

Research Article

The Strength of Weaker Ties: An Underexplored Resource for Maintaining Emotional Well-Being in Later Life

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Abstract

Objectives: The purpose of this study was to examine dynamic links between changes in social ties and changes in emotional well-being.

Method: Trivariate dual-change score models were used to test whether a large number of close ties would be more strongly associated with low levels of depressed affect than a large number of weaker ties, and a large number of weaker ties would be more strongly associated with high levels of positive affect compared to a large number of close ties, across three waves of a large, regionally representative sample of U.S. adults aged 40 and older ($N = 802$).

Results: We found that a greater number of weaker ties was associated with having more close ties over time, and that the number of weaker ties was more strongly predictive of positive age-related changes in *both* aspects of well-being (i.e., more positive affect and less depressed affect) than the number of close ties.

Discussion: Contrary to popular theoretical orientations in gerontology, weaker ties may offer older adults a more effective avenue for promoting emotional well-being over time than close ties, and may have the additional benefit of compensating for losses in the number of close ties.

Keywords: Longitudinal change, Social networks, Socioemotional selectivity, Well-being

Social networks commonly consist of hierarchical layers of relationships, ranging from emotionally close ties (e.g., spouses/partners, children) to weaker ties that are emotionally less close, but still considered important for an individual's overall well-being (e.g., acquaintances or fellow club members) (Sutcliffe, Dunbar, Binder, & Arrow, 2012; Weiss, 1974). Over 30 years ago, Mark Granovetter argued that “weak ties” are “vital for an individual's integration into modern society” (1983, p. 203). Similarly, Fingerman (2009) has claimed that “peripheral ties” require less time and effort to sustain and can provide functions that close ties often do not (e.g., novelty, facilitating

access to information resources). Despite the noted benefits of weaker ties, peripheral networks tend to shrink disproportionately compared to emotionally close networks as adults age (e.g., Lang, 2000). At the same time, at least up until the “fourth age” (85+) (Baltes & Smith, 2003), older adults report equal if not more positive affect and less negative affect than do younger adults (Carstensen, Fung, & Charles, 2003). Popular theories of social development across the life span (i.e., Carstensen, 1992; Charles, 2010) have linked these two phenomena, speculating that a focus on close emotional ties is beneficial for well-being later in life. However, the empirical evidence is limited.

Moreover, historical decreases in the availability of close family ties (due in part to decreasing fertility rates and increasing geographical mobility; Cherlin, 2010), along with historical increases in the importance placed on non-kin ties (Huxhold, 2019), highlight the practical relevance of understanding the role of weaker ties in later life. This renewed focus is reflected in a number of recent studies addressing this topic in the gerontological literature (Cornwell, Schumm, Laumann, Kim, & Kim, 2014; Fingerman, Huo, Charles, & Umberson, 2019). However, the longitudinal association between different types of ties and changes in well-being is still not well-understood. In the present study, we simultaneously model the differential longitudinal effects over 23 years of *both* close and weaker ties on changes in emotional well-being in a large sample of older adults.

Changes in Social Networks and Emotional Well-Being in Late Life

Social networks tend to shrink in size as adults age (Wrzus, Hänel, Wagner, & Neyer, 2013). This often results in older adults' social networks being comprised of a greater proportion of emotionally close network members (Lang, 2001). For example, English and Carstensen (2014) found that adults tend to lose peripheral (i.e., less emotionally close) network members but not close network members as they age. In a meta-analysis examining changes in network size over the life span, Wrzus and colleagues (2013) found that whereas the size of family networks tends to remain stable across the life span, the overall size of the social network tends to shrink in late adulthood.

In addition, older adults typically report higher levels of satisfaction with their social partners than do younger adults (Birditt & Antonucci, 2007; Luong, Charles, & Fingerman, 2011), and, at least cross-sectionally, older adults' network members tend to elicit less negative and more positive emotion (English & Carstensen, 2014). At the same time, cross-sectional studies indicate that older adults report equal if not more positive and less negative affect than do younger adults (Carstensen et al., 2003). There is also longitudinal evidence of increases in positive affect and decreases in negative affect across older adulthood, at least when controlling for health (Kunzmann, Little, & Smith, 2000).

Theoretical Links Between Social Network Changes and Emotional Well-Being

Socioemotional selectivity theory (SST; Carstensen, 1992) posits that with advancing age, the remaining time left to live feels increasingly limited, and this shift in perception influences how we choose to spend that time. Because their future feels expansive, younger adults prioritize creating new connections, whereas older adults prioritize spending time with people who know and treat them well. Consequently,

older adults are presumably discontinuing relationships with network members with whom they feel less connected. The underlying assumption is that this "culling" is linked to the maintenance of well-being. For example, in his 2001 paper, Lang suggests that "the regulation of social relationships may also be of particular relevance for strong subjective well-being in later adulthood" (P323).

The Strength and Vulnerability Integration model (SAVI; Charles, 2010) extends SST by positing that age-related changes in future time perspective are driven by greater reliance on and successful use of particular emotion regulation strategies (Charles, 2010). For example, by choosing to spend time with emotionally meaningful social partners rather than with new or less familiar social partners, older adults are thought to be avoiding potentially negative emotions (i.e., "antecedent emotion regulation;" Carstensen et al., 2003). The increased and more efficient use of these strategies is assumed to at least partially explain the higher overall levels of emotional well-being observed among older adults compared to middle-aged or younger adults.

Are Social Network Changes Empirically Linked to Changes in Emotional Well-Being?

There are several reasons to question the assumption that maintaining close ties at the expense of weaker ties will be positively and causally linked to maintaining high levels of emotional well-being. First, to date, empirical evidence establishing this link is surprisingly sparse. There are only a handful of cross-sectional studies showing positive associations between the proportion of emotionally close social partners and social measures of well-being (e.g., Lang & Carstensen, 1994; Lang, Staudinger, & Carstensen, 1998). Furthermore, longitudinal research indicates that reductions in overall network size (i.e., the sum of close and weaker ties) are linked to *worse* well-being (Böger & Huxhold, 2018; Huxhold, Fiori, & Windsor, 2013; Shankar, Rafnsson, & Steptoe, 2015).

Second, if there is a positive link between a higher proportion of close social ties and emotional well-being as postulated by SST and SAVI, then empirical evidence should indicate that close ties engender mostly positivity whereas weaker ties engender mostly negativity. However, older adults seem to maximize positivity and minimize conflict not just in their closest social relationships, but also in their less close relationships. For example, in their study of a small sample of adults ranging in age from 18 to 94, English and Carstensen (2014) found that older, compared to younger, adults, reported less negativity not only in their closest relationships, but also in their less close (i.e., more peripheral) relationships. In fact, older adults in the sample reported greater positivity in all of their relationships *except* their closest ones. As Rook and Charles (2017) point out, most of the interpersonal conflicts that older adults report are with close social ties. Thus, the assumption that smaller networks comprised of selected social partners is less likely

to result in negative social situations seems unfounded. It may be that close ties are simply more resilient, such that our closest family and friends remain close in spite of being “difficult,” whereas our weaker ties are more susceptible to being ended due to negative interactions or violations of trust (Sutcliffe, Dunbar, Binder, & Arrow, 2012).

Finally, the assumption in question also ignores the large literature on ambivalence, which can be defined as the simultaneous presence of both positive and negative feelings in a relationship (Pillemer et al., 2007), or feeling that a social tie is both close and problematic (Fingerman, Hay, & Birditt, 2004). Research indicates that feeling closer to a social partner is associated with increased ambivalence (Fingerman et al., 2004). Importantly, ambivalence has been linked to poor psychological health (e.g., Rook, Luong, Sorkin, Newsom, & Krause, 2012). It could be that because weaker ties are actually less likely to be ambivalent, they may offer older adults an avenue to well-being, specifically through promotion of positive affect.

Alternative Theoretical Explanations

There are several alternative theories to explain how the proportion of close versus weaker ties in social networks affects emotional well-being. Antonucci and colleagues (e.g., Antonucci, Ajrouch, & Birditt, 2014) conceptualize social networks as “convoys” consisting of ties of varying levels of emotional closeness that are shaped throughout the life span not only by personal choices, but also by life events (e.g., retirement can provide more free time to invest in close, nonwork relationships like family; Antonucci, Fiori, Birditt, & Jackey, 2010). It is argued that convoys influence well-being through the support that the convoy (i.e., network) members provide. Similarly, Dunbar and colleagues (Dunbar, Korstjens, & Lehmann, 2009; Sutcliffe et al., 2012) have observed that social networks appear to have both inner and outer layers, and people tend to spend more time with fewer people in the inner layers, and less time with more people in the outer layers (termed the “equal investment strategy”). Sutcliffe and colleagues (2012) argue that individuals maintain these different layers to benefit from different types of social resources, and that they are all necessary for optimizing well-being. Relatedly, functional specificity theory (Weiss, 1974) posits that different social ties serve different functions that are all essential for well-being.

Following the arguments put forward by Sutcliffe and colleagues (2012) and Weiss (1974), we assume that ties varying in closeness provide different functions that, in turn, have different associations with positive and negative affectivity. For example, close ties are considered a primary source of enacted support, which is thought to buffer against stress (Cohen & Wills, 1985). It follows that this stress-buffering process would reduce negative affect; thus, we hypothesize in the present study that a greater number of close ties will be associated with reductions in negative affect.

With respect to weaker ties, Lakey and colleagues (Lakey, Vander Molen, Fles, & Andrews, 2016) posit in their relational regulation theory (RRT) that the links between perceived social support and mental health lie primarily in ordinary social interactions, and that stress-buffering is not necessarily required to benefit from perceived social support. Ordinary social interactions may be particularly likely to occur with weaker, more peripheral ties. For example, Lakey and colleagues (2016) found positive links between perceived support and positive affect (but not negative affect) among strangers after brief text conversations. Similarly in a recent study using ecological momentary assessments, Fingerman, Huo, Charles, and Umberson (2019) found that interactions with weak ties, but not close ties, were associated with greater physical activity, and that physical activity (along with subsequent social activities) were associated with more positive mood throughout the course of a day. Thus, given the prior theoretical arguments and recent empirical evidence, we postulate that weaker ties will have a greater positive impact on positive affect than close ties.

The Present Study

Grounded in the theoretical framework of the Convoy Model, we utilize the hierarchical mapping technique (Antonucci, 1986) to differentiate between emotionally close ties and weaker ties. Specifically, the purpose of the present study is to examine the links between both close and weaker ties and changes in emotional well-being across three waves in a large sample of adults aged 40 and older. Because the current data set did not include the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), we operationalized positive and negative affect using two subscales from the Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977): positive affect and depressed affect. Of course, depressed affect represents only a subset of “negative” affect (that might also include stress, anxiety, anger, etc.). As such, we refer to “positive” and “depressed” affect when reporting study findings, though our theoretical framework is much broader and encompasses negative affect more generally. We hypothesize that maintaining a large number of close ties will be more strongly associated with low levels of depressed affect over time than maintaining a large number of weaker ties. In contrast, we expect that maintaining a large number of weaker ties will be more strongly associated with high levels of positive affect over time compared to maintaining a large number of close ties.

Method

Sample

Data for this study were drawn from the longitudinal Social Relations Study (Antonucci, Ajrouch, & Manalel, 2017). The original sample was regionally representative of

the Detroit tri-county metropolitan area and was collected using a two-stage area probability sample design in 1992 (response rate = 72%; $N = 1,703$; ages 18–92). We were not able to determine the optimal sample size a priori, since these data were previously collected.

Wave 1 was assessed via face-to-face interviews. Wave 2 was completed in 2005 via both telephone and face-to-face interviews (response rate = 78%). Wave 3 was completed via telephone interviews in 2015 (response rate = 73%). *T*-tests were performed to estimate potential effects of interview mode by examining mean differences in all variables used in the analyses between participants assessed face-to-face and those interviewed via phone at Wave 2. No significant differences were found, indicating negligible influences of interview mode.

The analytical sample for this study included only respondents aged 40 and older at Wave 1 (1992; mean age = 62.5; age range = 40–92) to limit the investigation to aging-related phenomena. During collection of social network data (details below), respondents were restricted to nominating no more than 20 people in their network. Respondents with network sizes of 20 or more were excluded to prevent deflation in the number of weaker ties ($n = 84$; 9.48%). A total of 802 respondents were included in the final analyses regardless of the number of waves they completed. Of these, 389 respondents provided data on their social network in 2005 (13 years after Wave 1) and 208 provided information again in 2015 (10 years after Wave 2). The attrition bias in all variables amounted to a less than moderate effect size (maximum $d \approx .38$). To reduce selectivity biases in the analyses, the Full Information Maximum Likelihood method (FIML) was used.

Measures

Number of Close and Weaker Ties

The number of close and weaker ties was measured using the hierarchical mapping technique (Antonucci, 1986). Respondents were presented with a set of three concentric circles with a smaller fourth circle in the center in which the word “you” was written. They were told that the outer three circles should be thought of as including “people who are important in your life right now” but who are not equally close. Respondents were then asked to think about “people to whom you feel so close that it is hard to imagine life without them.” Such persons were entered in the innermost circle of the network diagram. The same procedure was followed for the next circle, described as including “people to whom you may not feel quite that close but who are still very important to you,” and for the outer circle, described as including “people whom you haven’t already mentioned but who are close enough and important enough in your life that they should be placed in your personal network.” The number of people placed in the

inner circle created the variable *close ties*. Preliminary analyses showed that the correlations between the middle and outer circle sizes and the outcome variables did not differ. Therefore, to reduce complexity for the dynamic modeling procedure, the middle and outer circle sizes were combined into a single variable indicating the number of *weaker ties*. Both measures of network sizes were then transformed to *T*-scores.

Emotional Well-Being

Emotional well-being was represented as levels of *positive affect* and *depressed affect* from two subscales of the CES-D (Radloff, 1977). Based on a confirmatory factor analysis, the factor *positive affect* consisted of four items: In the last week... (a) “I felt that I was as good as other people”, (b) “I felt hopeful about the future”, (c) “I was happy”, and (d) “I enjoyed life,” all measured on a 4-point scale (0 = *rarely/none of the time* to 3 = *most/all of the time*). *Depressed affect* was also represented with four items: In the last week... (a) “I could not shake off the blues”, (b) “I felt depressed”, (c) “I had crying spells”, and (d) “I felt sad.”

Covariates

Network size and emotional well-being have been shown to be related to sex, education, and health (e.g., Huxhold et al., 2013). Therefore, we included these as covariates in the analyses. *Sex* was included as a dummy variable (0 = *male*, 1 = *female*). *Education* was entered as continuous variable assessing the number of years of education completed (range from 0 to 17 or more). Health was measured at each wave with two variables: (a) *self-rated health* measured on a 5-point scale (1 = *poor* to 5 = *excellent*), and (b) number of chronic illnesses measured as the sum of 11 possible chronic conditions: stomach problems (e.g., intestinal trouble or ulcers), respiratory disease (e.g., asthma, bronchitis), high blood pressure, stroke, heart trouble, liver problems, diabetes, bone problems, nervous disorder, cancer, or kidney trouble. To control for the impact of life events (i.e., job loss, retirement, divorce and widowhood), we included *work status* (0 = *working*, 1 = *not-working*) and *marital/partner status* (0 = *not married*, 1 = *married/living with partner*) at each wave in the analyses.

Analysis

We first established measurement equivalence across time for positive and depressed affect. To test our hypotheses, we used dual-change score models (DCSM; McArdle, 2009). DCSMs are better suited than latent growth models and fixed effect models to capture long-term dynamic interactions between variables. This is because they are able to simultaneously estimate lead-lag associations between levels and subsequent changes in all variables under

observation. Thus, a particular strength of DCSMs is the ability to account for reverse causation. Here, we adjusted the standard DCSM to account for the unequal time intervals between measurement points (i.e., 10 vs 13 years, respectively) by estimating two auto-regressive parameters (β_1 and β_2) instead of one, and by setting the first factor loading on the linear slope parameter (Slo.) to 1.3 (Figure 1). Changes in the number of close and weaker ties were estimated simultaneously as a bivariate dual-change score model (BDCSM). In the model, dynamic coupling between changes in both types of ties was also tested. In particular, we examined whether or not the number of close ties at a given time point was associated with changes in the number of weaker ties and vice versa (γ pathways in Figure 1). To address the unequal time lag between waves, four separate coupling parameters ($\gamma_{ct1 \rightarrow wt1}$, $\gamma_{ct \rightarrow wt2}$, $\gamma_{wt \rightarrow ct1}$, $\gamma_{wt \rightarrow ct2}$) were estimated. The time invariant covariates (TICov.), age, sex, and education, were linked to the respective intercepts and slopes. To account for the potential confounding influence of health and specific life events, the time-varying covariates (TVCov.), self-rated health, number of chronic illnesses, work status, and marital/partner status, were regressed on the residuals at each wave. The dynamic coupling of the number of close ties and weaker ties with either positive affect or depressed affect was examined with two separate trivariate DCSMs (TDCSM) (not illustrated). In the TDCSMs, positive and depressed affect were included as latent factors. Changes in these factors were also predicted by age, and we controlled for sex, education, self-rated health, number of chronic illnesses, work status, and marital/partner status. The first step in the trivariate analyses was to examine reverse causation by testing the dynamic effects of positive and depressed affect on changes in the number of close and weaker ties.

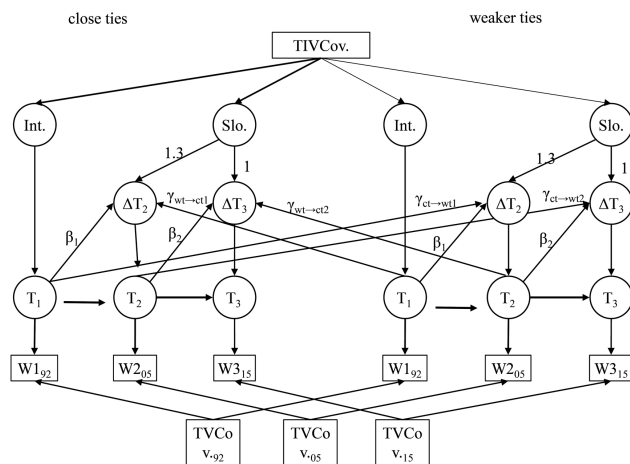


Figure 1. Bivariate Dual-Change Score Model (BDCSM) linking changes in the numbers of close ties (ct) and weaker ties (wt). Note: Int. = intercept; Slo. = slope; W_{92} , W_{05} , W_{15} = Wave 1992; Wave 2005; Wave 2015; TICov. = time invariant covariates (i.e., age, sex and education); TVCov. = time-varying covariates (i.e., self-rated health, number of illnesses, marital/partner status, work status).

Results

Establishing Measurement Invariance

Cheung and Rensvold (2002), among other methodologists, recommend that the testing of measurement equivalence be conducted with goodness-of-fit indices that are independent of sample size as well as model complexity. Following their suggestion, we tested *positive affect* and *depressed affect* for measurement equivalence across time points using differences in model fit as assessed by CFI (Cheung and Rensvold, 2002). Metric invariance (i.e., all factor loading parameters are equal across time points) was established for both facets ($\Delta CFI \leq .01$). Our analytic approach (i.e., dual-change score models) required setting item intercepts to zero. Thus, we did not test for intercept equivalence. We allowed for covariation between the residuals of two items for each facet to obtain acceptable model fit. The final model fit for depressed affect was ($X^2 = 189.53$; $df = 63$; CFI = .94; RMSEA = .051) and for positive affect was ($X^2 = 112.10$; $df = 64$; CFI = .95; RMSEA = .031).

Dynamic Coupling Between Close and Weaker Ties

As shown in Figure 2, we found both slight increases followed by decreases in both close ties and weaker ties over time. On average, however, both the number of close and weaker ties decreased over the 23 year time span, with the number of close ties decreasing less than the number of weaker ties ($\Delta X^2 = 16.07$; $\Delta df = 3$; $p = .001$). Age was as strongly related to the intercept of close ties as to the intercept of weaker ties ($\Delta X^2 = 1.91$; $\Delta df = 1$; $p = .167$), but more strongly associated with the slope of weaker ties than the slope of close ties ($\Delta X^2 = 8.31$; $\Delta df = 1$; $p = .004$). Figure 2 shows that starting around age 70, the decline in the number of weaker ties is markedly more pronounced than the decline in the number of close ties.

The intercepts of both types of ties were significantly negatively related ($\Delta X^2 = 7.89$; $\Delta df = 1$; $p = .004$). Having more close ties at Wave 1 was associated with having fewer weaker ties at Wave 1. The number of close ties (at Waves 1 and 2) was unrelated to change in the number

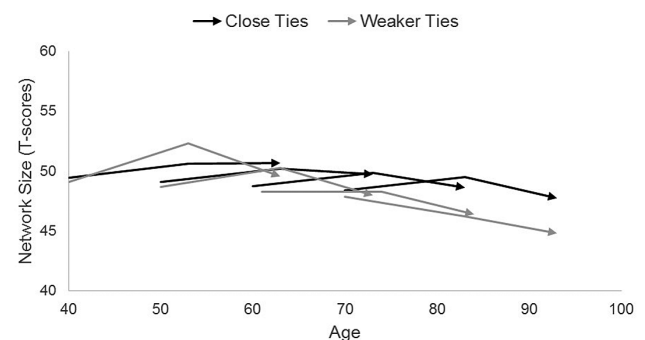


Figure 2. Aging trajectories of numbers of close ties and weaker ties.

of weaker ties, as indicated by the nonsignificance of the dynamic coupling parameters ($\gamma_{ct \rightarrow wt1}$, $\gamma_{ct \rightarrow wt2}$ in Figure 1; $\Delta X^2 = 2.66$; $\Delta df = 2$; $p = .264$). The dynamic coupling parameters linking the number of weaker ties to changes in the number of close ties was significant ($\gamma_{wt \rightarrow ct1}$, $\gamma_{wt \rightarrow ct2}$ in Figure 1; $\Delta X^2 = 6.46$; $\Delta df = 2$; $p = .040$); a greater number of weaker ties (at Waves 1 and 2) was associated with less decline in the number of close ties.

Dynamic Coupling Between Close and Weaker Ties and Depressed Affect

Depressed affect was not related to changes in the numbers of either type of ties ($\Delta X^2 = 0.61$; $\Delta df = 2$; $p = .737$), and freely estimating differential couplings from depressed affect to close ties and weaker ties did not improve model fit ($\Delta X^2 = 2.01$; $\Delta df = 2$; $p = .366$). Thus, there was no indication of reverse causation.

In contrast, the number of close and weaker ties at Waves 1 and 2 were significantly associated with changes in depressed affect when coupling parameters were estimated with the same strength ($\Delta X^2 = 98.26$; $\Delta df = 2$; $p = .000$). That is, having more people in the network (either close or weaker ties) at either Wave 1 or 2 was associated with a reduction in the amount of depressed affect. Furthermore, estimating the coupling parameters freely increased the model fit significantly ($\Delta X^2 = 22.19$; $\Delta df = 2$; $p = .000$). Contrary to our hypothesis, the number of weaker ties at Waves 1 and 2 was more strongly related to maintaining a low level of depressed affect over time than the number of close ties. Figure 3 displays changes in depressed affect for an average individual of 60 years of age conditionally for

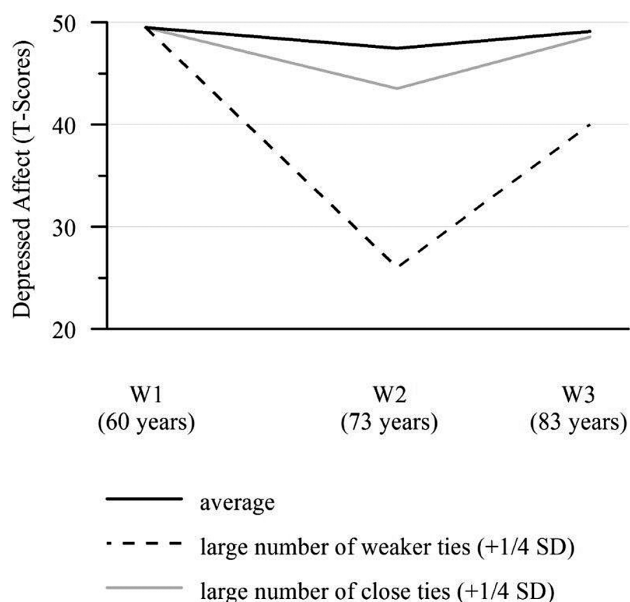


Figure 3. Aging trajectories in depressed affect are differentially influenced by the number of close and weaker ties. Note: A large number of ties is indicated by a starting value of 1/4 SD above the mean.

three different ratios of ties. Given an average number of both close and weaker ties, there is only minimal change in depressed affect over 23 years. An individual with a large number of close ties (1/4 SD above the mean) shows a very similar trajectory. In contrast, an individual with a large number of weaker ties (1/4 SD above the mean) shows a marked reduction in depressed affect over time (Cohen's $d \approx .91$).

Dynamic Coupling Between Close and Weaker Ties and Positive Affect

Positive affect was unrelated to changes in the number of network ties ($\Delta X^2 = 1.38$; $\Delta df = 2$; $p = .501$), and freely estimating differential couplings to close ties and weaker ties did not improve model fit ($\Delta X^2 = .43$; $\Delta df = 2$; $p = .807$). Thus, there was no indication of reverse causation.

Estimated with the same strength, the numbers of close and weaker ties were both significantly associated with changes in positive affect ($\Delta X^2 = 18.72$; $\Delta df = 2$; $p = .000$). Including freely estimated coupling parameters increased the model fit significantly ($\Delta X^2 = 6.07$; $\Delta df = 2$; $p = .048$). Having a greater number of weaker ties at Waves 1 and 2 was more strongly associated with the maintenance of positive affect over time than having a greater number of close ties. As shown in Figure 4, given an average number of both close and weaker ties, there is only marginal decline in positive affect across 23 years. However, consistent with our hypothesis, an individual with a large number of weaker ties (1/4 SD above the mean) shows a large increase in positive affect over time (Cohen's $d \approx 0.72$). In contrast, an individual with a large number of close ties (1/4 SD above

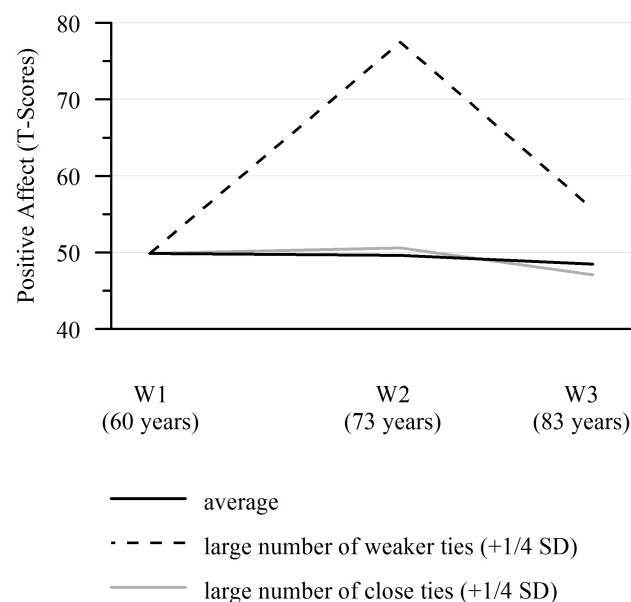


Figure 4. Aging trajectories in positive affect are differentially influenced by the number of close and weaker ties. Note: A large number of ties is indicated by a starting value of 1/4 SD above the mean.

the mean) shows a slight decline in positive affect from 73 to 83 years of age. However, this decline is a consequence of having a smaller number of weaker ties, since as noted previously, the numbers of close and weaker ties are negatively correlated.

Discussion

Using the Convoy Model (Antonucci et al., 2014) as our theoretical framework, we explored the dynamic links between close and weaker ties as well as their associations with positive and depressed affect in a sample of middle-aged and older adults over 23 years. The number of weaker ties declined more rapidly than close ties among older adults, replicating earlier results of a meta-analysis on changes in network size (Wrzus et al., 2013). However, our results diverged from the meta-analytic findings in that declines did not progress linearly from middle adulthood to old age; rather, the declines seemed to begin at approximately age 70. Speculatively, the combination of having a large sample size, the exceptionally long observation period (i.e., 23 years), and the sophisticated method of analysis (i.e., latent changes) might have enabled the detection of this non-linear change pattern.

Relationship Between Close and Weaker Ties

The numbers of close and weaker ties were significantly and negatively associated, which might reflect the “equal investment strategy” suggested by Dunbar and colleagues (Dunbar et al., 2009; Sutcliffe et al., 2012). According to this strategy, people tend to spend more time with fewer people in the inner layers, and less time with more people in the outer layers. The idea is that investing in a particular tie requires time and potentially effort (e.g., Lang, Wagner, Wrzus, & Neyer, 2013), and both of these resources are limited. Thus, investing in close ties may come at the expense of not investing in weaker ties. Furthermore, people likely vary in their social motivations, so that whereas some individuals may prefer to invest heavily in their closest network ties, others may be more interested in spending time with weaker ties. Research categorizing different types of social networks has identified qualitatively distinct types of networks that are consistent with these arguments (Fiori, Smith, & Antonucci, 2007; Miche, Huxhold, & Stevens, 2013).

Perhaps most intriguingly, our results demonstrated that having a greater number of weaker ties at earlier waves was related to better maintenance over time in the number of close ties. As previous research has shown (e.g., Cornwell & Laumann, 2015), even in old age the specific network members considered to be close change over time, at least in part because close social partners may leave the network due to death or functional disabilities. To maintain the number of people who are considered very close to the individual, contacts to weaker ties could be intensified so that those

contacts become closer over time. Consequently, focusing investment on weaker ties may have the unintended benefit of compensating for the loss of close ties. However, future research is needed to identify the special characteristics of ties that change from one layer of closeness to the next and the external circumstances under which those changes occur. In particular, critical life events such as widowhood and retirement could be potential triggers of changes between layers.

Dynamics Between Number of Ties and Facets of Emotional Well-Being

We had predicted that a larger number of close ties would be more strongly linked to decreases in depressed affect than a large number of weaker ties. In contrast, a larger number of weaker ties would be more strongly associated with increases in positive affect compared to a large number of close ties. Our hypotheses were partially supported. Overall, greater numbers of people in the personal network (i.e., close and weaker ties combined) were associated with the maintenance of low levels of depressed affect and high levels of positive affect. This underscores the notion that it is not only the quality of social ties that may be important for well-being in late life, but the quantity as well (Huxhold et al., 2013; Litwin, 2011). More people in the network could indicate a greater amount of social resources—such as social support or stimulation—that are available to handle problems arising with advancing age (e.g., Huxhold et al., 2013).

Contrary to our hypotheses, however, the number of weaker ties was more strongly predictive of positive age-related changes in *both* aspects of well-being (i.e., more positive affect *and* less depressed affect) than the number of close ties. According to our models, a 60-year-old individual with a focus on weaker ties (1/4 *SD* above the mean) would demonstrate approximately one standard deviation less depressed affect and half a standard deviation or more positive affect across 23 years compared to someone focused on close ties. These findings may relate to the fact that most interpersonal conflicts reported by older adults occur with their closest social ties (Sorkin & Rook, 2004), and their closest ties also tend to be imbued with the most ambivalence (Fingerman et al., 2004). In contrast, because weaker ties are actually more likely to be ended due to negative interactions or violations of trust (Sutcliffe et al., 2012), those that remain may offer older adults an avenue for promoting positive affect and decreasing negative affect. Furthermore, the “ordinary social interactions” and joyful activities thought to benefit mental health are most likely to occur with peripheral ties (Fingerman et al., 2019; Lakey et al., 2016). Finally, weaker ties tend to be less closely connected to the other ties in the social network, and therefore are often associated with a higher bridging potential (i.e., the potential to connect the individual to additional social resources) than close ties (e.g., Cornwell, 2011).

The bridging potential associated with weak ties may thus foster a sense of autonomy and access to nonredundant resources, which might be used in times of crisis.

However, one might speculate that some minimum number of close ties must be maintained to fulfill needs for belongingness (Baumeister & Leary, 1995), and perhaps also to act as a secure base (Antonucci et al., 2014) that allows people to invest in weaker ties. Overall, both theoretical (Weiss, 1974) and empirical work (Fiori et al., 2007) indicate that network diversity, for example in terms of closeness, is a key factor for maintaining well-being. Future research could consider how relative proportions of close versus weaker ties, in addition to absolute numbers, may relate to affective well-being. Furthermore, additional research could determine whether our results generalize to other measures of well-being (e.g., life satisfaction, self-esteem) as well as to other measures of affect (e.g., the PANAS; Watson et al., 1988).

Strengths and Limitations

This study examined age-related dynamics in a large sample over an extended observation period of 23 years. Selectivity analyses showed that potential estimation biases were at most in the moderate range. Furthermore, our implementation of the FIML algorithm for the handling of missing data, along with the use of predictor variables related to longitudinal drop-out (e.g., health, age, emotional well-being), mitigated the selection bias (Graham, 2009). It is possible, however, that we might have underestimated the effect of weaker ties to some degree, since individuals were limited to naming up to 20 ties. Thus, to avoid deflation in the number of weaker ties, we excluded those 84 individuals from our analyses who reached this limit. Future studies that include a more extensive mapping of individuals' social networks may be able to discern the effects of weaker ties on the development of well-being in late life more precisely by, for example, differentiating between relationships at medium and outer layers of the emotional closeness spectrum.

Furthermore, the long time-lag between measurements in our data set precluded any in-depth analysis of shorter-term fluctuations in the dynamics investigated in this study. Considering the importance of critical life events for social development across adulthood in general—such as widowhood or illnesses (e.g., Wrzus et al., 2013)—more fine-grained analyses are needed to evaluate the contributions of close ties and weaker ties to a successful adaptation to these events. In addition, these analyses may shed some light on the question of how much of the changes in the social network are driven by deliberate choices, versus how much change is in essence caused by external circumstances.

Another refinement of our study would be to explore whether the results generalize across different socioeconomic strata, different age groups, and other contrasting subpopulations (e.g., males and females). Given known

age differences in the make-up of the social network, age may be a particularly important moderator to consider. Unfortunately, due to model nonconvergence, we were unable to run multigroup TDSCMs to establish whether or not the links between close and weaker ties and emotional well-being differed between middle-aged and older adults. However, comparing separate models for individuals younger than 60 years of age and individuals older than 60 revealed coupling parameters of comparable strength. Therefore, there is some indication that the results we obtained did not mask age differential links.

Conclusions

We predicted that maintaining a large number of close ties would be associated with both lower levels of depressed affect and positive affect over time. In contrast, we found that having a larger number of weaker ties is associated with lower depressed affect and higher positive affect. A focus on weaker ties can help with maintaining the number of close ties over time. Thus, theoretical perspectives focused on the importance of close ties (e.g., Carstensen, 1992) may have overlooked the benefits of weaker ties in late life. Future research should refocus efforts to highlight this important resource.

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Conflict of Interest

None reported.

References

- Antonucci, T. (1986). Hierarchical mapping technique: Measuring social support networks. *Generations*, 10, 10–12.
- Antonucci, T. C., Ajrouch, K. J., & Birditt, K. S. (2014). The convoy model: Explaining social relations from a multidisciplinary perspective. *The Gerontologist*, 54, 82–92. doi:10.1093/geront/gnt118

- Antonucci, T. C., Ajrouch, K. J., & Manalel, J. A. (2017). Social relations and technology: Continuity, context, and change. *Innovation in Aging*, 1, igx029. doi:10.1093/geroni/igx029
- Antonucci, T. C., Fiori, K. L., Birditt, K., & Jackey, L. M. H. (2010). Convoys of social relations: Integrating life span and life course perspectives. In A. F. Freund, M. L. Lamb, & R. M. Lerner, (Eds.), *Handbook of Lifespan Development* (pp. 434–473). Hoboken, NJ: John Wiley and Sons.. doi:10.1002/9780470880166.hlsd002012
- Baltes, P. B., & Smith, J. (2003). New frontiers in the future of aging: From successful aging of the young old to the dilemmas of the fourth age. *Gerontology*, 49, 123–135. doi:10.1159/000067946
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497–529. doi:10.1037/0033-2909.117.3.497
- Birditt, K. S., & Antonucci, T. C. (2007). Relationship quality profiles and well-being among married adults. *Journal of Family Psychology*, 21, 595–604. doi:10.1037/0893-3200.21.4.595
- Böger, A., & Huxhold, O. (2018). Do the antecedents and consequences of loneliness change from middle adulthood into old age? *Developmental Psychology*, 54, 181–197. doi:10.1037/dev0000453
- 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., Fung, H. H., & Charles, S. T. (2003). Socioemotional selectivity theory and the regulation of emotion in the second half of life. *Motivation and Emotion*, 27, 103–123. doi:10.1023/A:1024569803230
- Charles, S. T. (2010). Strength and vulnerability integration: A model of emotional well-being across adulthood. *Psychological Bulletin*, 136, 1068–1091. doi:10.1037/a0021232
- Cherlin, A. (2010). Demographic trends in the United States: A review of research in the 2000s. *Journal of Marriage and the Family*, 72, 403–419. doi:10.1111/j.1741-3737.2010.00710.x
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9, 233–255. doi:10.1207/s15328007sem0902_5
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98, 310–357. doi:10.1037/0033-2909.98.2.310
- Cornwell, B. (2011). Independence through social networks: Bridging potential among older women and men. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 66, 782–794. doi:10.1093/geronb/gbr111
- Cornwell, B., & Laumann, E. O. (2015). The health benefits of network growth: New evidence from a national survey of older adults. *Social Science & Medicine*, 125, 94–106. doi:10.1016/j.socscimed.2013.09.011
- Cornwell, B., Schumm, L. P., Laumann, E. O., Kim, J. S., & Kim, Y. J. (2014). Assessment of social network change in a national longitudinal survey. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 69(Suppl_2), S75–S82. doi:10.1093/geronb/gbu037
- Dunbar, R. I., Korstjens, A. H., & Lehmann, J.; British Academy Centenary Research Project. (2009). Time as an ecological constraint. *Biological Reviews of the Cambridge Philosophical Society*, 84, 413–429. doi:10.1111/j.1469-185X.2009.00080.x
- English, T., & Carstensen, L. L. (2014). Selective narrowing of social networks across adulthood is associated with improved emotional experience in daily life. *International Journal of Behavioral Development*, 38, 195–202. doi:10.1177/0165025413515404
- Fingerman, K. L. (2009). Consequential strangers and peripheral ties: The importance of unimportant relationships. *Journal of Family Theory & Review*, 1, 69–86. doi:10.1111/j.1756-2589.2009.00010.x
- 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
- Fingerman, K. L., Huo, M., Charles, S. T., & Umberson, D. J. (2019). Variety is the spice of late life: Social integration and daily activity. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. doi: 10.1093/geronb/gbz007
- Fiori, K. L., Smith, J., & Antonucci, T. C. (2007). Social network types among older adults: A multidimensional approach. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 62, P322–P330. doi:10.1093/geronb/62.6.p322
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, 60, 549–576. doi:10.1146/annurev.psych.58.110405.085530
- Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory*, 1, 201–233. doi:10.2307/202051
- Huxhold, O. (2019). Gauging effects of historical differences on aging trajectories: The increasing importance of friendships. *Psychology and Aging*, 34, 1170–1184. doi:10.1037/pag0000390
- Huxhold, O., Fiori, K. L., & Windsor, T. D. (2013). The dynamic interplay of social network characteristics, subjective well-being, and health: The costs and benefits of socio-emotional selectivity. *Psychology and Aging*, 28, 3–16. doi:10.1037/a0030170
- Kunzmann, U., Little, T. D., & Smith, J. (2000). Is age-related stability of subjective well-being a paradox? Cross-sectional and longitudinal evidence from the Berlin Aging Study. *Psychology and Aging*, 15, 511–526. doi:10.1037//0882-7974.15.3.511
- Lakey, B., Vander Molen, R. J., Fles, E., & Andrews, J. (2016). Ordinary social interaction and the main effect between perceived support and affect. *Journal of Personality*, 84, 671–684. doi:10.1111/jopy.12190
- 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. (2001). Regulation of social relationships in later adulthood. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 56, P321–P326. doi:10.1093/geronb/56.6.p321
- 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. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 53, P21–P29. doi:10.1093/geronb/53b.1.p21

- Lang, F. R., Wagner, J., Wrzus, C., & Neyer, F. J. (2013). Personal effort in social relationships across adulthood. *Psychology and Aging, 28*, 529–539. doi:10.1037/a0032221
- Litwin, H. (2011). The association between social network relationships and depressive symptoms among older Americans: What matters most? *International Psychogeriatrics, 23*, 930–940. doi:10.1017/S1041610211000251
- Luong, G., Charles, S. T., & Fingerman, K. L. (2011). Better with age: Social relationships across adulthood. *Journal of Social and Personal Relationships, 28*, 9–23. doi:10.1177/0265407510391362
- McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology, 60*, 577–605. doi:10.1146/annurev.psych.60.110707.163612
- Miche, M., Huxhold, O., & Stevens, N. L. (2013). A latent class analysis of friendship network types and their predictors in the second half of life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 68*, 644–652. doi:10.1093/geronb/gbt041
- Pillemer, K., Suiitor, J. J., Mock, S. E., Sabir, M., Pardo, T. B., & Sechrist, J. (2007). Capturing the complexity of intergenerational relations: Exploring ambivalence within later-life families. *Journal of Social Issues, 63*, 775–791. doi:10.1111/j.1540-4560.2007.00536.x
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401. doi:10.1177/014662167700100306
- Rook, K. S., & Charles, S. T. (2017). Close social ties and health in later life: Strengths and vulnerabilities. *The American Psychologist, 72*, 567–577. doi:10.1037/amp0000104
- Rook, K. S., Luong, G., Sorkin, D. H., Newsom, J. T., & Krause, N. (2012). Ambivalent versus problematic social ties: Implications for psychological health, functional health, and interpersonal coping. *Psychology and Aging, 27*, 912–923. doi:10.1037/a0029246
- Shankar, A., Rafnsson, S. B., & Steptoe, A. (2015). Longitudinal associations between social connections and subjective wellbeing in the English Longitudinal Study of Ageing. *Psychology & Health, 30*, 686–698. doi:10.1080/08870446.2014.979823
- Sorkin, D. H., & Rook, K. S. (2004). Interpersonal control strivings and vulnerability to negative social exchanges in later life. *Psychology and Aging, 19*, 555–564. doi:10.1037/0882-7974.19.4.555
- Sutcliffe, A., Dunbar, R., Binder, J., & Arrow, H. (2012). Relationships and the social brain: Integrating psychological and evolutionary perspectives. *British Journal of Psychology (London, England: 1953), 103*, 149–168. doi:10.1111/j.2044-8295.2011.02061.x
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070. doi:10.1037//0022-3514.54.6.1063
- Weiss, R. S. (1974). The provisions of social relationships. In Z. Rubin (Ed.), *Doing unto others* (pp. 17–26). Englewood Cliffs, NJ: Prentice-Hall.
- Wrzus, C., Hänel, M., Wagner, J., & Neyer, F. J. (2013). Social network changes and life events across the life span: A meta-analysis. *Psychological Bulletin, 139*, 53–80. doi:10.1037/a0028601