-related change in social networks.

Table 4  
Number of Effect Sizes for Network Changes Associated With Life Events in Different Age Groups

Life event	11-18	18-30	30-45	45-60	60-80	80+
Puberty	10					
Marriage		4	2			
Parenthood		5	4			
Job entry		14	1			
Loss of a spouse					9	3
Death of a relative				2		
Divorce			19			
Relocation	1	1	4	1		

Note. If no number is given, there were no available effect sizes for this life event in this age group.

Table 5  
Change in Different Social Networks Associated With Life Events

Life event	<i>k</i>	<i>d</i>	<i>SE</i>	95% CI	<i>Q</i>	<i>I</i> <sup>2</sup>	<i>k</i> <sub>critical</sub>
Puberty							
Personal	2	0.436*	0.20	[0.04, 0.83]	3.31	69.8	7
Family	2	-0.013	0.20	[-0.41, 0.38]	0.95	0	
Friend	6	0.199 <sup>a</sup>	0.12	[-0.03, 0.43]	4.87	0	6
Marriage							
Personal	1	-0.323 <sup>a</sup>	0.84	[-1.97, 1.33]			3
Family	2	0.136	0.59	[-1.03, 1.30]	0.02	0	
Friend	3	0.383 <sup>a</sup>	0.49	[-0.57, 1.34]	3.82	47.7	8
Parenthood							
Global	2	0.316	0.27	[-0.22, 0.85]	4.47*	55.3	
Personal	3	-0.442*	0.21	[-0.85, -0.03]	2.39	0	16
Family	2	-0.501*	0.25	[-1.00, -0.00]	0.25	0	12
Friend	2	-0.236 <sup>a</sup>	0.26	[-0.75, 0.26]	0.01	0	7
Job entry							
Global	3	0.324 <sup>a</sup>	0.55	[-0.76, 1.41]	1.53	0	7
Personal	1	-0.127	0.94	[-1.96, 1.71]			
Family	3	0.081	0.55	[-0.99, 1.15]	0.17	0	
Coworker	2	2.998**	0.70	[1.63, 4.37]	2.68	62.7	58
Friend	4	0.214 <sup>a</sup>	0.48	[-0.73, 1.16]	9.99	70.0	5
Other	2	0.315 <sup>a</sup>	0.68	[-1.02, 1.65]	1.34	25.6	4
Loss of a spouse							
Global	2	-0.057	0.21	[-0.47, 0.36]	0.95	0	
Personal	6	-0.345**	0.13	[-0.59, -0.10]	5.82	14.0	15
Family	2	-0.175 <sup>a</sup>	0.21	[-0.58, 0.23]	0.64	0	2
Friend	1	0.053	0.29	[-0.51, 0.61]			
Other	1	0.276 <sup>a</sup>	0.31	[-0.33, 0.88]			2
Death							
Global	1	-0.606**	0.08	[-0.77, -0.45]			5
Personal	1	0.693**	0.11	[0.48, 0.91]			6
Divorce							
Global	5	-0.080	0.17	[-0.42, 0.26]	5.68	29.6	
Personal	4	-0.030	0.20	[-0.41, 0.35]	6.82	56.0	
Family	3	-0.429**	0.21	[-0.85, -0.01]	0.56	0	10
Coworker	1	-0.022	0.38	[-0.77, 0.73]			
Friend	5	-0.107	0.18	[-0.45, 0.24]	3.27	0	
Other	1	0.119	0.39	[-0.64, 0.88]			
Relocation							
Personal	1	-0.397 <sup>a</sup>	0.89	[-2.13, 1.34]			3
Family	1	-0.026		[-1.78, 1.73]			
Friend	5	-1.263**	0.40	[-2.05, -0.48]	5.12	2.3	58

Note. *k* = number of studies included; CI = confidence interval; *Q* = Cochran's *Q* test of heterogeneity between studies; *I*<sup>2</sup> = percentage of overall variance that is attributable to heterogeneity between studies (values smaller than 0 were set to 0; Higgins et al., 2003); *k*<sub>critical</sub> = number of studies with null findings necessary to reduce the observed effect size to |0.10|.

<sup>a</sup> Effect size is significantly different from 0 under fixed-effects model assumptions.

\* *p* < .05. \*\* *p* < .01.

The experience of a nonnormative life event, such as death of a relative, divorce, or relocation, almost exclusively reduced the size of social networks (see Table 5). (6) Two longitudinal studies analyzed network changes 2 years after the unexpected death of a relative. On the one hand, the global network size decreased, and on the other hand, the closer personal network increased in size. (7) After experiencing a divorce, the size of the family network decreased substantially. Other networks did not change significantly in relation to this life event. (8) Experiencing relocation had strong effects on friendship networks: The number of friends decreased irrespective of age. One study on the personal network also found a small decrease in size, yet it was only significant under the assumption of a fixed-effects model. Again, the family network did not change significantly when relocation occurred.

### Comparing Age-Related and Life-Event-Related Network Change

Age-related social network changes did not differ significantly from life-event-related social network change,  $Q(1) = 2.75$ ,  $p = .10$  (see Figure 4). We compared both kinds of effect sizes on network changes irrespective of the network type because significant effect sizes for one age group or life event in that age group were nearly always in the same direction. Furthermore, we found no evidence that effect sizes on age-related and life-event-related change differed in specific age groups (all comparisons  $p > .15$ ). Figure 4 illustrates that, in general, networks increased in size during adolescence and young adulthood, no reliable change was observed during middle adulthood, and networks decreased sig-

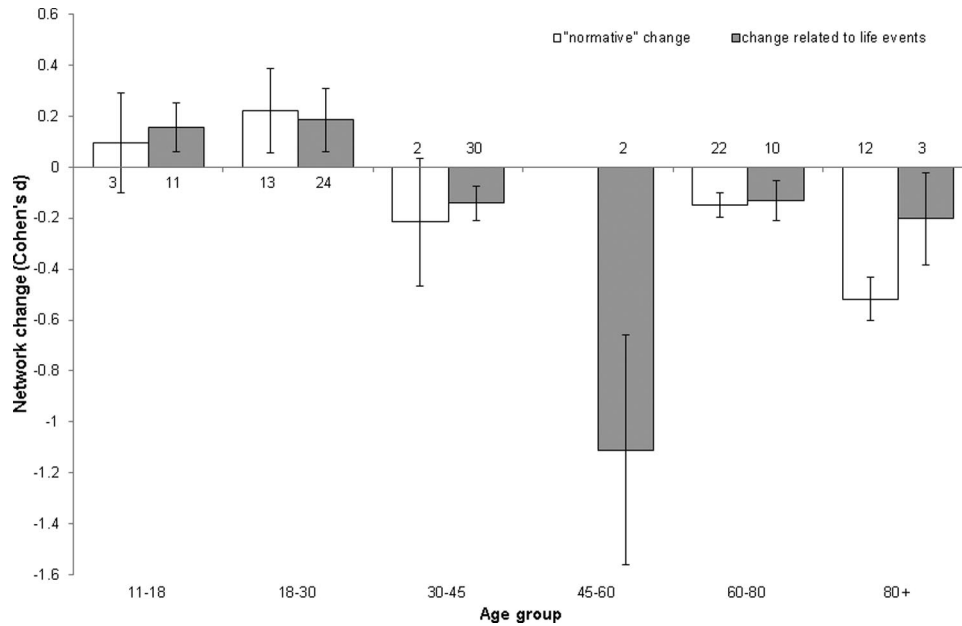


Figure 4. Comparison of normative network changes and change related to life events per age group. Numbers in bars represent the number of studies. Error bars indicate  $\pm 1$  standard error.

nificantly during old age. Furthermore, for all age groups,  $Q$  statistics were not significant, indicating homogeneity of effect sizes on network changes, although the number of studies was not too small and ranged between 13 and 35. An exception was effect sizes during young adulthood with significant heterogeneity,  $Q(35) = 106.82, p < .01$ .

### Moderator Analyses

We assumed that the size of social networks differs with characteristics of the sample, the type of the network assessment, and the year the study was conducted. First, we tested whether these study characteristics varied with the average age of the sample. In other words, we addressed the question whether certain types of studies were more prevalent in specific age groups.

Studies with different gender distributions or with different types of assessment did not vary significantly from one another regarding the average age of the sample. The overall tests suggested small effects for assessment type,  $F(2, 271) = 3.19, p = .043$ , but all post hoc tests were nonsignificant with  $p > .10$ . As expected, student samples were significantly younger ( $M = 23.5, SD = 10.4, k = 38$ ) than convenience ( $M = 43.4, SD = 18.5, k = 75$ ) or general population-based samples ( $M = 53.7, SD = 22.9, k = 159$ ), and convenience and general population-based samples also differed by average sample age,  $F(2, 269) = 34.68, p < .001$ , with all post hoc tests significant with  $p < .001$ . Samples from countries varying in collectivistic value orientation did not significantly differ in average sample age ( $r_{\text{age}} = -.02, p = .75$ ).

Longitudinal studies were conducted with slightly younger samples ( $M = 42.0, SD = 21.2, k = 78$ ) compared with cross-sectional samples ( $M = 48.7, SD = 23.3, k = 197$ ),  $t(273) = 2.20, p = .03$ . Among longitudinal studies, study duration was longer with higher age of the sample ( $r = .26, p = .01$ ). Finally, more recent studies

(i.e., published in later years) often addressed older samples ( $r = .11, p = .04$ ). Perhaps this is attributable to an increased interest in life-span psychology and old age over the last 2 decades. Together these findings necessitated moderator analyses on effect sizes under control for age effects.

**Moderator effects on the size of social networks.** We tested moderator effects separately for each network type to ensure independence of effect sizes. We included moderators in regression models after accounting for effects of the average sample age (see Table 6). In this way, we achieved information on how the size of the different networks varied with different methodological factors after the age effects were taken into account. In addition, we tested for interaction effects between the average age of the sample and each moderator. For work-related networks and networks of other acquaintances, we do not report moderation analyses because there were too few studies. Preliminary analyses showed no significant moderation effects.

Network sizes were largely robust to sample differences, and we observed only scattered effects (see Table 6). As expected, samples from countries with higher scores in collectivistic value orientation reported smaller global and personal networks. Personal and friendship network sizes were larger in student samples, and friendship network sizes were also larger in convenience samples than in general population-based samples. No further significant effects of sample type, country of origin, or gender distribution occurred.

The type of assessment made a difference for the average reported global, personal, and family network sizes (see Table 6). When studies used interview techniques rather than standardized questionnaires, larger networks were obtained. Interview methods elicited 5.3 and 1.7 additional people from the global and personal networks, respectively, and 1.6 additional family members. No

Table 6  
Overview on Moderator Effects of Network Size

Variable	<i>k</i>	Effect on network size		<i>Q</i>	$\Delta R^2$
		<i>b</i>	<i>SE</i>		
Global network ( <i>k</i> = 101)					
Gender distribution	97	0.18	0.67	35.12**	.01
Sample type <sup>a</sup>					
Student	13	-0.18	1.86	33.89**	.00
Convenience	21	1.57	1.39		
Country's collectivism <sup>b</sup>	99	-3.07*	1.29	38.22**	.02
Assessment <sup>c</sup>					
Interview	57	5.28**	1.11	55.48**	.09
Free recall	9	3.37	2.10		
Year of publication <sup>d</sup>	98	0.63	0.44	34.08**	.01
Personal network ( <i>k</i> = 125)					
Gender distribution	120	0.15	0.35	29.72**	.00
Sample type <sup>a</sup>					
Student	15	3.81**	1.24	38.18**	.03
Convenience	38	-0.21	0.83		
Country's collectivism <sup>b</sup>	123	-3.80**	0.66	59.92**	.10
Assessment <sup>c</sup>					
Interview	46	1.65*	0.82	34.71**	.01
Free recall	36	0.01	0.88		
Year of publication <sup>d</sup>	125	-1.47**	0.46	98.66**	.21
Age × Year of Publication		0.05**	0.01		
Family network ( <i>k</i> = 115)					
Gender distribution	112	-0.53	0.29	4.50	.01
Sample type <sup>a</sup>					
Student	18	0.22	0.90	0.88	.00
Convenience	24	0.08	0.72		
Country's collectivism <sup>b</sup>	113	-0.66	0.52	2.47	.01
Assessment <sup>c</sup>					
Interview	62	1.63**	0.58	9.69*	.04
Free recall	22	0.52	0.74		
Year of publication <sup>d</sup>	113	-0.33	0.18	4.77	.01
Friends network ( <i>k</i> = 104)					
Gender distribution	101	0.51	0.33	46.47**	.00
Sample type <sup>a</sup>					
Student	24	4.80**	0.68	102.81**	.13
Convenience	24	1.32*	0.60		
Country's collectivism <sup>b</sup>	103	-0.09	0.60	49.33**	.00
Assessment <sup>c</sup>					
Interview	39	0.90	0.64	49.36**	.01
Free recall	32	-0.01	0.65		
Year of publication <sup>d</sup>	103	-0.94**	0.19	71.99**	.06

Note. *k* = number of studies included; *b* = unstandardized regression coefficient; *Q* = model fit comparable to *F* statistic in linear regression (Lipsey & Wilson, 2001, p. 123);  $\Delta R^2$  = explained variance by the moderator.

<sup>a</sup> Reference category = general population sample. <sup>b</sup> Collectivism scores based on *z*-standardized, averaged country scores published in Hofstede (1980) and Oyserman et al. (2002). <sup>c</sup> Reference category = standardized instrument method. <sup>d</sup> Recoded into 5-year categories; there were no further significant interactions with average age of the sample.

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

significant effects were observed for friendship networks, yet effects pointed in the same direction.

The year of publication was related to the average size of personal and friendship networks, but to no other network type (see Table 6). For personal networks, with every 5-year period the average network size decreased by 1.6 people. This means that on average participants in studies conducted between 1980 and 1985 reported about 6.3 more people than participants in

studies conducted between 2000 and 2005. The significant interaction with average sample age showed that age differences in average personal network size were more pronounced during the 1980s ( $r_{\text{age}} = -.60, p = .01$ ) and early 1990s ( $r_{\text{age}} = -.38, p = .07$ ), compared with more recent years (average  $r_{\text{age}} = -.07, p > .30$ ). For friendship networks, with every 5-year period the average network size shrank by 0.9 people. Hence, studies conducted between 1980 and 1985 reported on

average about 3.6 more friends than recent studies from 2000 to 2005.

There were no further interaction effects with the average age of the sample. All reported effects remained significant when controlling for the other moderating variables simultaneously.

**Moderator effects on social network change.** Significant  $Q$  statistics and large  $I^2$  values indicate heterogeneity between effect sizes that might be explained by moderating study characteristics. Effect sizes on age-related and life-event-related social network changes were largely not significantly heterogeneous between studies (see Tables 3 and 5, respectively). This could be attributable to effect sizes already being homogeneous within network types, age groups, and life events or to the limited number of studies per network type, age group, and life event. To test whether certain study characteristics tended to produce larger effects than other studies irrespective of the direction of change and of the network type, we used the absolute magnitude of standardized network change as the dependent variable in multilevel models. Multilevel models took the dependencies among effect sizes of different social networks from the same study into account. Also, they allowed us to test effects of moderators with sufficient power while controlling for age effects simultaneously.<sup>6</sup> On average, 1.5 and 1.8 effect sizes were obtained per study focusing on age-related and life-event-related change, respectively ( $k = 34$  and  $k = 45$ ).

For age-related network change, effect sizes only varied significantly with the type of the sample. Studies with convenience samples reported larger network changes compared with studies with population-based samples ( $b = 0.39$ ,  $SE = 0.19$ ,  $p = .05$ ). Effect sizes from student samples did not diverge significantly from population-based samples ( $b = 0.04$ ,  $SE = 0.15$ ,  $p = .79$ ). Effect sizes did not vary significantly among studies with different gender distributions, from different countries, with different network assessment methods, or conducted in different years. Also, effect sizes did not differ significantly between cross-sectional and longitudinal studies ( $b = -0.04$ ,  $SE = 0.10$ ,  $p = .70$ ) or with longitudinal study duration ( $b = -0.03$ ,  $SE = 0.03$ ,  $p = .42$ ). No interactions between moderators and age of the sample remained significant in the follow-up analyses.

Changes in social networks related to life events also differed between different types of samples. Again, studies with convenience samples reported larger network changes than studies with population-based samples ( $b = 0.44$ ,  $SE = 0.21$ ,  $p = .03$ ), whereas effect sizes from student samples were not significantly different ( $b = 0.24$ ,  $SE = 0.26$ ,  $p = .35$ ). Effect sizes did not vary significantly with gender distribution, country of origin, type of network assessment, or publication year. The amount of network change did not vary between cross-sectional and longitudinal studies ( $b = -0.25$ ,  $SE = 0.32$ ,  $p = .44$ ). However, among longitudinal studies effects of network change were more pronounced in shorter studies ( $b = -0.03$ ,  $SE = 0.01$ ,  $p = .02$ ). That means that studies assessing social networks sooner after the life event and comparing it to the baseline size found larger absolute changes compared with studies that assessed social networks after a longer period. Visual inspection revealed that network changes up to 2 years after the life event were on average larger ( $d = 0.62$ ,  $SE = 0.10$ ,  $k = 38$ ) than network changes observed over a longer period ( $d = 0.32$ ,  $SE = 0.06$ ,  $k = 21$ ),  $t(57) = 2.67$ ,  $p = .01$ . There

were no further significant effects or interactions with age of the sample.

In sum, changes in social network sizes seemed to be rather robust to differences in samples or methods. Only studies conducted with convenience samples reported larger network changes as compared with other studies. Also, studies on network changes related to life events observed larger changes soon after the event.

## Discussion

The meta-analysis provides the first comprehensive evidence of how the size of social networks changes from adolescence to old age by summarizing the current available social relationships literature, including Western and non-Western populations: The size of family networks remains stable throughout the life span, whereas global, personal, and friendship networks expand during adolescence and young adulthood and shrink during later adulthood, respectively. Innovatively, we showed that these age-related network changes are congruent to life-event-related network changes occurring at the same age. This suggests that social network development follows an age-graded path and age-related life events accompany, and maybe even prompt, these specific network changes. We first explain these main findings and place them in the context of current literature on the development of social relationships. We then provide a theoretical integration of social relationship development with social, evolutionary, cultural, and personality psychological perspectives and highlight how the current findings might inform future research in these fields.

### Social Networks Change With Life Events Across the Life Span

Both cross-sectional and longitudinal analyses support our assumptions that the increase of the global network size during adolescence and young adulthood is followed by a plateau between mid-20s and early 30s and a continuous decrease throughout adulthood and old age. The personal network, which is a selected network of close and supportive family members and friends, offers a less clear picture for adolescence and young adulthood. The only available longitudinal study reports an increase in size (Neyer & Lang, 2004); however, the cross-sectional analyses suggest a continuous shrinking from adolescence to old age. It is possible that a slight increase in personal network size occurs as assumed during adolescence and young adulthood and that the limited number of studies hindered the detection of an increase. In general, findings agree that personal networks become smaller in late adulthood. Decreases in the size of friendship networks

<sup>6</sup> We specified random coefficients models in Mplus separately for age-related and life-event-related effect sizes of absolute network change. Effect sizes from the same study regarding different social networks were predicted with the following equations:

$$\text{Effect size level (Level 1), } ES_{ij} = \beta_{0j} + r_{ij},$$

$$\text{Study level (Level 2), } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{age}) + \gamma_{02}(\text{moderator})$$

$$+ \gamma_{03}(\text{age} \times \text{moderator}) + \mu_{0j}.$$

Age and continuous moderators were entered as centered predictors. Categorical variables were entered as dummy-coded variables.

throughout adulthood were also observed cross-sectionally and longitudinally. These patterns match predictions made by socio-emotional selectivity theory, where increasing social networks during adolescence and young adulthood may satisfy informational goals while decreasing social networks during adulthood and older age mirror a termination of peripheral relationships and a focus on close and pleasant relationships to satisfy emotional goals.

Results on family networks were highly consistent across cross-sectional and longitudinal approaches and fully supported our expectations: No significant change in network size with age was observed. This concurs with assumptions of social convoy theory that family relationships are the stable convoy escorting people on their life course (Kahn & Antonucci, 1980). Social convoy theory further states that changes in social networks result from changes in circumstances. We argued that life events constitute such changing circumstances that necessitate adaptation of social relationships.

The meta-analysis showed that certain major life events have been studied more often in specific age periods. This supports the assumption that normative life events, such as puberty, marriage, parenthood, and job entry, occur at a specific age during the life course and, thus, outline a “normative course of life” that most people follow (Heckhausen, 1999). Changes in social networks that were associated with these life events closely mirrored the age-related network changes observed for these particular life phases. Puberty as a life event was related to an increase in the size of the personal network, whereas no effects on the size of the family network were observed. During the bustling period of young adulthood, effects of marriage, parenthood, and job entry overlapped and countervailed one another. This could contribute to an apparent plateau, where gains and losses balanced one another in the global and friendship networks. The loss of a spouse decreased the size of the personal network and, naturally, the family network. Effects on the global and friendship networks were negligible, which concurs with studies that show active replacement and rekindling efforts on relationships after the loss of a spouse (Zettel & Rook, 2004). The direct comparison of age-related and life-event-related network changes showed no significant differences in overall network changes. This further supports our assumption that age-related network changes are congruent with life-event-related network changes occurring at the same age. One interpretation of this congruency could be that life events guide and maybe even prompt changes in social networks so that network changes happen in an age-graded manner.

Finally, nonnormative life events such as divorce or relocation did not follow the pattern of age-graded network changes outlined before. These life events do not occur for everybody and are not necessarily typical at specific ages, and thus are not congruent with age-related change. For divorce, we observed a decrease in the size of the family network. This is likely due to the departure of the spouse and discontinued contact with in-laws (Terhell, Broese van Groenou, & van Tilburg, 2004). Two studies focused on network changes after the death of a relative, both over a span of 2 years. One study observed a decrease in the global network size, whereas the other found an increase in the size of the personal network. This seemingly opposing pattern is consistent with our definition of the global and personal networks (cf. Different Types of Social Networks section). Previous research shows an increase in impor-

tance of close and supportive relationships when facing stressful times (Guiaux et al., 2007; Morgan, Neal, & Carder, 1997a). At the same time, people withdraw from more peripheral, less close relationships, which results in an overall shrinking of the global network (Carstensen et al., 1999). Finally, relocation most strongly reduced the size of friendship networks, irrespective of age. At the same time, family networks were not significantly affected when experiencing any life event, apart from the effects of divorce. This further supports the high stability of family relationships, even when facing adversity (Lang, 2000).

In sum, the findings suggest that social network changes follow an age-graded path and that age-related life events accompany and perhaps even initiate these specific network changes. Hence we assume that network changes will be less pronounced or even absent for an individual if certain life events, such as job entry or transition to parenthood, have not (yet) occurred.

### Moderators of Social Network Size and Change

We further addressed the question whether characteristics of the sample, measurement, or time of assessment affected the average network sizes or network change. Average network sizes and network changes were largely robust to such factors with singular effects for few network types. We observed that global, personal, and family networks were larger when they were assessed in interviews as compared with standardized instruments. Since social network interviews mostly use cued-recall techniques, and because standardized instruments mostly rely on free-recall procedures, this result can be attributed to memory bias as shown by Bernard et al. (1990) and Sudman (1985).

Friendship and personal networks were larger if they were studied with student samples compared with general population-based samples, whereas other networks were similar for different sample types. Since the analyses statistically controlled for the age of participants, we conclude that student samples may overestimate friendship networks, but otherwise provide a picture of global and family networks similar to that observed in general population samples. In contrast, age-related and life-event-related changes were more pronounced in convenience samples compared with population-based samples. Possibly, convenience samples were specific groups, since they were often recruited from homes for elderly or counseling offices. Due to their living environment or effects of counseling, their networks might change more strongly compared with the general population. Previously reported gender differences in the size of friendship or family networks (Moore, 1990) were not observed in this meta-analysis. Since only few social network studies report gender differences, our findings suggest that gender differences could be more important for relationship processes (M. A. Caldwell & Peplau, 1982; Impett & Peplau, 2006).

The assessment of social networks in countries with more versus less pronounced collectivistic values affected the size of the global and personal network, but not the size of family and friendship networks, or changes in network sizes. We discuss these findings and their meaning for generalizability of social network development in detail when addressing societal factors.

We observed effects of the year of publication on the size of personal and friendship networks but not for family networks. This pattern contradicts contemporary concerns on the dissolution of



the family (Phillipson, 1997). We relate these findings to the predicted period effects in the section on Theoretical Implications With Related Fields Addressing Social Relationships. In contrast to our expectations, changes in network sizes did not differ between cross-sectional and longitudinal studies. Results of cross-sectional and longitudinal studies can differ if age differences (i.e., age measured cross-sectionally between persons) are distinct from age-related changes (i.e., age measured longitudinally within persons; Lindenberger et al., 2011; Molenaar & Campbell, 2009; Nesselroade et al., 1972). For example, older people may report fewer friends than younger people because they belong to different cohorts with diverging concepts of friendship and thus use the term *friend* differently (Wrzus, Wagner, & Neyer, 2011). At the same time, it is possible that when both younger and older people are observed over time, their number of friends remains stable—resulting in different findings for longitudinal as compared with cross-sectional studies. In this meta-analysis, longitudinal and cross-sectional results converged. In addition, most studies on both age-related and life-event-related network changes followed a longitudinal design, thus enabling the study of true within-person change and therefore development. In longitudinal studies on effects of life events, social networks changed more strongly shortly after the event. When a longer period had passed between life event and second assessment, effects were less pronounced, which suggests a consolidation and reestablishment of social relationships.

In sum, both social network size and change were largely robust to variations in sample type, assessment method, or year of study publication. We observed single important effects of the country of origin and the publication year, which we further discuss next. Also, global and family networks assessed with interviews were larger than networks obtained by using standardized questionnaires or free recall. This suggests that social networks based on standardized instruments or free recall may underestimate the available social resources of individuals (Bernard et al., 1990; Sudman, 1985).

### Theoretical Integration With Related Fields Addressing Social Relationships

We propose a general framework that structures the most important questions on social network development and integrates the developmental perspectives represented by socioemotional selectivity and social convoy theory with perspectives from social, personality, cultural, and evolutionary psychology.

**Which social relationships and periods of the life course are addressed?** Social networks can comprise very diverse relationships such as with different family members, friends, and acquaintances that are comprehensively addressed in both socioemotional selectivity and social convoy theory. Some other (than developmental) approaches have primarily focused on nonfamilial relationships and classified relationships mainly on a quantitative basis, that is, either with regard to relationship stability (e.g., personality psychology) or based on the level of acquaintanceship or commitment (e.g., social psychology; Back et al., 2011; Hogg & Tindale, 2001; Hogg & Vaugan, 2011). In contrast, evolutionary and cultural-psychological perspectives are more explicit about the qualitative distinctiveness of relationships and distinguish between cross-culturally invariant relationships based on their differential

significance for genetic reproduction and continuity, namely different degrees of kin (i.e., lineal and collateral relatives), nonkin (i.e., cooperative and noncooperative partners), and sexual relationships (i.e., short-term and long-term partners; e.g., Bugental, 2000; Buss, 1999; Neyer et al., 2011). Comparing these diverse relationships might reveal new insights for established personality or social theories. For example, M. S. Clark and Mills (1979) showed that exchange and equity behavior, which was assumed to be a universal characteristic of social relationships (Thibaut & Kelley, 1959), can be less important in so-called communal relationships, which are often kin and kin-like relationships. Thus, from a meta-theoretical perspective, cultural and evolutionary psychology may add to our understanding of how relationships differ and are similar as well as why some types of relationships are stable and others change over the life course.

In particular, so-called life history approaches emphasize the age-graded significance of different relationships regarding mating (adolescence and young adulthood), parental investment (young adulthood), and kin investment (throughout adulthood; Buss, 1999; Harvey & Wenzel, 2006; Kenrick, Ackerman, & Ledlow, 2003). For example, friends and peers are assumed to be more important during adolescence as well as young adulthood and somewhat less important during later adulthood because of their relevance for mating, which is anchored mainly in adolescence and young adulthood. This is supported by our current findings on decreases of friendship networks with age and could be informative for personality and social psychological research, which largely addresses friendships in young adulthood. Our finding that family network size is surprisingly stable across adulthood is also very much consistent with evolutionary theorizing regarding kin and parental investment, which are both thought of as indirect means to increase the inclusive fitness throughout the life span (Hamilton, 1964). This leads to the question of causes and processes of social network changes.

**What are assumed reasons and psychological processes for social network stability and change?** Individual development always occurs under multiple internal and external influences (Bronfenbrenner, 1989). In the current meta-analysis we focused on age-related network changes and changes related to life events. In short, we observed high stability of family network sizes and changes in global, personal, and friendship networks throughout the life course that were mirrored by life-event-related changes. Furthermore, this pattern of stability and change was similar across the diverse countries. Evolutionary theories on kinship preference concur with these findings and provide an ultimate explanation: By maintaining relationships with and helping kin, such as children, siblings, or nieces and nephews, individuals increase the likelihood of passing on genes to the next generation (Hamilton, 1964). Relationships with nonkin are less stable in contrast because they are mainly based on exchange and cooperation and are more likely dissolved when exchange becomes unbalanced (Ikkinck, & van Tilburg, 1998).

These ultimate causes of relationship stability are solely based on reproductive success, but they have no psychological meaning unless they are not complemented by the proximate processes that affect behavior more directly. For example, the proximate cause for why kin care for one another is not that they expect reproductive benefits, but that they experience a sense of emotional closeness (Neyer & Lang, 2003). Social and personality psychology

offers a variety of theories that may further substantiate such proximate mechanisms. For example, attraction theories (Byrne, 1971; Festinger et al., 1950) state that liking in new relationships forms under conditions of proximity and similarity. Maintenance and ending of relationships depend on perceptions of dissimilarity (e.g., balance theories; Heider, 1958), perceived balance of exchange (exchange theories; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959), and sometimes spatial distance. For instance, neighbor relationships among older adults were more likely to dissolve if they had been imbalanced (Ikkink & van Tilburg, 1998) or if people moved to a different area (Thomése, van Tilburg, & Knipscheer, 2003). Personality psychology emphasizes the role of social dispositions (e.g., affiliative needs, extraversion, conscientiousness) and personality–relationship transactions (e.g., active selection, passive evocation) for explaining stability and change of social networks (Asendorpf & Wilpers, 1998; Baumeister & Leary, 1995; Neyer & Asendorpf, 2001). In addition, personality psychology would predict increasing stability of (certain) relationships with higher age as personality traits and self-concepts consolidate and relationships are shaped accordingly (B. W. Roberts & DelVecchio, 2000; Robins & Trzesniewski, 2005). Finally, cultural psychology states that cultural norms such as collectivism–individualism predict stability and change of relationships (Hofstede, 1980; Triandis, 1993, 1995).

In the current meta-analyses we could not directly address the underlying psychological processes, but we can conclude that the observed age-related network changes were neither mere fluctuations, because the changes were observable over periods of several months and years, nor predetermined, system-inherent alterations (Leik & Chalkley, 1997), because the shifts occurred in the same direction as life-event-related change. We assume that all previously outlined influences work in accordance: Major changes in people's lives and resources, such as job entry, divorce, or illness, necessitate modifications in behavioral patterns (Filipp, 1990; Holmes & Rahe, 1967). At that moment, social motives and exchange and similarity considerations of relationships help to decide which relationships are emphasized or ended. Finally, stable personal dispositions (i.e., traits) moderate how behavioral pattern and relationships are changed.

**How do societal structure factors such as epoch and culture affect social network change?** A recurring concern is that modernization and urbanization lead to declines of family ties and increased social isolation and loneliness (Allan, 2008; Bott, 1957; C. S. Fischer, 1982; McPherson et al., 2006; Phillipson, 1997). Here we observed no associations between the year of study publication, which usually takes place a few months or years after the study conduction, and the size of the global or the family network. Personal and friendship networks, however, were significantly smaller in more recent studies. These results are consistent with the observed decrease in Americans' personal networks over the last 20 years (McPherson et al., 2006), yet this result is still under debate (e.g., C. S. Fischer, 2009; McPherson et al., 2009).

This finding is unlikely explained by cohort effects because of the joint analysis of cross-sectional age effects and effects of the publication year. The cross-sectional age effect alone can be due to cohort, period, and "true" age effects. Once cross-sectional age differences are statistically controlled, differences between publication years can be interpreted as effects related to societal changes. One possible explanation is that higher mobility in recent

years specifically decreased the number of people considered as belonging to the personal network because they are supportive, close, and live close by. The observed effect of relocation as the life event that most strongly decreases friendship and personal networks supports this explanation. Assessment instruments for personal networks often ask for people with whom important matters are discussed or who would provide support when needed (Marsden, 1987; van der Poel, 1993). The number of such confidants living nearby decreases, as people do not live in the same place for years. At the same time, the number of family members does not decrease because contact is maintained over long distances (Fincham, 2005). This is also supported by the current finding that relocation did not change the size of family networks. The global network, on the other hand, could possibly remain stable in size because more peripheral acquaintances are included nowadays. All in all, dissolution of family ties and increasing social isolation were not observed—judging by network sizes. This is in line with contemporary views of relationship changes in late modernity: Although individual differences or diversity in how people maintain relationships exists, there is no general trend of a decreasing importance of family ties (Allan, 2008; Neyer et al., 2011; Wrzus et al., 2011).

The importance of family ties is further highlighted by findings that average family networks did not significantly differ between countries with varying collectivistic values. The available studies from non-Western countries are too scarce to warrant comprehensive conclusions. However, warnings that individualistic societies dissolve family relationships and social ties in general (McPherson et al., 2006; Parsons, 1955) seem too far-reaching. Evolutionary psychological perspectives also suggest that the observed stability of family networks over the life course might be similar in diverse cultural settings (Buss, 1999). As expected, global and personal networks were larger in more individualistic countries as compared with more collectivistic countries because individualism places—among other things—less emphasis on the in-group and attributes more importance to persons outside the family (Hofstede, 1980; Oyserman et al., 2002; Triandis et al., 1988). Global and personal networks comprise support providers and confidants to discuss important matters with. In more collectivistic countries, family members very often fulfill this role (Avogo & Agadjanian, 2008), whereas both intra- and extrafamilial persons frequently satisfy such functions in more individualistic countries. Also, the described life events largely are equally common in more collectivistic countries, and social motives as described by socioemotional selectivity theory are likely equally generalizable to a certain extent (Yeung, Fung, & Lang, 2008). All this supports assumptions that social network development follows similar patterns in both Western and non-Western countries (Antonucci et al., 2002, 2001; Fiori, Antonucci, & Akiyama, 2008; Fung, Stoeber, Yeung, & Lang, 2008; Yeung et al., 2008).

In sum, socioemotional selectivity and social convoy theory focus on the long-term changes of social networks, which are ascribed to changing motivational and situational factors. Other psychological disciplines show considerable consistency with the two theories. For example, social convoy theory and social psychology both highlight the importance of situational factors, and socioemotional selectivity theory focuses on motivational characteristics, where personality psychology would predict individual differences. Both theories are consistent with cultural psychology,

as the social motives and most important age-graded life events occur across cultures. Both theories are also consistent with evolutionary psychology, as motivational processes can be qualified by evolutionary predictions: Flexible relationship maintenance or dissolution, depending on situational circumstances, can be viewed as conditional developmental strategies, such as grandparental investment, depending on availability and certainty of grandchildren (Coall & Hertwig, 2010). Furthermore, other psychological perspectives can complement socioemotional selectivity and social convoy theory by addressing short-term processes and moderating dispositional or societal factors. It is important to emphasize that such a framework cannot be viewed as a theory of social network development because more specificity on the exact interplay of short-term and long-term processes as well as personality and societal factors would be needed. Instead, it outlines the most important questions on social network development and how psychological disciplines can contribute to answer them more comprehensively.

### Limitations and Future Directions

Despite the comprehensive nature of this meta-analysis, which spans several decades of cross-sectional and longitudinal social network research, a few issues limit the generalizability of the findings. First, we focused on studies from adolescence onward because social relationships of children are almost exclusively assessed through parents' reports, and we wanted to avoid a confounding of age and method effects. Future reviews could focus exclusively on social networks assessed by methods other than self-report and include younger samples. We included studies from all countries examined; yet it has to be noted that the majority of studies came from U.S. samples and only a handful were from Asian or African countries. Further research on the generalizability of network sizes and network composition across the life span is clearly needed. Importantly, we observed a research gap for studies in middle adulthood. In comparison to young and late adulthood, few cross-sectional and hardly any longitudinal studies were conducted for middle adulthood. More studies on this life period are certainly needed to establish how and why social relationships change during this age period (Fingerman & Hay, 2002).

Most studies incorporated in this meta-analytical review focused on friendships and family relationships, especially in association with effects of life events. There are two directions for new studies. First, peripheral relationships at work, at church, in the neighborhood, or at voluntary services might be most important when encountering specific life events such as retirement, or during specific age periods. These peripheral relationships might even gain importance as people's life expectation and time in good health increase (Cornwell, Laumann, & Schumm, 2008; Granovetter, 1973; Phillipson, 1997). Second, e-quaintances—that is, relationships with others only known over the Internet—have increased in importance over the last few years and now constitute a significant part of some people's social networks (Lewis, Kaufman, Gonzalez, Wimmer, & Christakis, 2008; Mesch & Talmud, 2006; Wang & Wellman, 2010). Changes and processes of these e-networks surely constitute a promising field for researchers of social relationships (for a review on research regarding online social networks, see Wilson, Gosling, & Graham, in press).

Finally, future studies on the effects of life events on social network changes should adopt prospective designs because changes can often precede the occurrence of a life event. This was shown for a decrease in life satisfaction even before life events such as divorce occurred (Lucas, Clark, Georgellis, & Diener, 2003). Such studies could also focus not only on average network sizes but also on the stability of specific relationships. Few of the reviewed studies reported change in specific relationships, whereas the overall network size hardly changed (Morgan et al., 1997b; Zettel & Rook, 2004). Therefore, the current study might slightly underestimate change in specific relationships, and focuses on changes in availability of relationship domains instead. Although difficult to apply (Sutor, Wellman, & Morgan, 1997), studying the processes of how social relationships change while they are embedded in changing social networks would provide insight into relationship dynamics and how they are influenced by the (social) environment.

In conclusion, the current meta-analysis shows that people's networks of social relationships change from adolescence to adulthood to old age, and these changes are similar to changes related to experiencing age-specific life events. At the same time, a stable convoy of family relationships and few close confidants accompanies people through positive and negative life events and as they grow older. The study should equip the reader with two things: (a) an answer on the initial questions of what the typical size of networks is and how it changes over the life span, and (b) first insights into how social network development relates to and informs other disciplines.

### References

- References marked with an asterisk indicate studies included in the meta-analysis.
- \*Aartsen, M. J., van Tilburg, T., Smits, C. H. M., & Knipscheer, K. C. P. M. (2004). A longitudinal study of the impact of physical and cognitive decline on the personal network in old age. *Journal of Social and Personal Relationships*, *21*, 249–266. doi:10.1177/0265407504041386
  - \*Adams, A. M., Madhavan, S., & Simon, D. (2002). Women's social networks and child survival in Mali. *Social Science & Medicine*, *54*, 165–178. doi:10.1016/S0277-9536(01)00017-X
  - \*Adams, R. G., & Torr, R. (1998). Factors underlying the structure of older adult friendship networks. *Social Networks*, *20*, 51–61. doi:10.1016/S0378-8733(97)00004-X
  - Agresti, A., & Wackerly, D. (1977). Some exact conditional tests of independence for  $R \times C$  cross-classification tables. *Psychometrika*, *42*, 111–125. doi:10.1007/BF02293748
  - \*Ajrouch, K. J., Blandon, A. Y., & Antonucci, T. C. (2005). Social networks among men and women: The effects of age and socioeconomic status. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, *60*, S311–S317. doi:10.1093/geronb/60.6.S311
  - \*Albeck, S., & Kaydar, D. (2002). Divorced mothers: Their network of friends pre- and post-divorce. *Journal of Divorce & Remarriage*, *36*, 111–138. doi:10.1300/J087v36n03\_07
  - Allan, G. (2006). Social networks and personal communities. In A. L. Vangelisti & D. Perlman (Eds.), *The Cambridge handbook of personal relationships* (pp. 657–671). Cambridge, England: Cambridge University Press.
  - Allan, G. (2008). Flexibility, friendship, and family. *Personal Relationships*, *15*, 1–16. doi:10.1111/j.1475-6811.2007.00181.x
  - \*Allen, J. D., Sorensen, G., Stoddard, A. M., Peterson, K. E., & Colditz, G.

- (1999). The relationship between social network characteristics and breast cancer screening practices among employed women. *Annals of Behavioral Medicine*, 21, 193–200. doi:10.1007/BF02884833
- Allison, P. D. (2000). Multiple imputation for missing data. *Sociological Methods & Research*, 28, 301–309. doi:10.1177/0049124100028003003
- Anderson, J. R., & Bower, G. H. (1972). Recognition and retrieval processes in free recall. *Psychological Review*, 79, 97–123. doi:10.1037/h0033773
- Antonucci, T. C. (1986). Hierarchical mapping technique. *Generations*, 10, 10–12.
- Antonucci, T. C., & Akiyama, H. (1987). Social networks in adult life and a preliminary examination of the convoy model. *Journal of Gerontology*, 42, 519–527. doi:10.1093/geronj/42.5.519
- \*Antonucci, T. C., Lansford, J. E., Akiyama, H., Smith, J., Baltes, M. M., Takahashi, K., . . . Dartigues, J.-F. (2002). Differences between men and women in social relations, resource deficits, and depressive symptomatology during later life in four nations. *Journal of Social Issues*, 58, 767–783. doi:10.1111/1540-4560.00289
- \*Antonucci, T. C., Lansford, J. E., Schaberg, L., Smith, J., Baltes, M., Akiyama, H., . . . Dartigues, J.-F. (2001). Widowhood and illness: A comparison of social network characteristics in France, Germany, Japan, and the United States. *Psychology and Aging*, 16, 655–665. doi:10.1037/0882-7974.16.4.655
- \*Apicella, C. L., Marlowe, F. W., Fowler, J. H., & Christakis, N. A. (2012). Social networks and cooperation in hunter-gatherers. *Nature*, 481, 497–501. doi:10.1038/nature10736
- \*Asendorpf, J. B. (2000). A person-centered approach to personality and social relationships: Findings from the Berlin Relationship Study. In L. R. Bergman, R. B. Cairns, L.-G. Nilsson, & L. Nystedt (Eds.), *Developmental science and the holistic approach* (pp. 281–298), Mahwah, NJ: Erlbaum.
- Asendorpf, J., & Banse, R. (2000). *Psychologie der Beziehung* [Relationship psychology]. Bern, Germany: Huber.
- \*Asendorpf, J., & Wilpers, S. (1998). Personality effects on social relationships. *Journal of Personality and Social Psychology*, 74, 1531–1544. doi:10.1037/0022-3514.74.6.1531
- Avogo, W., & Agadjanian, V. (2008). Men's social networks and contraception in Ghana. *Journal of Biosocial Science*, 40, 413–429. doi:10.1017/S0021932007002507
- Back, M. D., Baumert, A., Denissen, J. J. A., Hartung, F.-M., Penke, L., Schmukle, S. C., . . . Wrzus, C. (2011). PERSOC: A unified framework for understanding the dynamic interplay of personality and social relationships. *European Journal of Personality*, 25, 90–107. doi:10.1002/per.811
- Back, M. D., Schmukle, S. C., & Egloff, B. (2008). Becoming friends by chance. *Psychological Science*, 19, 439–440. doi:10.1111/j.1467-9280.2008.02106.x
- \*Baerveldt, C., van Rossem, R., Vermande, M., & Weerman, F. (2004). Students' delinquency and correlates with strong and weaker ties: A study of students' networks in Dutch high schools. *Connections*, 26, 11–28.
- Baldwin, M. W. (1992). Relational schemas and the processing of social information. *Psychological Bulletin*, 112, 461–484. doi:10.1037/0033-2909.112.3.461
- \*Barker, J. C., Morrows, J., & Mittness, L. S. (1998). Gender, informal social support networks, and elderly urban African Americans. *Journal of Aging Studies*, 12, 199–222. doi:10.1016/S0890-4065(98)90015-9
- \*Barnhardt, S. (2010). *Essays on the impact of residential location on networks, attitudes and cooperation: Experimental evidence from India* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3414627)
- \*Barton, L. R., Roman, L. A., Fitzgerald, H. E., & McKinney, M. H. (2002). Informal social support characteristics and utilization of parenting support services among low-income African American mothers of premature infants. *Infant Mental Health Journal*, 23, 278–292. doi:10.1002/imhj.10017
- \*Bass, L. A., & Stein, C. H. (1997). Comparing the structure and stability of network ties using the Social Support Questionnaire and the Social Network List. *Journal of Social and Personal Relationships*, 14, 123–132. doi:10.1177/0265407597141007
- Bastani, S. (2007). Family comes first: Men's and women's personal networks in Tehran. *Social Networks*, 29, 357–374. doi:10.1016/j.socnet.2007.01.004
- Baumeister, R. F., & Leary, M. A. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497–529. doi:10.1037/0033-2909.117.3.497
- \*Bear, M. (1990). Social network characteristics and the duration of primary relationships after entry into long-term care. *Journals of Gerontology*, 45, S156–S162. doi:10.1093/geronj/45.4.S156
- \*Bennett, D. A., Schneider, J. A., Tang, Y., Arnold, S. E., & Wilson, R. S. (2006). The effect of social networks on the relation between Alzheimer's disease pathology and level of cognitive function in old people: A longitudinal cohort study. *The Lancet Neurology*, 5, 406–412. doi:10.1016/S1474-4422(06)70417-3
- \*Bergeron, N. (2011). *Social support, cognitive ability, and resilience in maltreated adolescents transitioning to adulthood* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 1505512)
- Bernard, H. R., Johnsen, E. C., Killworth, P. D., McCarty, C., Shelley, G. A., & Robinson, S. (1990). Comparing four different methods for measuring personal social networks. *Social Networks*, 12, 179–215. doi:10.1016/0378-8733(90)90005-T
- Bernardi, L. (2003). Channels of social influence on reproduction. *Population Research and Policy Review*, 22, 527–555. doi:10.1023/B:POPU.0000020892.15221.44
- \*Biegel, D. E., Magaziner, J., & Baum, M. (1991). Social support networks of White and Black elderly people at risk for institutionalization. *Health & Social Work*, 16, 245–257.
- Bien, W., Marbach, J., & Neyer, F. (1991). Using egocentered networks in survey research: A methodological preview on an application of social network analysis in the area of family research. *Social Networks*, 13, 75–90. doi:10.1016/0378-8733(91)90014-K
- Bloem, B. A., van Tilburg, T. G., & Thomése, F. (2008). Changes in older Dutch adults' role networks after moving. *Personal Relationships*, 15, 465–478. doi:10.1111/j.1475-6811.2008.00210.x
- \*Bolwijn, P. H., van Santen-Hoeufft, M. H. J., Baars, H. M. J., & Kaplan, C. D. (1996). The social network characteristics of fibromyalgia patients compared with healthy controls. *Arthritis Care & Research*, 9, 18–26. doi:10.1002/art.1790090106
- \*Bost, K. K., Cox, M. J., Burchinal, M. R., & Payne, C. (2002). Structural and supportive changes in couples' family and friendship networks across the transition to parenthood. *Journal of Marriage and Family*, 64, 517–531. doi:10.1111/j.1741-3737.2002.00517.x
- Bott, E. (1957). *Family and social network: Roles, norms, and external relationships in ordinary urban families*. London, England: Tavistock.
- \*Boyce, W. T., Schaefer, C., & Uitti, C. (1985). Permanence and change: Psychosocial factors in the outcome of adolescent pregnancy. *Social Science & Medicine*, 21, 1279–1287. doi:10.1016/0277-9536(85)90278-3
- Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin*, 86, 307–324. doi:10.1037/0033-2909.86.2.307
- Brim, O. G., Jr., & Ryff, C. D. (1980). On the properties of life events. In P. B. Baltes & O. G. Brim Jr. (Eds.), *Life-span development and behavior* (Vol. 3, pp. 367–388). New York, NY: Academic Press.
- \*Broese van Groenou, M. I., & van Tilburg, T. (2003). Network size and support in old age: Differentials by socio-economic status in childhood

- and adulthood. *Ageing and Society*, 23, 625–645. doi:10.1017/S0144686X0300134X
- Bronfenbrenner, U. (1989). *Die Ökologie der menschlichen Entwicklung: Natürliche und geplante Experimente* [The ecology of human development: Experiments by nature and design]. Frankfurt am Main, Germany: Fischer.
- Brown, D. R., & Gary, L. E. (1985). Social support network differentials among married and nonmarried Black females. *Psychology of Women Quarterly*, 9, 229–241. doi:10.1111/j.1471-6402.1985.tb00874.x
- \*Brown, W. M., Consedine, N. S., & Magai, C. (2005). Altruism relates to health in an ethnically diverse sample of older adults. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 60, P143–P152. doi:10.1093/geronb/60.3.P143
- Brugha, T. S. (Ed.). (2007). *Social support and psychiatric disorder: Research findings and guidelines for clinical practice*. Cambridge, England: Cambridge University Press.
- Buchwald, P. (2007). A general bilinear model to describe growth or decline time profiles. *Mathematical Biosciences*, 205, 108–136. doi:10.1016/j.mbs.2006.08.013
- Bugental, D. B. (2000). Acquisition of the algorithms of social life: A domain-based approach. *Psychological Bulletin*, 126, 187–219. doi:10.1037/0033-2909.126.2.187
- \*Burger, E., & Milardo, R. M. (1995). Marital interdependence and social networks. *Journal of Social and Personal Relationships*, 12, 403–415. doi:10.1177/0265407595123005
- Buss, D. M. (1999). *Evolutionary psychology: The new science of the mind*. Boston, MA: Allyn & Bacon.
- Byrne, D. (1971). *The attraction paradigm*. New York, NY: Academic Press.
- Byrne, D., Griffitt, W., & Stefaniak, D. (1967). Attraction and similarity of personality characteristics. *Journal of Personality and Social Psychology*, 5, 82–90. doi:10.1037/h0021198
- Caldwell, M. A., & Peplau, L. A. (1982). Sex differences in same-sex friendship. *Sex Roles*, 8, 721–732. doi:10.1007/BF00287568
- Caldwell, R. A., Bloom, B. L., & Hodges, W. F. (1983). Sex differences in separation and divorce: A longitudinal perspective. *Issues in Mental Health Nursing*, 5, 103–120. doi:10.3109/01612848309009435
- Carstensen, L. L. (1991). Socioemotional selectivity theory: Social activity in life-span context. *Annual Review of Gerontology and Geriatrics*, 11, 195–217.
- Carstensen, L. L. (1992). Social and emotional patterns in adulthood: Support for socioemotional selectivity theory. *Psychology and Aging*, 7, 331–338. doi:10.1037/0882-7974.7.3.331
- Carstensen, L. L. (1995). Evidence for a life-span theory of socioemotional selectivity. *Current Directions in Psychological Science*, 4, 151–156. doi:10.1111/1467-8721.ep11512261
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, 54, 165–181. doi:10.1037/0003-066X.54.3.165
- Cerella, J., & Hale, S. (1994). The rise and fall in information-processing rates over the life span. *Acta Psychologica*, 86, 109–197. doi:10.1016/0001-6918(94)90002-7
- \*Chan, Y. K., & Lee, R. P. L. (2006). Network size, social support and happiness in later life: A comparative study of Beijing and Hong Kong. *Journal of Happiness Studies*, 7, 87–112. doi:10.1007/s10902-005-1915-1
- \*Chou, K.-L. (1999). Social support and subjective well-being among Hong Kong Chinese young adults. *Journal of Genetic Psychology: Research and Theory on Human Development*, 160, 319–331. doi:10.1080/00221329909595402
- \*Claes, M. E. (1992). Friendship and personal adjustment during adolescence. *Journal of Adolescence*, 15, 39–55. doi:10.1016/0140-1971(92)90064-C
- \*Clark, C. (1984). Structural characteristics of social networks associated with adjustment to marital disruption. *Dissertation Abstracts International: Section B. Sciences and Engineering*, 45(1), 345.
- Clark, M. S., & Mills, J. (1979). Interpersonal attraction in exchange and communal relationships. *Journal of Personality and Social Psychology*, 37, 12–24. doi:10.1037/0022-3514.37.1.12
- Coall, D. A., & Hertwig, R. (2010). Grandparental investment: Past, present, and future. *Behavioral and Brain Sciences*, 33, 1–19. doi:10.1017/S0140525X09991105
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.
- \*Cohen, M. A. (2007). Work relationships as investments: The unexplored component of continuance commitment. *Dissertation Abstracts International: Section B. Sciences and Engineering*, 68(1), 657.
- \*Connolly, J., Furman, W., & Konarski, R. (2000). The role of peers in the emergence of heterosexual romantic relationships in adolescence. *Child Development*, 71, 1395–1408. doi:10.1111/1467-8624.00235
- \*Cornwell, B. (2011). Independence through social networks: Bridging potential among older women and men. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 66, 782–794. doi:10.1093/geronb/gbr111
- \*Cornwell, B., Laumann, E. O., & Schumm, L. P. (2008). The social connectedness of older adults: A national profile. *American Sociological Review*, 73, 185–203. doi:10.1177/000312240807300201
- \*Cozijnsen, R., Stevens, N. L., & van Tilburg, T. G. (2010). Maintaining work-related personal ties following retirement. *Personal Relationships*, 17, 345–356. doi:10.1111/j.1475-6811.2010.01283.x
- \*Cronenwett, L. R. (1985a). Network structure, social support, and psychological outcomes of pregnancy. *Nursing Research*, 34, 93–99. doi:10.1097/00006199-198503000-00009
- \*Cronenwett, L. R. (1985b). Parental network structure and perceived support after birth of first child. *Nursing Research*, 34, 347–352. doi:10.1097/00006199-198511000-00007
- Cross, S. E., & Madson, L. (1997). Models of the self: Self-construals and gender. *Psychological Bulletin*, 122, 5–37. doi:10.1037/0033-2909.122.1.5
- \*Dalgard, O. S., & Håheim, L. L. (1998). Psychosocial risk factors and mortality: A prospective study with special focus on social support, social participation, and locus of control in Norway. *Journal of Epidemiology & Community Health*, 52, 476–481. doi:10.1136/jech.52.8.476
- Daniels-Mohring, D., & Berger, M. (1984). Social network changes and the adjustment to divorce. *Journal of Divorce*, 8, 17–32. doi:10.1300/J279v08n01\_02
- \*Degenne, A., & Lebeaux, M.-O. (2005). The dynamics of personal networks at the time of entry into adult life. *Social Networks*, 27, 337–358. doi:10.1016/j.socnet.2004.11.002
- \*de Jong Gierveld, J., & Peeters, A. (2003). The interweaving of repartnered older adults' lives with their children and siblings. *Ageing and Society*, 23, 187–205. doi:10.1017/S0144686X02001095
- Diehl, M., Owen, S. K., & Youngblade, L. M. (2004). Agency and communion attributes in adults' spontaneous self-representations. *International Journal of Behavioral Development*, 28, 1–15. doi:10.1080/01650250344000226
- \*Dong, X.-Q., Simon, M., & Evans, D. (2010). Cross-sectional study of the characteristics of reported elder self-neglect in a community-dwelling population: Findings from a population-based cohort. *Gerontology*, 56, 325–334. doi:10.1159/000243164
- \*Dorfman, L. T., Lieckerl, D. A., Hili, E. A., & Kohous, F. I. (1988). Retirement satisfaction in rural husbands and wives. *Rural Sociology*, 53, 25–39.
- Duck, S. (Ed.). (1988). *Handbook of personal relationships: Theory, research, and interventions*. New York, NY: Wiley.
- \*Duffy, M. E. (1993). Social networks and social support of recently

- divorced women. *Public Health Nursing*, *10*, 19–24. doi:10.1111/j.1525-1446.1993.tb00015.x
- \*Dykstra, P. A. (2006). Off the beaten track: Childlessness and social integration in late life. *Research on Aging*, *28*, 749–767. doi:10.1177/0164027506291745
- \*Dykstra, P. A., & de Jong Gierveld, J. (2004). Gender and marital-history differences in emotional and social loneliness among Dutch older adults. *Canadian Journal on Aging*, *23*, 141–155. doi:10.1353/cja.2004.0018
- \*Dykstra, P. A., van Tilburg, T. G., & de Jong Gierveld, J. (2005). Changes in older adult loneliness: Results from a seven-year longitudinal study. *Research on Aging*, *27*, 725–747. doi:10.1177/0164027505279712
- Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal*, *315*, 629–634. doi:10.1136/bmj.315.7109.629
- \*Feiring, C., & Lewis, M. (1991). The transition from middle childhood to early adolescence: Sex differences in the social network and perceived self-competence. *Sex Roles*, *24*, 489–509. doi:10.1007/BF00289335
- Ferguson, C. J., & Brannick, M. T. (2012). Publication bias in psychological science: Prevalence, methods for identifying and controlling, and implications for the use of meta-analyses. *Psychological Methods*, *17*, 120–128. doi:10.1037/a0024445
- \*Ferring, D., & Filipp, S.-H. (1999). Soziale Netze im Alter: Selektivität in der Netzwerkgestaltung, wahrgenommene Qualität der Sozialbeziehungen und Affekt [Social networks in old age: Socioemotional selectivity, perceived quality of social interactions, and affect]. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, *31*, 127–137. doi:10.1026/0049-8637.31.3.127
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, *7*, 117–140. doi:10.1177/001872675400700202
- Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups: A study of human factors in housing*. New York, NY: Harper.
- Filipp, S.-H. (1990). Ein allgemeines Modell für die Analyse kritischer Lebensereignisse [A general model for the analysis of critical life events]. In S.-H. Filipp (Ed.), *Kritische Lebensereignisse* (pp. 3–52). München, Germany: Psychologie Verlags Union.
- Fincham, T. D. (2005). Keeping the ball in the air: Contact in long-distance friendships. *Journal of Women & Aging*, *17*, 91–106. doi:10.1300/J074v17n03\_07
- Fingerman, K. L., & Hay, E. L. (2002). Searching under the streetlight? Age biases in the personal and family relationships literature. *Personal Relationships*, *9*, 415–433. doi:10.1111/1475-6811.09404
- \*Fingerman, K. L., Hay, E. L., & Birditt, K. S. (2004). The best of ties, the worst of ties: Close, problematic, and ambivalent social relationships. *Journal of Marriage and Family*, *66*, 792–808. doi:10.1111/j.0022-2445.2004.00053.x
- \*Fiori, K. L. (2007). Social relations and health among older adults: A cross-cultural and pattern-centered approach. *Dissertation Abstracts International: Section B. Sciences and Engineering*, *67*(7), 4132.
- Fiori, K. L., Antonucci, T. C., & Akiyama, H. (2008). Profiles of social relations among older adults: A cross-cultural approach. *Ageing and Society*, *28*, 203–231. doi:10.1017/S0144686X07006472
- \*Fiori, K. L., Smith, J., & Antonucci, T. C. (2007). Social network types among older adults: A multidimensional approach. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, *62*, P322–P330. doi:10.1093/geronb/62.6.P322
- Fischer, C. S. (1982). *To dwell among friends: Personal networks in town and city*. Chicago, IL: University of Chicago Press.
- Fischer, C. S. (2009). The 2004 GSS finding of shrunken social networks: An artifact? *American Sociological Review*, *74*, 657–669. doi:10.1177/000312240907400408
- \*Fischer, J. L., Sollie, D. L., & Morrow, K. B. (1986). Social networks in male and female adolescents. *Journal of Adolescent Research*, *1*, 1–14. doi:10.1177/074355488611002
- \*Fischer, J. L., Sollie, D. L., Sorell, G. T., & Green, S. K. (1989). Marital status and career stage influences on social networks of young adults. *Journal of Marriage and the Family*, *51*, 521–534. doi:10.2307/352513
- Fjell, A. M., Walhovd, K. B., Westlye, L. T., Østby, Y., Tamnes, C. K., Jernigan, T. L., . . . Dale, A. M. (2010). When does brain aging accelerate? Dangers of quadratic fits in cross-sectional studies. *NeuroImage*, *50*, 1376–1383. doi:10.1016/j.neuroimage.2010.01.061
- \*Forrester-Jones, R., Carpenter, J., Coolen-Schrijner, P., Cambridge, P., Tate, A., Beecham, J., . . . Wooff, D. (2006). The social networks of people with intellectual disability living in the community 12 years after resettlement from long-stay hospitals. *Journal of Applied Research in Intellectual Disabilities*, *19*, 285–295. doi:10.1111/j.1468-3148.2006.00263.x
- \*Forrester-Jones, R., Jones, S., Heason, S., & DiTerlizzi, M. (2004). Supported employment: A route to social networks. *Journal of Applied Research in Intellectual Disabilities*, *17*, 199–208. doi:10.1111/j.1468-3148.2004.00199.x
- \*Fuhrer, R., & Stansfeld, S. A. (2002). How gender affects patterns of social relations and their impact on health: A comparison of one or multiple sources of support from “close persons.” *Social Science & Medicine*, *54*, 811–825. doi:10.1016/S0277-9536(01)00111-3
- Fung, H. H., Stoerber, F. S., Yeung, D. Y., & Lang, F. R. (2008). Cultural specificity of socioemotional selectivity: Age differences in social network composition among Germans and Hong Kong Chinese. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, *63*, P156–P164. doi:10.1093/geronb/63.3.P156
- \*Gameiro, S., Boivin, J., Canavarro, M. C., Moura-Ramos, M., & Soares, I. (2010). Social nesting: Changes in social network and support across the transition to parenthood in couples that conceived spontaneously or through assisted reproductive technologies. *Journal of Family Psychology*, *24*, 175–187. doi:10.1037/a0019101
- \*Garbarino, J. (1978). The social maps of children approaching adolescence: Studying the ecology of youth development. *Journal of Youth and Adolescence*, *7*, 417–428. doi:10.1007/BF01537809
- \*Gayen, K., & Raeside, R. (2007). Social networks, normative influence and health delivery in rural Bangladesh. *Social Science & Medicine*, *65*, 900–914. doi:10.1016/j.socscimed.2007.03.037
- \*Gerich, J., & Lehner, R. (2006). Collection of ego-centered network data with computer-assisted interviews. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, *2*, 7–15. doi:10.1027/1614-2241.2.1.7
- \*Gerstel, N., Riessman, C. K., & Rosenfield, S. (1985). Explaining the symptomatology of separated and divorced women and men: The role of material conditions and social networks. *Social Forces*, *64*, 84–101. doi:10.2307/2578973
- \*Giles, L. C., Metcalf, P. A., Glonek, G. F. V., Luszcz, M. A., & Andrews, G. A. (2004). The effects of social networks on disability in older Australians. *Journal of Aging and Health*, *16*, 517–538. doi:10.1177/0898264304265778
- Goldberg, R. W., Rollins, A. L., & Lehman, A. F. (2003). Social network correlates among people with psychiatric disabilities. *Psychiatric Rehabilitation Journal*, *26*, 393–402. doi:10.2975/26.2003.393.402
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, *78*, 1360–1380. doi:10.1086/225469
- \*Greenbaum, S. D., & Greenbaum, P. E. (1985). The ecology of social networks in four urban neighborhoods. *Social Networks*, *7*, 47–76. doi:10.1016/0378-8733(85)90008-5
- \*Greve, A. (1995). Networks and entrepreneurship—An analysis of social relations, occupational background, and use of contacts during the establishment process. *Scandinavian Journal of Management*, *11*, 1–24. doi:10.1016/0956-5221(94)00026-E
- \*Grossman, A. H., D’Augelli, A. R., & Hershberger, S. L. (2000). Social support networks of lesbian, gay, and bisexual adults 60 years of age and

- older. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 55, P171–P179. doi:10.1093/geronb/55.3.P171
- \*Guiaux, M., van Tilburg, T., & Broese van Groenou, M. (2007). Changes in contact and support exchange in personal networks after widowhood. *Personal Relationships*, 14, 457–473. doi:10.1111/j.1475-6811.2007.00165.x
- \*Hallaraker, E., Arefjord, K., Havik, O. E., & Maeland, J. G. (2001). Social support and emotional adjustment during and after a severe life event: A study of wives of myocardial infarction patients. *Psychology & Health*, 16, 343–355. doi:10.1080/08870440108405511
- Hamilton, W. D. (1964). The genetical evolution of social behaviour. I. *Journal of Theoretical Biology*, 7, 1–16. doi:10.1016/0022-5193(64)90038-4
- Hammer, M. (1983). “Core” and “extended” social networks in relation to health and illness. *Social Science & Medicine*, 17, 405–411. doi:10.1016/0277-9536(83)90344-1
- \*Hammer, M., Gutwirth, L., & Phillips, S. L. (1982). Parenthood and social networks: A preliminary view. *Social Science & Medicine*, 16, 2091–2100. doi:10.1016/0277-9536(82)90258-1
- \*Han, H.-R., Kim, M., Lee, H. B., Pistulka, G., & Kim, K. B. (2007). Correlates of depression in the Korean American elderly: Focusing on personal resources of social support. *Journal of Cross-Cultural Gerontology*, 22, 115–127. doi:10.1007/s10823-006-9022-2
- \*Hansen, F. J., Fallon, A. E., & Novotny, S. L. (1991). The relationship between social network structure and marital satisfaction in distressed and nondistressed couples: A pilot study. *Family Therapy*, 18, 101–114.
- \*Hansson, R. O. (1986). Relational competence, relationships, and adjustment in old age. *Journal of Personality and Social Psychology*, 50, 1050–1058. doi:10.1037/0022-3514.50.5.1050
- Harvey, J. H., & Wenzel, A. (2006). Theoretical perspectives in the study of close relationships. In A. L. Vangelisti & D. Perlman (Eds.), *The Cambridge handbook of personal relationships* (pp. 35–49). Cambridge, England: Cambridge University Press.
- \*Hays, R. B., & Oxley, D. (1986). Social network development and functioning during a life transition. *Journal of Personality and Social Psychology*, 50, 305–313. doi:10.1037/0022-3514.50.2.305
- Heckhausen, J. (1999). *Developmental regulation in adulthood: Age-normative and sociostructural constraints as adaptive challenges*. Cambridge, England: Cambridge University Press.
- Hedges, L. V. (1981). Distribution theory for Glass’s estimator of effect size and related estimators. *Journal of Educational Statistics*, 6, 107–128. doi:10.2307/1164588
- Heider, F. (1958). *The psychology of interpersonal relations*. New York, NY: Wiley. doi:10.1037/10628-000
- \*Heller, K., & Mansbach, W. E. (1984). The multifaceted nature of social support in a community sample of elderly women. *Journal of Social Issues*, 40, 99–112. doi:10.1111/j.1540-4560.1984.tb01109.x
- Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal*, 327, 557–560. doi:10.1136/bmj.327.7414.557
- Hill, R. A., & Dunbar, R. I. M. (2003). Social network size in humans. *Human Nature*, 14, 53–72. doi:10.1007/s12110-003-1016-y
- \*Hilton, J. M., Desrochers, S., & Devall, E. L. (2001). Comparison of role demands, relationships, and child functioning in single-mother, single-father, and intact families. *Journal of Divorce & Remarriage*, 35, 29–56. doi:10.1300/J087v35n01\_02
- Hinde, R. A. (1979). *Towards understanding relationships*. London, England: Academic Press.
- Hofer, M., & Pikowski, B. (2002). Familien mit Jugendlichen [Families with adolescents]. In M. Hofer, E. Wild, & P. Noack (Eds.), *Lehrbuch Familienbeziehungen: Eltern und Kinder in der Entwicklung* (pp. 241–264). Göttingen, Germany: Hogrefe.
- Hofstede, G. (1980). *Culture’s consequences: International differences in work-related values*. Beverly Hills, CA: Sage.
- Hogg, M. A., & Tindale, R. S. (Eds.). (2001). *Blackwell handbook of social psychology: Group processes*. Oxford, England: Blackwell. doi:10.1002/9780470998458
- Hogg, M. A., & Vaughan, G. M. (2011). *Social psychology* (6th ed.). Harlow, England: Pearson.
- Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research*, 11, 213–218. doi:10.1016/0022-3999(67)90010-4
- Huedo-Medina, T. B., Sánchez-Meca, J., Marín-Martínez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: *Q* statistic or *I*<sup>2</sup> index? *Psychological Methods*, 11, 193–206. doi:10.1037/1082-989X.11.2.193
- Hughes, R., Jr. (1988). Divorce and social support: A review. *Journal of Divorce*, 11, 123–145.
- \*Hughes, R., Jr., Good, E. S., & Candell, K. (1993). A longitudinal study of the effects of social support on the psychological adjustment of divorced mothers. *Journal of Divorce & Remarriage*, 19, 37–56. doi:10.1300/J087v19n01\_03
- Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings* (2nd ed.). Thousand Oaks, CA: Sage.
- Hurlbert, J. S., & Acock, A. C. (1990). The effects of marital status on the form and composition of social networks. *Social Science Quarterly*, 71, 163–174.
- \*Huurre, T., Junkkari, H., & Aro, H. (2006). Long-term psychosocial effects of parental divorce: A follow-up study from adolescence to adulthood. *European Archives of Psychiatry and Clinical Neuroscience*, 256, 256–263. doi:10.1007/s00406-006-0641-y
- \*Ikkink, K. K., & van Tilburg, T. (1998). Do older adults’ network members continue to provide instrumental support in unbalanced relationships? *Journal of Social and Personal Relationships*, 15, 59–75. doi:10.1177/0265407598151004
- \*Ikkink, K. K., & van Tilburg, T. (1999). Broken ties: Reciprocity and other factors affecting the termination of older adult’s relationships. *Social Networks*, 21, 131–146. doi:10.1016/S0378-8733(99)00005-2
- \*Imamoğlu, E. O., Küller, R., Imamoğlu, V., & Küller, M. (1993). The social psychological worlds of Swedes and Turks in and around retirement. *Journal of Cross-Cultural Psychology*, 24, 26–41. doi:10.1177/0022022193241002
- Impett, E. A., & Peplau, L. A. (2006). “His” and “her” relationships? A review of the empirical evidence. In A. L. Vangelisti & D. Perlman (Eds.), *The Cambridge handbook of personal relationships* (pp. 273–291). Cambridge, England: Cambridge University Press.
- \*Jackson, P. R. (1988). Personal networks, support mobilization and unemployment. *Psychological Medicine*, 18, 397–404. doi:10.1017/S0033291700007947
- \*Jennings, K. D., Stagg, V., & Connors, R. E. (1991). Social networks and mothers’ interactions with their preschool-children. *Child Development*, 62, 966–978. doi:10.2307/1131146
- \*Jerusalem, M., Hahn, A., & Schwarzer, R. (1996). Social bonding and loneliness after network disruption: A longitudinal study of East German refugees. *Social Indicators Research*, 38, 229–243. doi:10.1007/BF00292047
- Johnson, M. A. (1989). Variables associated with friendship in an adult population. *Journal of Social Psychology*, 129, 379–390. doi:10.1080/0022454.1989.9712054
- \*Johnson, M. P., & Leslie, L. (1982). Couple involvement and network structure: A test of the dyadic withdrawal hypothesis. *Social Psychology Quarterly*, 45, 34–43. doi:10.2307/3033672
- Kahn, R. L., & Antonucci, T. C. (1980). Convoys over the life course: Attachment, roles and social support. In P. B. Baltes & O. G. Brim Jr. (Eds.), *Life-span development and behavior* (Vol. 3, pp. 253–286). New York, NY: Academic Press.
- \*Kalavar, J. M., & Jamuna, D. (2011). Aging of Indian women in India:

- The experience of older women in formal care homes. *Journal of Women & Aging*, 23, 203–215. doi:10.1080/08952841.2011.587730
- \*Kalish, Y., & Robins, G. (2006). Psychological predispositions and network structure: The relationship between individual predispositions, structural holes and network closure. *Social Networks*, 28, 56–84. doi:10.1016/j.socnet.2005.04.004
- \*Kalmijn, M., & Vermunt, J. K. (2007). Homogeneity of social networks by age and marital status: A multilevel analysis of ego-centered networks. *Social Networks*, 29, 25–43. doi:10.1016/j.socnet.2005.11.008
- \*Kana'iaupuni, S. M., Donato, K. M., Thompson-Colón, T., & Stainback, M. (2005). Counting on kin: Social networks, social support, and child health status. *Social Forces*, 83, 1137–1164. doi:10.1353/sof.2005.0036
- \*Kazak, A. E. (1988). Stress and social networks in families with older institutionalized retarded children. *Journal of Social and Clinical Psychology*, 6, 448–461. doi:10.1521/jscp.1988.6.3-4.448
- \*Kazak, A. E., & Wilcox, B. L. (1984). The structure and function of social support networks in families with handicapped children. *American Journal of Community Psychology*, 12, 645–661. doi:10.1007/BF00922617
- Kelley, H. H., & Thibaut, J. W. (1978). *Interpersonal relations: A theory of interdependence*. New York, NY: Wiley.
- Kenrick, D., Ackerman, J., & Ledlow, S. (2003). Evolutionary social psychology: Adaptive predispositions and human culture. In J. Delamater (Ed.), *Handbook of social psychology* (pp. 103–122). New York, NY: Kluwer.
- Killworth, P. D., Johnsen, E. C., Bernard, H. R., Shelley, G. A., & McCarty, C. (1990). Estimating the size of personal networks. *Social Networks*, 12, 289–312. doi:10.1016/0378-8733(90)90012-X
- \*Kincaid, S. B., & Caldwell, R. A. (1991). Initiator status, family support, and adjustment to marital separation: A test of an interaction hypothesis. *Journal of Community Psychology*, 19, 79–88. doi:10.1002/1520-6629(199101)19:1<79::AID-JCOP2290190108>3.0.CO;2-O
- \*Kirke, D. M. (1996). Collecting peer data and delineating peer networks in a complete network. *Social Networks*, 18, 333–346. doi:10.1016/0378-8733(95)00280-4
- Kogovšek, T., & Ferligoj, A. (2005). Effects on reliability and validity of egocentered network measurements. *Social Networks*, 27, 205–229. doi:10.1016/j.socnet.2005.01.001
- \*Koniak-Griffin, D. (1989). Psychosocial and clinical variables in pregnant adolescents: A survey of maternity home residents. *Journal of Adolescent Health Care*, 10, 23–29. doi:10.1016/0197-0070(89)90042-9
- \*Koram, N., Liu, H., Li, J., Li, J., Luo, J., & Nield, J. (2011). Role of social network dimensions in the transition to injection drug use: Actions speak louder than words. *AIDS and Behavior*, 15, 1579–1588. doi:10.1007/s10461-011-9930-1
- \*Kramer, R. A., & Vaquera, E. (2011). Who is really doing it? Peer embeddedness and substance use during adolescence. *Sociological Perspectives*, 54, 37–58. doi:10.1525/sop.2011.54.1.37
- \*Kramer, S. E., Kapteyn, T. S., Kuik, D. J., & Deeg, D. J. H. (2002). The association of hearing impairment and chronic diseases with psychosocial health status in older age. *Journal of Aging and Health*, 14, 122–137. doi:10.1177/089826430201400107
- Kreppner, K. (1993). Eltern-Kind Beziehungen: Kindes und Jugendalter [Parent-child relationships: Childhood and adolescence]. In A. E. Auhagen & M. von Salisch (Eds.), *Zwischenmenschliche Beziehungen* (pp. 81–104). Göttingen, Germany: Hogrefe.
- \*Kuttler, A. F., & La Greca, A. M. (2004). Linkages among adolescent girls' romantic relationships, best friendships, and peer networks. *Journal of Adolescence*, 27, 395–414. doi:10.1016/j.adolescence.2004.05.002
- \*La Greca, A. M., & Mackey, E. R. (2007). Adolescents' anxiety in dating situations: The potential role of friends and romantic partners. *Journal of Clinical Child and Adolescent Psychology*, 36, 522–533. doi:10.1080/15374410701662097
- \*Laireiter, A.-R., Baumann, U., Perkonig, A., & Himmelbauer, S. (1997). Social support resources in interpersonal relationships (social networks) during stressful life conditions: Results from two pilot studies. *European Review of Applied Psychology*, 47, 123–129.
- \*Lakon, C. M., Hipp, J. R., & Timberlake, D. S. (2010). The social context of adolescent smoking: A systems perspective. *American Journal of Public Health*, 100, 1218–1228. doi:10.2105/AJPH.2009.167973
- \*Lang, F. R. (1998). Einsamkeit, Zärtlichkeit und subjektive Zukunftsorientierung im Alter. Eine Untersuchung zur Sozioemotionalen Selektivitätstheorie [Loneliness, tenderness, and subjective future orientation in old age: A study on socioemotional selectivity theory]. *Zeitschrift für Klinische Psychologie*, 27, 98–104.
- \*Lang, F. R. (2000). Endings and continuity of social relationships: Maximizing intrinsic benefits within personal networks when feeling near to death. *Journal of Social and Personal Relationships*, 17, 155–182. doi:10.1177/0265407500172001
- Lang, F. R. (2004). Social motivation across the life span. In F. R. Lang & K. L. Fingerman (Eds.), *Growing together: Personal relationships across the lifespan* (pp. 341–367). Cambridge, England: Cambridge University Press.
- \*Lang, F. R., & Carstensen, L. L. (1994). Close emotional relationships in late life: Further support for proactive aging in the social domain. *Psychology and Aging*, 9, 315–324. doi:10.1037/0882-7974.9.2.315
- \*Lang, F. R., Staudinger, U. M., & Carstensen, L. L. (1998). Perspectives on socioemotional selectivity in late life: How personality and social context do (and do not) make a difference. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 53, P21–P30. doi:10.1093/geronb/53B.1.P21
- Lehman, D. R., Wortman, C. B., & Williams, A. F. (1987). Long-term effects of losing a spouse or child in a motor vehicle crash. *Journal of Personality and Social Psychology*, 52, 218–231. doi:10.1037/0022-3514.52.1.218
- Leik, R. K., & Chalkley, M. A. (1997). On the stability of network relations under stress. *Social Networks*, 19, 63–74. doi:10.1016/S0378-8733(96)00291-2
- \*Levitt, M. J., Weber, R. A., & Clark, M. C. (1986). Social network relationships as sources of maternal support and well-being. *Developmental Psychology*, 22, 310–316. doi:10.1037/0012-1649.22.3.310
- \*Levitt, M. J., Weber, R. A., & Guacci, N. (1993). Convoys of social support: An intergenerational analysis. *Psychology and Aging*, 8, 323–326. doi:10.1037/0882-7974.8.3.323
- \*Levy-Storms, L., & Lubben, J. E. (2006). Network composition and health behaviors among older Samoan women. *Journal of Aging and Health*, 18, 814–836. doi:10.1177/0898264306293263
- Lewis, K., Kaufman, J., Gonzalez, M., Wimmer, A., & Christakis, N. (2008). Tastes, ties, and time: A new social network dataset using Facebook.com. *Social Networks*, 30, 330–342. doi:10.1016/j.socnet.2008.07.002
- Li, S.-C., Lindenberger, U., Hommel, B., Aschersleben, G., Prinz, W., & Baltes, P. B. (2004). Transformations in the couplings among intellectual abilities and constituent cognitive processes across the life span. *Psychological Science*, 15, 155–163. doi:10.1111/j.0956-7976.2004.01503003.x
- Lim, J., & Dinges, D. F. (2010). A meta-analysis of the impact of short-term sleep deprivation on cognitive variables. *Psychological Bulletin*, 136, 375–389. doi:10.1037/a0018883
- Lindenberger, U., von Oertzen, T., Ghisletta, P., & Hertzog, C. (2011). Cross-sectional age variance extraction: What's change got to do with it? *Psychology and Aging*, 26, 34–47. doi:10.1037/a0020525
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.
- \*Lombardi, E. L. (1999). Integration within a transgender social network and its effect upon members' social and political activity. *Journal of Homosexuality*, 37, 109–126. doi:10.1300/J082v37n01\_08
- \*Lovell, M. L., & Richey, C. A. (1995). The effectiveness of social-support



- skill training with multiproblem families at risk for child maltreatment. *Canadian Journal of Community Mental Health*, 14, 29–48.
- Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and the set point model of happiness: Reactions to changes in marital status. *Journal of Personality and Social Psychology*, 84, 527–539. doi:10.1037/0022-3514.84.3.527
- Lüdtke, O., Robitzsch, A., Trautwein, U., & Köller, O. (2007). Umgang mit fehlenden Werten in der psychologischen Forschung. Probleme und Lösungen [Treatment of missing data in psychological research: Problems and solutions]. *Psychologische Rundschau*, 58, 103–117. doi:10.1026/0033-3042.58.2.103
- \*Magdol, L. (2000). The people you know: The impact of residential mobility on mothers' social network ties. *Journal of Social and Personal Relationships*, 17, 183–204. doi:10.1177/0265407500172002
- Marsden, P. V. (1987). Core discussion networks of Americans. *American Sociological Review*, 52, 122–131. doi:10.2307/2095397
- \*McGuire, G. M. (2000). Gender, race, ethnicity, and networks: The factors affecting the status of employees' network members. *Work and Occupations*, 27, 500–523. doi:10.1177/0730888400027004004
- \*McLaughlin, D., Adams, J., Vagenas, D., & Dobson, A. (2011). Factors which enhance or inhibit social support: A mixed-methods analysis of social networks in older women. *Ageing and Society*, 31, 18–33. doi:10.1017/S0144686X10000668
- McPherson, M., Smith-Lovin, L., & Brashears, M. E. (2006). Social isolation in America: Changes in core discussion networks over two decades. *American Sociological Review*, 71, 353–375. doi:10.1177/000312240607100301
- McPherson, M., Smith-Lovin, L., & Brashears, M. E. (2009). Models and marginals: Using survey evidence to study social networks. *American Sociological Review*, 74, 670–681. doi:10.1177/000312240907400409
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415–444. doi:10.1146/annurev.soc.27.1.415
- \*McTavish, S. (2010). *What paves the road to maternal health care use? Investigating education, urban-rural residence, social networks and supernatural beliefs in the far-north province of Cameroon* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 70048)
- \*Mellor, K. S., & Edelman, R. J. (1988). Mobility, social support, loneliness and well-being amongst two groups of older adults. *Personality and Individual Differences*, 9, 1–5. doi:10.1016/0191-8869(88)90024-4
- \*Mendes de Leon, C. F., Glass, T. A., Beckett, L. A., Seeman, T. E., Evans, D. A., & Berkman, L. F. (1999). Social networks and disability transitions across eight intervals of yearly data in the New Haven EPESE. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 54, S162–S172. doi:10.1093/geronb/54B.3.S162
- \*Mendes de Leon, C. F., Gold, D. T., Glass, T. A., Kaplan, L., & George, L. K. (2001). Disability as a function of social networks and support in elderly African Americans and Whites: The Duke EPESE 1986–1992. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 56, S179–S190. doi:10.1093/geronb/56.3.S179
- Mesch, G., & Talmud, I. (2006). The quality of online and offline relationships: The role of multiplexity and duration of social relationships. *Information Society*, 22, 137–148. doi:10.1080/01972240600677805
- \*Milardo, R. M. (1989). Theoretical and methodological issues in the identification of the social networks of spouses. *Journal of Marriage and the Family*, 51, 165–174. doi:10.2307/352377
- \*Milardo, R. M., Johnson, M. P., & Huston, T. L. (1983). Developing close relationships: Changing patterns of interaction between pair members and social networks. *Journal of Personality and Social Psychology*, 44, 964–976. doi:10.1037/0022-3514.44.5.964
- Molenaar, P. C., & Campbell, C. G. (2009). The new person-specific paradigm in psychology. *Current Directions in Psychological Science*, 18, 112–117. doi:10.1111/j.1467-8721.2009.01619.x
- Moore, G. (1990). Structural determinants of men's and women's personal networks. *American Sociological Review*, 55, 726–735. doi:10.2307/2095868
- \*Morgan, D., Carder, P., & Neal, M. (1997). Are some relationships more useful than others? The value of similar others in the networks of recent widows. *Journal of Social and Personal Relationships*, 14, 745–759. doi:10.1177/0265407597146002
- \*Morgan, D. L., Neal, M. B., & Carder, P. C. (1997a). Both what and when: The effects of positive and negative aspects of relationships on depression during the first 3 years of widowhood. *Journal of Clinical Geropsychology*, 3, 73–91.
- \*Morgan, D. L., Neal, M. B., & Carder, P. C. (1997b). The stability of core and peripheral networks over time. *Social Networks*, 19, 9–25. doi:10.1016/S0378-8733(96)00288-2
- Morris, S. B., & DeShon, R. P. (2002). Combining effect size estimates in meta-analysis with repeated measures and independent-groups designs. *Psychological Methods*, 7, 105–125. doi:10.1037/1082-989X.7.1.105
- \*Morrison, E. W. (2002). Newcomers' relationships: The role of social network ties during socialization. *Academy of Management Journal*, 45, 1149–1160. doi:10.2307/3069430
- \*Mrug, S., Borch, C., & Cillessen, A. H. N. (2011). Other-sex friendships in late adolescence: Risky associations for substance use and sexual debut? *Journal of Youth and Adolescence*, 40, 875–888. doi:10.1007/s10964-010-9605-7
- \*Munch, A., McPherson, J. M., & Smith-Lovin, L. (1997). Gender, children, and social contact: The effects of childrearing for men and women. *American Sociological Review*, 62, 509–520. doi:10.2307/2657423
- \*Murphy, S. A., Lohan, J., Dimond, M., & Fan, J. (1998). Network and mutual support for parents bereaved following the violent deaths of their 12- to 28-year-old-children: A longitudinal prospective analysis. *Journal of Personal and Interpersonal Loss*, 3, 303–333. doi:10.1080/10811449808409708
- \*Nauck, B. S., & Suckow, J. (2006). Intergenerational relationships in cross-cultural comparison: How social networks frame intergenerational relations between mothers and grandmothers in Japan, Korea, China, Indonesia, Israel, Germany, and Turkey. *Journal of Family Issues*, 27, 1159–1185. doi:10.1177/0192513X06288125
- \*Nelson, G. (1995). Women's social support networks and social support following marital separation: A controlled prospective study. *Journal of Divorce & Remarriage*, 23, 149–170. doi:10.1300/J087v23n01\_10
- Nesselroade, J. R., & Jones, C. J. (1991). Multi-modal selection effects in the study of adult development: A perspective on multivariate, replicated, single-subject, repeated measures designs. *Experimental Aging Research*, 17, 21–28. doi:10.1080/03610739108253883
- Nesselroade, J. R., Schaie, K. W., & Baltes, P. B. (1972). Ontogenetic and generational components of structural and quantitative change in adult behavior. *Journal of Gerontology*, 27, 222–228. doi:10.1093/geronj/27.2.222
- \*Neyer, F. J. (1999). Die Persönlichkeit junger Erwachsener in verschiedenen Lebensformen [Personality of young adults with different life styles]. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 51, 491–508.
- Neyer, F. J., & Asendorpf, J. B. (2001). Personality-relationship transaction in young adulthood. *Journal of Personality and Social Psychology*, 81, 1190–1204. doi:10.1037/0022-3514.81.6.1190
- Neyer, F. J., & Lang, F. R. (2003). Blood is thicker than water: Kinship orientation across adulthood. *Journal of Personality and Social Psychology*, 84, 310–321. doi:10.1037/0022-3514.84.2.310
- \*Neyer, F. J., & Lang, F. R. (2004). Die Bevorzugung von genetischen Verwandten im Lebenslauf [Preference for genetic kin across the life course]. *Zeitschrift für Sozialpsychologie*, 35, 115–129. doi:10.1024/0044-3514.35.3.115

- \*Neyer, F. J., & Lehnart, J. (2007). Relationships matter in personality development: Evidence from an 8-year longitudinal study across young adulthood. *Journal of Personality, 75*, 535–568. doi:10.1111/j.1467-6494.2007.00448.x
- Neyer, F. J., Wrzus, C., Wagner, J., & Lang, F. R. (2011). Principles of relationship differentiation. *European Psychologist, 16*, 267–277. doi:10.1027/1016-9040/a000055
- \*O'Hara, M. W., Rehm, L. P., & Campbell, S. B. (1983). Postpartum depression: A role for social network and life stress variables. *Journal of Nervous and Mental Disease, 171*, 336–341. doi:10.1097/00005053-198306000-00002
- \*Ojanen, T., Sijtsema, J. J., Hawley, P. H., & Little, T. D. (2010). Intrinsic and extrinsic motivation in early adolescents' friendship development: Friendship selection, influence, and prospective friendship quality. *Journal of Adolescence, 33*, 837–851. doi:10.1016/j.adolescence.2010.08.004
- \*Ortega, D. M. (2002). How much support is too much? Parenting efficacy and social support. *Children and Youth Services Review, 24*, 853–876. doi:10.1016/S0190-7409(02)00239-6
- Overton, R. C. (1998). A comparison of fixed-effects and mixed (random-effects) models for meta-analysis tests of moderator variable effects. *Psychological Methods, 3*, 354–379. doi:10.1037/1082-989X.3.3.354
- Oyserman, D., Coon, H. M., & Kemmelmeier, M. (2002). Rethinking individualism and collectivism: Evaluation of theoretical assumptions and meta-analyses. *Psychological Bulletin, 128*, 3–72. doi:10.1037/0033-2909.128.1.3
- \*Pagel, M. D., Erdly, W. W., & Becker, J. (1987). Social networks: We get by with (and in spite of) a little help from our friends. *Journal of Personality and Social Psychology, 53*, 793–804. doi:10.1037/0022-3514.53.4.793
- \*Palinkas, L. A., Wingard, D. L., & Barrett-Connor, E. (1990). The biocultural context of social networks and depression among the elderly. *Social Science & Medicine, 30*, 441–447. doi:10.1016/0277-9536(90)90346-T
- Parsons, T. (1955). The American family. In T. Parsons & R. Bales (Eds.), *Family: Socialization and interaction process* (pp. 3–33). Glencoe, IL: Free Press.
- \*Paul, E. L., & Brier, S. (2001). Friendsickness in the transition to college: Precollege predictors and college adjustment correlates. *Journal of Counseling & Development, 79*, 77–89. doi:10.1002/j.1556-6676.2001.tb01946.x
- \*Penninx, B. W. J. H., van Tilburg, T., Kriegsman, D. M. W., Boeke, A. J. P., Deeg, D. J. H., & van Eijk, J. Th. M. (1999). Social network, social support, and loneliness in older persons with different chronic diseases. *Journal of Aging and Health, 11*, 151–168. doi:10.1177/089826439901100202
- \*Perl, H. I. (1988). Personal and environmental resources in the transition from middle school to high school: The impact of adolescents' social networks and social exploration preference on adaptation. *Dissertation Abstracts International: Section B. Sciences and Engineering, 48*(8), 2500.
- \*Phillips, A. C., Carroll, D., Ring, C., Sweeting, H., & West, P. (2005). Life events and acute cardiovascular reactions to mental stress: A cohort study. *Psychosomatic Medicine, 67*, 384–392. doi:10.1097/01.psy.0000160464.63264.5d
- Phillipson, C. (1997). Social relationships in later life: A review of the research literature. *International Journal of Geriatric Psychiatry, 12*, 505–512. doi:10.1002/(SICI)1099-1166(199705)12:5<505::AID-GPS577>3.0.CO;2-Q
- \*Pillay, U., & Rao, K. (2002). The structure and function of social support in relation to help-seeking behavior. *Family Therapy, 29*, 153–167.
- Pinquart, M., & Sörensen, S. (2000). Influences of socioeconomic status, social network, and competence on subjective well-being in later life: A meta-analysis. *Psychology and Aging, 15*, 187–224. doi:10.1037/0882-7974.15.2.187
- \*Pollet, T. V., Roberts, S. G. B., & Dunbar, R. I. M. (2011). Use of social network sites and instant messaging does not lead to increased offline social network size, or to emotionally closer relationships with offline network members. *CyberPsychology, Behavior, and Social Networking, 14*, 253–258. doi:10.1089/cyber.2010.0161
- \*Poulin, F., & Pedersen, S. (2007). Developmental changes in gender composition of friendship networks in adolescent girls and boys. *Developmental Psychology, 43*, 1484–1496. doi:10.1037/0012-1649.43.6.1484
- Power, T. G., & Parke, R. D. (1984). Social network factors and the transition to parenthood. *Sex Roles, 10*, 949–972. doi:10.1007/BF00288517
- \*Powers, B. A. (1992). The roles staff play in the social networks of elderly institutionalized people. *Social Science & Medicine, 34*, 1335–1343. doi:10.1016/0277-9536(92)90142-D
- \*Priel, B., & Besser, A. (2002). Perceptions of early relationships during the transition to motherhood: The mediating role of social support. *Infant Mental Health Journal, 23*, 343–360. doi:10.1002/imhj.10021
- \*Prota, L., & Beresford, M. (2012). Emerging class relations in the Mekong river delta of Vietnam: A network analysis. *Journal of Agrarian Change, 12*, 60–80. doi:10.1111/j.1471-0366.2011.00334.x
- \*Ramírez Ortiz, M. G., Caballero Hoyos, J. R., & Ramírez López, M. G. (2004). The social networks of academic performance in a student context of poverty in Mexico. *Social Networks, 26*, 175–188. doi:10.1016/j.socnet.2004.01.010
- Rands, M., & Milardo, R. M. (1988). Changes in social networks following marital separation and divorce. In R. M. Milardo (Ed.), *Families and social networks* (pp. 127–146). Thousand Oaks, CA: Sage.
- \*Reich, W. A., Silbert-Mazzarella, B. A., Spence, J. A., & Siegel, H. I. (2005). Self-structure and postpartum dejection in first-time mothers. *Journal of Psychology: Interdisciplinary and Applied, 139*, 426–438. doi:10.3200/JRLP.139.5.426-438
- \*Reisenzein, E., Baumann, U., & Reisenzein, R. (1993). Unterschiedliche Zugänge zum Sozialen Netzwerk [Different approaches to social networks]. In A. Laireiter (Ed.), *Soziales Netzwerk und soziale Unterstützung: Konzepte, Methoden und Befunde* (pp. 67–77). Bern, Germany: Huber.
- \*Rhee, M. (2007). The time relevance of social capital. *Rationality and Society, 19*, 367–389. doi:10.1177/1043463107080451
- Roberts, B. W., & DeVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin, 126*, 3–25. doi:10.1037/0033-2909.126.1.3
- \*Roberts, S. G. B., & Dunbar, R. I. M. (2011). The costs of family and friends: An 18-month longitudinal study of relationship maintenance and decay. *Evolution and Human Behavior, 32*, 186–197. doi:10.1016/j.evolhumbehav.2010.08.005
- \*Roberts, W. L. (1989). Parents' stressful life events and social networks: Relations with parenting and children's competence. *Canadian Journal of Behavioural Science, 21*, 132–146.
- Robins, R. W., & Trzesniewski, K. H. (2005). Self-esteem development across the lifespan. *Current Directions in Psychological Science, 14*, 158–162. doi:10.1111/j.0963-7214.2005.00353.x
- \*Rook, K. S. (2003). Exposure and reactivity to negative social exchanges: A preliminary investigation using daily diary data. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences, 58*, P100–P111. doi:10.1093/geronb/58.2.P100
- Rosenthal, R. (1991). *Meta-analytic procedures for social research*. Thousand Oaks, CA: Sage.
- \*Ross, L. E., Villegas, L., Dennis, C.-L., Bourgeault, I. L., Cairney, J., Grigoriadis, S., . . . Yudin, M. H. (2011). Rural residence and risk for perinatal depression: A Canadian pilot study. *Archives of Women's Mental Health, 14*, 175–185. doi:10.1007/s00737-011-0208-4
- \*Samulesson, M. A. K. (1997). Social networks of children in single-parent

- families: Differences according to sex, age, socioeconomic status and housing-type and their associations with behavioural disturbances. *Social Networks*, 19, 113–127. doi:10.1016/S0378-8733(95)00284-7
- \*Schaffer, M. H. (2011). Health and network centrality in a continuing care retirement community. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 66, 795–803. doi:10.1093/geronb/gbr112
- \*Schleicher, H., Alonso, C., Shirtcliff, E. A., Muller, D., Loevinger, B. L., & Coe, C. L. (2005). In the face of pain: The relationship between psychological well-being and disability in women with fibromyalgia. *Psychotherapy and Psychosomatics*, 74, 231–239. doi:10.1159/000085147
- \*Schweizer, T., Schnegg, M., & Berzborn, S. (1998). Personal networks and social support in a multiethnic community of southern California. *Social Networks*, 20, 1–21. doi:10.1016/S0378-8733(96)00304-8
- \*Seeds, P. M., Harkness, K. L., & Quilty, L. C. (2010). Parental maltreatment, bullying, and adolescent depression: Evidence for the mediating role of perceived social support. *Journal of Clinical Child and Adolescent Psychology*, 39, 681–692. doi:10.1080/15374416.2010.501289
- \*Segerstrom, S. C. (2007). Optimism and resources: Effects on each other and on health over 10 years. *Journal of Research in Personality*, 41, 772–786. doi:10.1016/j.jrp.2006.09.004
- \*Shaver, P., Furman, W., & Buhrmester, D. (1985). Transition to college: Network changes, social skills, and loneliness. In S. Duck & D. Perlman (Eds.), *Understanding personal relationships: An interdisciplinary approach* (pp. 193–219). Thousand Oaks, CA: Sage.
- Sherif, M. (1966). In *common predicament: Social psychology of intergroup conflict and cooperation*. Boston, MA: Houghton Mifflin.
- \*Shulman, N. (1975). Life-cycle variations in patterns of close relationships. *Journal of Marriage and the Family*, 37, 813–821. doi:10.2307/350834
- \*Sollie, D. L., & Fischer, J. L. (1988). Career entry influences on social networks of young adults: A longitudinal study. *Journal of Social Behavior & Personality*, 3, 205–225.
- \*South, S. J., & Haynie, D. L. (2004). Friendship networks of mobile adolescents. *Social Forces*, 83, 315–350. doi:10.1353/sof.2004.0128
- Sprecher, S., & Felmlee, D. (2000). Romantic partners' perceptions of social network attributes with the passage of time and relationship transitions. *Personal Relationships*, 7, 325–340. doi:10.1111/j.1475-6811.2000.tb00020.x
- Sprecher, S., Felmlee, D., Schmeekle, M., & Shu, X. (2006). No breakup occurs on an island: Social networks and relationship dissolution. In M. A. Fine & J. H. Harvey (Eds.), *Handbook of divorce and relationship dissolution* (pp. 457–478). Mahwah, NJ: Erlbaum.
- \*Stacey-Konnert, C., & Pynoos, J. (1992). Friendship and social networks in a continuing care retirement community. *Journal of Applied Gerontology*, 11, 298–313. doi:10.1177/073346489201100304
- \*Stackman, R. W., & Pinder, C. C. (1999). Context and sex effects on personal work networks. *Journal of Social and Personal Relationships*, 16, 39–64. doi:10.1177/0265407599161003
- \*Stansfeld, S. A., Fuhrer, R., & Shipley, M. J. (1998). Types of social support as predictors of psychiatric morbidity in a cohort of British civil servants (Whitehall II study). *Psychological Medicine*, 28, 881–892. doi:10.1017/S0033291798006746
- \*Stansfeld, S., & Marmot, M. (1992). Deriving a survey measure of social support: The reliability and validity of the Close Persons Questionnaire. *Social Science & Medicine*, 35, 1027–1035. doi:10.1016/0277-9536(92)90242-I
- \*Starker, J. E. (1990). Psychosocial aspects of geographic relocation: The development of a new social network. *American Journal of Health Promotion*, 5, 52–57. doi:10.4278/0890-1171-5.1.52
- \*Steinhausen, H.-C., & Metzke, C. W. (2001). Risk, compensatory, vulnerability, and protective factors influencing mental health in adolescence. *Journal of Youth and Adolescence*, 30, 259–280. doi:10.1023/A:1010471210790
- \*Stenfort Kroese, B., Hussein, H., Clifford, C., & Ahmed, N. (2002). Social support networks and psychological well-being of mothers with intellectual disabilities. *Journal of Applied Research in Intellectual Disabilities*, 15, 324–340. doi:10.1046/j.1468-3148.2002.00128.x
- Sterne, J. A. C., Egger, M., & Smith, G. D. (2001). Systematic reviews in health care: Investigating and dealing with publication and other biases in meta-analysis. *British Medical Journal*, 323, 101–105. doi:10.1136/bmj.323.7304.101
- Sterne, J. A. C., Gavaghan, D., & Egger, M. (2000). Publication and related bias in meta-analysis: Power of statistical tests and prevalence in the literature. *Journal of Clinical Epidemiology*, 53, 1119–1129. doi:10.1016/S0895-4356(00)00242-0
- \*Stevens, N., & Westerhof, G. J. (2006). Partners and others: Social provisions and loneliness among married Dutch men and women in the second half of life. *Journal of Social and Personal Relationships*, 23, 921–941. doi:10.1177/0265407506070474
- \*Stewart, M., Craig, D., MacPherson, K., & Alexander, S. (2001). Promoting positive affect and diminishing loneliness of widowed seniors through a support intervention. *Public Health Nursing*, 18, 54–63. doi:10.1046/j.1525-1446.2001.00054.x
- \*Stokes, J. P. (1983). Predicting satisfaction with social support from social network structure. *American Journal of Community Psychology*, 11, 141–152. doi:10.1007/BF00894363
- \*Storm, C. L., Sheehan, R., & Sprenkle, D. H. (1983). The structure of separated women's communication with their nonprofessional and professional social networks. *Journal of Marital & Family Therapy*, 9, 423–429. doi:10.1111/j.1752-0606.1983.tb01531.x
- \*Straits, B. C. (1996). Ego-net diversity: Same- and cross-sex coworker ties. *Social Networks*, 18, 29–45. doi:10.1016/0378-8733(95)00254-5
- \*Straits, B. C. (2000). Ego's important discussants or significant people: An experiment in varying the wording of personal network name generators. *Social Networks*, 22, 123–140. doi:10.1016/S0378-8733(00)00018-6
- Sudman, S. (1985). Experiments in the measurement of the size of social networks. *Social Networks*, 7, 127–151. doi:10.1016/0378-8733(85)90002-4
- \*Suitor, J. J. (1987). Friendship networks in transitions: Married mothers return to school. *Journal of Social and Personal Relationships*, 4, 445–461. doi:10.1177/0265407587044004
- \*Suitor, J., & Keeton, S. (1997). Once a friend, always a friend? Effects of homophily on women's support networks across a decade. *Social Networks*, 19, 51–62. doi:10.1016/S0378-8733(96)00290-0
- \*Suitor, J. J., & Pillemer, K. (1996). Sources of support and interpersonal stress in the networks of married caregiving daughters: Findings from a 2-year longitudinal study. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences*, 51, S297–S306. doi:10.1093/geronb/51B.6.S297
- \*Suitor, J. J., & Pillemer, K. (2000). When experience counts most: Effects of experiential similarity on men's and women's receipt of support during bereavement. *Social Networks*, 22, 299–312. doi:10.1016/S0378-8733(00)00028-9
- \*Suitor, J. J., Pillemer, K., & Keeton, S. (1995). When experience counts: The effects of experiential and structural similarity on patterns of support and interpersonal stress. *Social Forces*, 73, 1573–1588. doi:10.1093/sf/73.4.1573
- Suitor, J. J., Wellman, B., & Morgan, D. L. (1997). It's about time: How, why, and when networks change. *Social Networks*, 19, 1–7. doi:10.1016/S0378-8733(96)00287-0
- Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology*, 1, 149–178. doi:10.1002/ejsp.2420010202
- \*Tanaka, T., Takai, J., Kohyama, T., Fujihara, T., & Minami, H. (1997). Effects of social networks on cross-cultural adjustment. *Japanese Psychological Research*, 39, 12–24. doi:10.1111/1468-5884.00032

- \*Terhell, E. L., Broese van Groenou, M. I., & van Tilburg, T. (2004). Network dynamics in the long-term period after divorce. *Journal of Social and Personal Relationships, 21*, 719–738. doi:10.1177/0265407504047833
- \*Terhell, E. L., Broese van Groenou, M. I., & van Tilburg, T. (2007). Network contact changes in early and later postseparation years. *Social Networks, 29*, 11–24. doi:10.1016/j.socnet.2005.11.006
- Thibaut, J. W., & Kelley, H. H. (1959). *The social psychology of groups*. New York, NY: Wiley.
- \*Thomé, F., van Tilburg, T., & Knipscheer, K. C. (2003). Continuation of exchange with neighbors in later life: The importance of the neighborhood context. *Personal Relationships, 10*, 535–550. doi:10.1046/j.1475-6811.2003.00064.x
- \*Tracy, E. M. (1990). Identifying social support resources of at-risk families. *Social Work, 35*, 252–258.
- Triandis, H. C. (1993). Collectivism and individualism as cultural syndromes. *Cross-Cultural Research, 27*, 155–180. doi:10.1177/106939719302700301
- Triandis, H. C. (1995). *Individualism and collectivism*. Boulder, CO: Westview Press.
- Triandis, H. C., Bontempo, R., Villareal, M. J., Asai, M., & Lucca, N. (1988). Individualism and collectivism: Cross-cultural perspectives on self-in-group relationships. *Journal of Personality and Social Psychology, 54*, 323–338. doi:10.1037/0022-3514.54.2.323
- \*Troop-Gordon, W., & Kopp, J. (2011). Teacher–child relationship quality and children’s peer victimization and aggressive behavior in late childhood. *Social Development, 20*, 536–561. doi:10.1111/j.1467-9507.2011.00604.x
- Ueno, K., & Adams, R. G. (2006). Adult friendship: A decade review. In P. Noller & J. A. Feeney (Eds.), *Close relationships: Functions, forms and processes* (pp. 151–169). New York, NY: Psychology Press.
- \*Uhlenberg, P., & de Jong Gierveld, J. (2004). Age-segregation in later life: An examination of personal networks. *Ageing and Society, 24*, 5–28. doi:10.1017/S0144686X0300151X
- \*Uhlendorff, H. (2004). After the Wall: Parental attitudes to child rearing in East and West Germany. *International Journal of Behavioral Development, 28*, 71–82. doi:10.1080/01650250344000280
- \*van Aken, M. A. G., & Asendorpf, J. B. (1997). Support by parents, classmates, friends and siblings in preadolescence: Covariation and compensation across relationships. *Journal of Social and Personal Relationships, 14*, 79–93. doi:10.1177/0265407597141004
- \*van Aken, M. A. G., Asendorpf, J. B., & Wilpers, S. (1996). Children’s social support network: Structural features, level of support and conflict, and relations with self-worth. *Psychologie in Erziehung und Unterricht, 43*, 114–126.
- van der Poel, M. G. M. (1993). Delineating personal support networks. *Social Networks, 15*, 49–70. doi:10.1016/0378-8733(93)90021-C
- \*Vandervoort, D. J. (1999). Quality of social support in mental and physical health. *Current Psychology, 18*, 205–222. doi:10.1007/s12144-999-1029-8
- \*Vandervoort, D. J., & Skorikov, V. B. (2002). Physical health and social network characteristics as determinants of mental health across cultures. *Current Psychology, 21*, 50–67. doi:10.1007/BF02903159
- \*van Tilburg, T. (1992). Support networks before and after retirement. *Journal of Social and Personal Relationships, 9*, 433–445. doi:10.1177/0265407592093006
- \*van Tilburg, T. (1998). Losing and gaining in old age: Changes in personal network size and social support in a four-year longitudinal study. *Journals of Gerontology: Series B. Psychological Sciences and Social Sciences, 53*, S313–S323. doi:10.1093/geronb/53B.6.S313
- \*van Tilburg, T., & Broese van Groenou, M. I. (2002). Network and health changes among older Dutch adults. *Journal of Social Issues, 58*, 697–713. doi:10.1111/1540-4560.00041
- \*van Tilburg, T., de Jong Gierveld, J., Lecchini, L., & Marsiglia, D. (1998). Social integration and loneliness: A comparative study among older adults in the Netherlands and Tuscany, Italy. *Journal of Social and Personal Relationships, 15*, 740–754. doi:10.1177/0265407598156002
- \*van Tilburg, T., van Sonderen, E., & Ormel, J. (1991). The measurement of reciprocity in ego-centered networks of personal relationships: A comparison of various indices. *Social Psychology Quarterly, 54*, 54–66. doi:10.2307/2786788
- \*van Willigen, J., Chadha, N. K., & Kedia, S. (1995). Personal networks and sacred texts: Social aging in Delhi, India. *Journal of Cross-Cultural Gerontology, 10*, 175–198. doi:10.1007/BF00972239
- \*Veiel, H. O. F., Crisand, M., Strokzeck-Somschor, H., & Herrie, J. (1991). Social support networks of chronically strained couples: Similarity and overlap. *Journal of Social and Personal Relationships, 8*, 279–292. doi:10.1177/0265407591082007
- \*Vittengl, J. R. (2002). Social integration as a function of characteristic social pleasure and distress. *Dissertation Abstracts International: Section B. Sciences and Engineering, 62*(12), 5983.
- \*Völker, B., & Flap, H. (1995). The effects of institutional transformation on personal networks. East Germany, four years later. *Netherlands Journal of Social Sciences, 31*, 87–107.
- Wang, H., & Wellman, B. (2010). Social connectivity in America: Changes in adult friendship network size from 2002 to 2007. *American Behavioral Scientist, 53*, 1148–1169. doi:10.1177/0002764209356247
- Watson, D., Klohnen, E. C., Casillas, A., Simms, E. N., Haig, J., & Berry, D. S. (2004). Match makers and deal breakers: Analyses of assortative mating in newlywed couples. *Journal of Personality, 72*, 1029–1068. doi:10.1111/j.0022-3506.2004.00289.x
- \*White, A. E., & McLennan, J. P. (1987). Single parents and social support networks: The contribution of “Parents Without Partners.” *Australian Journal of Sex, Marriage & Family, 8*, 164–172.
- \*Widmer, E. D., Kempf-Constantin, N. L., & Carminati, G. G. (2010). Exploring perceptions of family relationships by individuals with intellectual disability and psychiatric disorders. *Families in Society, 91*, 378–384. doi:10.1606/1044-3894.4041
- Wilson, R. E., Gosling, S. D., & Graham, L. T. (in press). A review of Facebook research in the social sciences. *Perspectives on Psychological Science*.
- Wrzus, C., Wagner, J., & Neyer, F. J. (2011). The interdependence of horizontal family relationships and friendships relates to higher well-being. *Personal Relationships*. Advance online publication. doi:10.1111/j.1475-6811.2011.01373.x
- \*Wutich, A., & McCarty, C. (2008). Social networks and infant feeding in Oaxaca, Mexico. *Maternal & Child Nutrition, 4*, 121–135. doi:10.1111/j.1740-8709.2007.00122.x
- \*Yamamoto, T., Sawada, H., Minami, H., & Ishii, S. (1992). Transition from the university to the workplace. *Environment and Behavior, 24*, 189–205. doi:10.1177/0013916592242003
- Yeung, D. Y., Fung, H. H., & Lang, F. R. (2008). Self-construal moderates age differences in social network characteristics. *Psychology and Aging, 23*, 222–226. doi:10.1037/0882-7974.23.1.222
- \*Zautra, A. J., Finch, J. F., Reich, J. W., & Guamaccia, C. A. (1991). Predicting the everyday life events of older adults. *Journal of Personality, 59*, 507–538. doi:10.1111/j.1467-6494.1991.tb00258.x
- Zettl, L. A., & Rook, K. S. (2004). Substitution and compensation in the social networks of older widowed women. *Psychology and Aging, 19*, 433–443. doi:10.1037/0882-7974.19.3.433

Received February 15, 2011

Revision received March 19, 2012

Accepted March 26, 2012 ■