Title: Social networks and social support among older adults in rural South Africa: findings from the Health and Aging in Africa: a Longitudinal Study of an INDEPTH community in South Africa

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ABSTRACT

Objectives: We used data from the Health and Aging in Africa: A Longitudinal Study of an INDEPTH community in South Africa (HAALSI) study in rural South Africa to examine how age and gender interact to predict older adults' social networks and receipt of social support in rural South Africa.

Method: We used regression analysis on data for 5059 adults aged over 40. We examined how network size, density, and communication and social support receipt were associated with gender and age, as well as with kin, gender and geographic composition.

Results: Older respondents reported fewer important social network ties, greater network density and less frequent communication than their middle-aged peers, largely due to fewer non-kin connections. Women had smaller networks, and difference in networks size was greater between older and younger women than among men. Older women had fewer non-kin ties living in the same village than younger women; older men's lower levels of contact relative to middle-aged men in some spheres were offset by more female and co-resident ties.

Discussion: In contrast to the extant literature, older women in this study area had more limited social network and support than their male peers, and may thus benefit from targeted interventions.

Keywords: choice theory: constraint theory; gender; kin; marital status

INTRODUCTION

Personal social networks are a central component of social life affecting many outcomes across the life course. Social relationships promote well-being and are considered a key to "successful aging" (Rowe & Kahn, 1997). Relationships often provide both emotional and instrumental support, protecting against and aiding recovery from health shocks through numerous mechanisms (Thoits, 2011). In the United States (US) and Europe, fewer numbers and poor quality of social relationships in later life are associated with depression and loneliness (Stoeckel & Litwin, 2016), cognitive and functional impairment (Ertel, Glymour, & Berkman, 2008; Kuiper et al., 2015), risk of long-term care institutionalization (Pynnönen, Törmäkangas, Heikkinen, Rantanen, & Lyyra, 2012), and mortality (Shor & Roelfs, 2015).

In sub-Saharan Africa (SSA), the number of people over 60 is expected to increase by 64 percent over the next 15 years (United Nations, 2015). A key policy question is how family structures and households will adapt to demographic, economic, and social transitions (National Research Council, 2006). Supportive networks in SSA have been shown to improve access to medical care, HIV testing (Musheke et al., 2013) and adherence to antiretroviral therapy (Ware et al., 2009). Given the paucity of formal social support on the continent, provision of informal support through personal networks may be more important for physical and mental health than elsewhere (Perkins, Subramanian, & Christakis, 2015). Yet despite recognition that social networks are associated with health (Berkman & Krishna, 2014; Litwin, 2010; Perkins, et al., 2015), research on older adults' social networks and how they relate to well-being in low- and middle-income countries – particularly SSA – is limited. Although qualitative study of personal networks in SSA communities has a long history (Mitchell, 1969), with several focused on older adults (De Klerk, 2011; van Eeuwijk, 2014), virtually no work excepting a small study of older HIV-positive Togolese adults (Moore & Prybutok, 2014) has examined this quantitatively.

South Africa's unique combination of cultural norms, political history, social policies and population trends suggests that the social networks of older adults might differ from those seen in other low-income settings, including elsewhere in SSA. For example, older adults in South Africa typically have both dependent and productive household roles. Norms of interdependency and reciprocity suggest that families should provide the bulk of later-life care, especially where there are few long-term care facilities (Schatz, Madhavan, Collinson, Gomez-Olive, & Ralston, 2015). However, these norms are changing, particularly with the "hollowing-out" of the prime-aged adult population; especially in rural areas, older women are crucial sources of care for spouses, grandchildren, and medically-dependent adult children (Schatz, 2007; Schatz & Seeley, 2015). Changes to household composition have arisen due to HIV-related disease, labor migration, and a high and increasing level of female-headed households (Collinson, Tollman, Kahn, & Clark, 2006; Manderson & Block, 2016; Manderson, Block, & Mkhwanazi, 2016). High rural unemployment post-Apartheid has led men (and increasingly women) to leave their rural villages in pursuit of work. This migration increases the burden on older adults to support the family left behind while also providing the primary source of income: South Africa pays a government-funded means-tested non-contributory pension to all those aged over 60 (Schatz, Gómez-Olivé, Ralston, Menken, & Tollman, 2012).

Aging and Network Change: Theories of Choice and Constraint

Many US studies report that older adults have smaller personal networks (B. Cornwell, Laumann, & Schumm, 2008) and lower rates of daily social contact and participation in social activities (B. Cornwell, 2011; Marcum, 2013) than younger and middle aged adults. Two categories of theory help explain how social contact patterns change with age: theories of choice and theories of constraint.

Theories of Choice

It been assumed that age is associated with social isolation, withdrawal from social roles, increasing disengagement from social activities, and thus smaller personal networks. However, contemporary scholars emphasize that small networks may not reflect social isolation (E. Y. Cornwell & Waite, 2009); rather, size may reflect functional or socioemotional selectivity (B. Cornwell, Schumm, Laumann, Kim, & Kim, 2014). Functional selectivity theory contends that personal networks contract and become more kin-centric (Lang, Rieckmann, & Baltes, 2002). Smith et al. (2015) find that age is negatively related to tie multiplexity: instead of retaining a core of emotionally-intimate network members that fulfill a variety of functions as in the convoy model, older adults both retain and replace a core group of members who fulfill specific functions.

Socioemotional selectivity theory argues that as individuals age they become more aware of their mortality and become increasingly selective, investing more in a core group of emotionally-intimate network members than seeking new ties (Carstensen, 1992); personal networks consequently decrease in size and become denser and more kin-centric with age. This theory undergirds both the core-periphery model of social networks and the convoy model of social support. The core-periphery model argues personal networks include a stable core of emotionally-intimate family and friends, and a rotating periphery of less intimate members (Morgan, Neal, & Carder, 1997). The convoy model argues that the periphery is shed as individuals age, so the core network forms a convoy that "travels together" and provides members with mutual support, thus protecting health and well-being (Antonucci, Ajrouch, & Birditt, 2013). Evidence to support socioemotional selectivity may be perceived in a recent US study which found that emotional support remained stable while receipt of other support increased with age (Shaw, Krause, Liang, & Bennett, 2007).

Theories of Constraint

Contraction in personal networks with age can also be explained by structural constraints inherent over the life course. Network structure and content change with each life course transition, e.g., marriage of adult children, birth of grandchildren, retirement, or change in marital status. Such transitions impact health in higher-income settings (Dupre, Beck, & Meadows, 2009; Stroebe, Schut, & Stroebe, 2007), although SSA evidence is limited and more mixed (Myroniuk, 2016). The foci theory of personal networks argues that relationships are drawn from foci of activity: the places we live, work, and socialize (Feld, 1981). As adults age and retire, in addition to decreases due to mortality (B. Cornwell, 2015), the number of foci decrease and consequently network size and multiplexity decrease (E. J. Smith, et al., 2015).

Health or functional constraints may also impact personal networks. As adults age, they may lose their ability to reciprocate instrumental support, due to increased functional limitations, cognitive impairment or chronic conditions (Klein Ikkink & van Tilburg, 1999). According to exchange theory, norms of contemporaneous reciprocity dictate that relationships remain balanced; when balance is lost, relationships dissolve. However, normative role expectations may mean that individuals are willing to overlook an imbalance with older parents or other relatives (Shaw, et al., 2007), if maintenance of currently imbalanced relationships reflects reciprocity from earlier points in time, when the relational imbalance was reversed (the convoy theory). Yet our knowledge of how social support changes with age in low income settings, where economic and social changes are complicating household and family composition, is limited.

Gender and Social Networks in Later Life

In higher-income settings, men and women experience different rates and forms of network change across the life course due to the gendered nature of family and work trajectories, and these gender

differences increase with age (Fischer & Beresford, 2014). Women have larger networks with lower density and higher communication levels (McDonald & Mair, 2010), and greater multiplexity in their networks, maintaining connections to family, friends, and neighbors. Men, however, are more likely to maintain connections with coworkers (Shaw, et al., 2007), and are more severely affected by network loss following retirement (McDonald & Mair, 2010). Women are more likely to both provide and receive emotional, informational and financial support, including from kin in addition to spouses (Allen, 1994; McDonald & Mair, 2010), and they are more likely to benefit from support (Taylor, 2011). These differences widen with age (Fischer & Beresford, 2014). While these patterns may be weakening in higher-income settings as gender norms shift, gender differences in social networks may persist in SSA due to stronger prevailing gender and familial norms (Katungi, Edmeades, & Smale, 2008). The scope and nature of these differences may vary however, including in South Africa given the context of migration, female employment and female-headed households.

In this paper, we use personal network data from 5059 older adults living in rural Mpumalanga, South Africa to examine how patterns of social contact and support across age reflect theories of choice and constraint, and how such findings are modified by gender.

METHODS

Sample

Health and Aging in Africa: a Longitudinal Study of an INDEPTH community in South Africa (HAALSI) cohort study is a population-based study of the health, aging and wellbeing of men and women aged 40 years and over. The baseline wave of HAALSI was conducted in 27 of the 31 villages that comprise the MRC/Wits Rural Public Health and Health Transitions Research Unit site in

Mpumalanga Province, South Africa (hereafter, "Agincourt") (Kahn et al., 2012), between November 2014 and November 2015. The study area is close to the Mozambique border and almost one-third of residents are Mozambican migrants. HAALSI participants were randomly sampled from the community with a response rate of 87%.

The baseline survey was modeled closely on the Health and Retirement Study (Sonnega et al., 2014) and its several international sister studies, and was based on a three-hour household visit including structured quantitative interviews, anthropometric and physiological measurements and blood draws. HAALSI was granted ethics approved by the University of the Witwatersrand Human Research Ethics Committee, the Harvard T.H. Chan School of Public Health Office of Human Research Administration, and the Mpumalanga Provincial Research and Ethics Committee.

The HAALSI baseline survey included a social network module, modeled on the network data collection in the National Social Life, Health, and Aging Project (S. Smith et al., 2009). The social network module included one name generator question: "Please tell me the names of 6 adults with whom you have been in communication either in person or by phone or by internet in the past six months, starting with the person who is most important to you for any reason." If the respondent was married and living with their spouse, but did not name them, the spouse's name was added to the list. Respondents could provide fewer than six named persons ("alters"). Respondents were then asked questions about each alter's socio-demographic information (age, sex, and residential location), relationship to the respondent, frequency of contact with the alter (in-person, by phone/text/email), how frequently the alter provided support (emotional, informational, physical, financial), and how frequently the ego and alter were in conflict. Finally, respondents were asked about the relationship and frequency of contact they believed each alter had with each other alter. Frequencies were captured as: monthly; few times a month; weekly; few times a week; or daily/almost daily.

Measures

We consider several domains of social connectedness. First, network size is measured as the number of alters the respondent communicated with over the past six months: (a) on an at least monthly basis ("monthly alters"); and (b) on a daily or almost daily basis ("daily alters"). Second, frequency of communication is measured as the approximate amount of monthly contact over the past six months: calculated by valuing "monthly" communication as one, "few times a month" as two, "weekly" as four, "few times a week" as ten, and "daily/almost daily" as 30. Total communication frequency was calculated as the sum of frequencies across all named alters (i.e. a maximum of 210). Third, network density is measured as the proportion of alter-pairs who communicated at least monthly. Fourth, social support size is measured separately as the number of individuals providing each type of social support at least monthly to the respondent. Fifth, social support frequency is measured as the number of support occasions, calculated in the same way as frequency of communication.

Analytic Hypotheses

Building on theories described earlier, we hypothesize several patterns that might emerge in cross-sectional data of older adults, such as HAALSI. Importantly, several of these may be modified by gender. All theories predict networks are smaller in older age, that women have higher communication levels, and that this gender gap increases with age. We therefore expect network size and frequency of communication to be lower for both older men and women, but with a larger gap from a lower base for men. In addition, both socioemotional selectivity and functional constraint theories suggest that adults will selectively maintain kin relationships – in the former case because they represent core connections and in the latter because loss of ability to reciprocate is offset by normative role expectations for individuals to care for their older relatives. In our context, we expect this shift to be represented by larger drops in contact and support from non-kin than from kin.

We also expect to see several structural constraints arising as individuals move from middle to older age. These include the end of employment (for those previously employed) and the absence of a spouse reducing social network size and communication frequency. We expect to see notably lower levels of social contact for those aged over 70 compared to those aged under 60, and for those who lost or never had a spouse compared to those currently living with one. Given the ongoing changes in South African social norms, and high rates of unemployment, it is unclear whether the employment effect will be stronger for men. Finally, socioemotional selectivity theory suggests that while network size falls with age, receipt of emotional support may not decline if peripheral connections are dropped but a dense core of contacts remains; conversely, functional selectivity theory suggests that alters will be maintained based on ability to provide support in any of several domains. We test this by comparing differences across age cohorts in the level of emotional support received with those for other support types.

Statistical Analyses

For each of the five domains of social connectedness described above, we first ran "unadjusted" regression models containing only indicators for age-sex categories (ages 40-49, 50-59, 60-69, 70-79, 80+), indicator variables for month of interview, and random intercepts for interviewers. We accounted for month and interviewer identity since these factors predict reported network size in this survey, possibly due to interviewer learning effects. We then ran "adjusted" models that additionally included socio-demographic factors expected to affect social support levels and changes with age: (i) educational attainment (none, primary, secondary, tertiary); (ii) country of origin (South Africa, Mozambique/other); (iii) marital status (civil or religious marriage, never married, separated/divorced, widowed); (iv) household wealth quintile; household size (1, 2, 4-7, 8+); and (v) employment status (not employed, employed, not working outside the home). For models of network density we also added a count of the number of alters named, since density is likely to vary systematically with network size, and included

only individuals reporting two or more contacts since density is not meaningful otherwise. We re-ran the network size count models stratified by network composition measures of: (i) kinship (i.e., one model to predict number of kin contacts, another to predict number of non-kin contacts); (ii) gender (same-gender vs. other-gender contacts); and (iii) alter location (same household, elsewhere in village, elsewhere in Agincourt, outside Agincourt). Finally, we re-ran our analyses stratifying respondents by marital status.

From all models, we predicted mean outcome values for each of the ten age-gender categories, setting the month of interview to that with the highest response rate (December 2014). We used a Poisson link for count variables (except when values were over-dispersed, in which case we used a negative-binomial link), including a zero-inflation term where appropriate. We used the identity link for frequency and density variables. Unadjusted models included all HAALSI respondents; adjusted models used a complete-case approach, dropping 245 (4.8%) individuals with missing data on at least one covariate.

RESULTS

The 5,059 HAALSI respondents reported communicating at least monthly with 15,058 alters, representing 96.8% of all 15,549 alters nominated (Table 1). Respondents named a median of three alters with whom they communicated at least monthly, with 267 (5.3%) individuals reporting zero alters and 669 (13.2%) reporting one alter. One hundred and fifty (3.0%) currently married respondents reported six non-spousal alters and thus had a total of seven alters. Both monthly network size and frequency of contact were lower for individuals of older age, with no formal education, not of South African origin, not cohabiting with a partner, living in smaller households, not working and with lower household wealth. Under age 60, women reported larger networks and more frequency of contact than men; above age 60 this was reversed. Almost four-fifths (79.6%) of monthly alters were relatives, 28% lived in the same household as the respondent, 43.7% elsewhere in the same village and 12.0%

elsewhere in Agincourt. Frequency of contact, although non-continuous by design, ranged from zero to 210 contacts per month (Supplementary Figure 1). The distribution was right-skewed with a median value of 60 and interquartile range 30-90, and had large masses at multiples of 30, reflecting the large proportion of respondents (43.7%) who only reported important alters with whom they communicated daily or almost daily. Respondents reported daily/almost daily in-person communication with 82.7% of same-household alters, 62% of same-village alters and 24.6% of those living further away.

Communication networks

In unadjusted models, the predicted number of monthly alters fell from age 60 for women and age 70 for men, for both in-person and phone/digital ("remote") communication alters (Figure 1A). Predicted numbers of daily or almost daily communication alters in unadjusted models showed a similar fall-off for women, but a weaker pattern for men; patterns for women were also weaker in adjusted models (Figure 1B). Patterns of predicted monthly communication frequency across age within gender were very similar to patterns of predicted alter numbers (Figure 1C). At all ages, while numbers of in-person and remote communication alters were similar for monthly contact, total frequency of daily and monthly in-person communication was higher than remote communication. For men, monthly communication frequency fell linearly with age for in-person contact, but was stable until age 70 for remote communication. Fall-off for women with age was more rapid for remote communication. Communication rates generally fell more rapidly for women than for men in unadjusted models. This differential fall-off appeared to be explained by covariates, notably marital status (Table 2). This finding is supported by models of monthly alters stratified by marital status (Figure 2), which showed very similar patterns of alter numbers across age for married and widowed men and women. However, never married men under 70 and separated or divorced men over 70 had fewer alters than their female counterparts.

Kinship

The great majority of important alters named by respondents were kin (Figure 3A), and while older respondents reported fewer kin and non-kin alters, the ratio of kin to non-kin was highest among oldest respondents, especially women. The gender distribution of these alters differed markedly by respondent's gender (Figure 3B). Women consistently reported more female than male alters, while men reported roughly equal numbers of each. The ratio of male to female alters remained roughly constant for women, as numbers of both declined, while the ratio rose slightly for men as the number of male alters fell while their number of female alters remained relatively constant.

Residential location

The location of alters differed by respondent gender (Figure 3C). Alter locations were similar amongst men and women in their 40s, with the largest proportion living in the same village but not the same household, followed by same household, then elsewhere in Agincourt. Numbers of alters living in the same village or elsewhere in Agincourt decreased with age. Within household, alter numbers fell steadily for women, while rising for men until their 60s, after which they held steady. The age difference between respondents and alters increased with age for kin and non-kin in all locations (i.e. household; same village, elsewhere) (Supplementary Figure 2). There was a strong gender difference for household kin alter ages: women's median kin alter remained around age 45 for all age cohorts, while for men it rose from around 40 at ages 40-49 to 60 by ages 80+.

Domains of social support

Men reported receiving more support of all types, in terms of unique providers (Supplementary Figure 3) and frequency of provision (Supplementary Figure 4). This gendered difference was particularly

marked for physical support. Age was weakly negatively associated with all types of support, although financial support rose slightly among the very oldest respondents.

Network density

The density of respondents' networks rose with respondent's age, although with different patterns by gender (Supplementary Figure 5). For women, density rose rapidly from their 40s to their 60s, before flattening off; in contrast, for men density was similar at younger ages, but rose from their 60s to their 80s.

DISCUSSION

African countries are set to age rapidly. Financial and social support will necessarily be provided informally through social networks, but how these networks change with age is not clear. In this paper, we describe the social networks of 5,059 older adults in rural South Africa, and show several important changes structured by age and gender.

When asked to report the important people in their lives, these older adults named a small number of others, in many cases kin from the same household or living geographically close to them, and with whom they communicated daily. Communication was more frequently in-person than via phone or other means, although similar numbers of alters were contacted through each method suggesting in-person connections were tighter than remote ones. These patterns reflect the large multi-generational households and continuing strong kinship relations of these cohorts of older rural South Africans (Schatz, et al., 2015).

First, supporting evidence from the US (Antonucci, et al., 2013; B. Cornwell, et al., 2008), older adults named fewer important alters with higher network density than middle-aged respondents in this sample. Using a measure of approximate communication frequency, we show additional nuance – notably that in-person contact formed a large proportion of all communication, probably due to limited access to and proficiency with digital technologies among older rural South Africans. However, in contrast to higher-income settings, women had smaller networks and the gap between older and younger women was larger than for men.

Second, as predicted by theories of both choice and constraint, the decline in contact rates over age was substantially greater for non-kin than for kin. The fall-off in non-kin contact was more rapid for women, particularly in the number of non-kin contacts living in the same village. Men's loss of contacts in many areas of life was offset by rises (from an already substantial level) in the number of female alters and those living in the same household (including both children and grandchildren). This increase in younger female, co-resident kin alters regular communication with older men, and these men's receipt of substantial social support, consistent with exchange theory and normative gender role expectations, support socioemotional selectivity theory and the convoy model (Antonucci, et al., 2013). This pattern suggests that a range of factors push men towards their core kin network.

Third, we found some evidence consistent with structural constraint theories. Both men and women who were currently married had consistently higher levels of support across age compared to those who were not. Without longitudinal data we have limited ability to determine whether this difference is causal; however spouses clearly contribute substantial social support in this setting. This was not differential by gender. We did not, however, find support for retirement acting as a structural constraint: the only drop in contact levels for men and women aged 60-70, was of men's kin rather than non-kin, and may well reflect the limited employment and retirement opportunities in this area.

Fourth, emotional, informational, financial and physical support provided by alters changed little with age. A stable level of support received from a smaller number of alters suggests increasing multiplexity, in line with socioemotional selectivity theory; however the wide range of support types maintained into older age argues more strongly for functional selectivity. Also notable was the higher level of physical support received by men compared to women, in contrast to US research findings (Ware, et al., 2009). Much of the reduction in contact frequencies with age and the moderating effect of gender could be explained by a few key socio-demographic factors: marital status, household composition and wealth, employment status, country of origin, and education level.

Strengths and Limitations

While the HAALSI sample consists of a very large random sample of older South Africans across a wide age range with a high response rate, our study has several potential limitations. First, this dataset covers a single study location, a poor and rural area in northeast South Africa. While the area is quite typical of other rural parts of South Africa, studies in other settings, particularly in urban areas, will help us to understand the generalizability of these findings. Second, our data are cross-sectional, and thus our cross-age comparisons conflate both age and cohort effects. Although the whole study sample grew up during Apartheid, the impact of its end in the mid-1990s has likely been felt differently across cohorts. Further, the heavy burden of HIV in this community, and rapid changes in family composition and gender relations, will have differentially affected cohorts. Future follow-up studies with the HAALSI cohort should allow us to disentangle such effects and to make within-individual comparisons. Linked to this cross-sectionality, we are unable to examine causal pathways leading from other factors to high or low social connectedness, but only show associations. We therefore cannot yet definitively evaluate classic theories of choice and constraint. Finally, survey name generators such as those in HAALSI do

not capture the full range of network contacts, and may have limited comparability cross-nationally (Small, 2013).

Conclusion

In this study, we described the personal networks and support of older men and women living in rural South Africa in order to better understand the social and household dynamics of a population that is aging. While some differences are similar to those seen in high-income settings, others differ in significant ways. Notably, gender differences in this population suggest considerably higher levels of social constraint for women, a differential that rises with age and may reflect care giving responsibilities and poverty of these women. We emphasize the need to carefully consider gender differences in social network size and support provision when planning approaches to address the health and social needs of older South Africans.

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FIGURES AND TABLES

Table 1: Descriptive statistics for HAALSI respondents

	Respondents		Number of contacts		Frequency of contact	
	N	%	Mean	95% CI	Mean	95% CI
Age & gender						
Male 40-49	418	8.3%	2.79	[2.63 - 2.95]	59.5	[55.8 - 63.2]
Male 50-59	624	12.3%	2.97	[2.84 - 3.10]	59.9	[57.1 - 62.6]
Male 60-69	643	12.7%	3.23	[3.10 - 3.36]	66.1	[63.0 - 69.1]
Male 70-79	446	8.8%	2.99	[2.83 - 3.15]	62.9	[59.2 - 66.5]
Male 80+	214	4.2%	2.93	[2.70 - 3.15]	57.0	[52.3 - 61.6]
Female 40-49	500	9.9%	3.08	[2.94 - 3.21]	61.5	[58.2 - 64.7]
Female 50-59	786	15.5%	3.09	[2.98 - 3.20]	63.8	[61.1 - 66.5]
Female 60-69	661	13.1%	3.05	[2.92 - 3.18]	62.6	[59.5 - 65.7]
Female 70-79	432	8.5%	2.76	[2.61 - 2.92]	53.7	[50.1 - 57.2]
Female 80+	335	6.6%	2.45	[2.28 - 2.62]	47.7	[43.9 - 51.5]
Education level						
No formal education	2306	45.6%	2.81	[2.74 - 2.88]	56.4	[54.9 - 58.0]
Some primary (1-7 years)	1614	31.9%	3.12	[3.04 - 3.20]	64.7	[62.8 - 66.6]
Some secondary (8-11 years)	537	10.6%	3.09	[2.96 - 3.23]	62.5	[59.4 - 65.7]
Secondary or more (12+ years)	585	11.6%	3.12	[2.99 - 3.25]	63.5	[60.6 - 66.4]
Country of origin						
South Africa	3528	69.7%	3.02	[2.96 - 3.07]	61.3	[60.1 - 62.6]
Mozambique/other	1526	30.2%	2.88	[2.79 - 2.96]	58.7	[56.8 - 60.6]
Marital status						
Currently married/cohabiting	2575	50.9%	3.43	[3.37 - 3.49]	71.1	[69.7 - 72.5]
Never married	290	5.7%	2.06	[1.88 - 2.23]	43.9	[39.8 - 48.1]
Separated/divorced	650	12.8%	2.57	[2.45 - 2.69]	50.6	[47.9 - 53.4]
Widowed	1540	30.4%	2.56	[2.48 - 2.64]	50.2	[48.3 - 52.1]
Household composition						
Living alone	534	10.6%	2.31	[2.18 - 2.45]	43.7	[40.7 - 46.8]
Living with 1 other person	538	10.6%	2.88	[2.75 - 3.02]	58.2	[55.0 - 61.5]
Living in 3-6 person household	2438	48.2%	3.01	[2.94 - 3.07]	61.7	[60.2 - 63.1]
Living in 7+ person household	1549	30.6%	3.19	[3.10 - 3.27]	65.4	[63.5 - 67.3]
Employment status						
Not working	3719	73.5%	2.81	[2.76 - 2.86]	58.9	[57.7 - 60.2]
Employed (part or full time)	805	15.9%	3.06	[2.95 - 3.17]	63.6	[61.1 - 66.1]
Not working outside the home	521	10.3%	4.07	[3.92 - 4.21]	67.5	[64.3 - 70.7]
Wealth index						
Least wealthy quintile	950	18.8%	2.60	[2.49 - 2.70]	52.9	[50.5 - 55.4]
Quintile 2	957	18.9%	2.90	[2.80 - 3.01]	58.2	[55.8 - 60.6]
Quintile 3	949	18.8%	3.11	[3.01 - 3.22]	63.0	[60.5 - 65.4]
Quintile 4	1002	19.8%	3.08	[2.98 - 3.18]	62.2	[59.9 - 64.6]
Most wealthy quintile	1053	20.8%	2.66	[2.44 - 2.89]	55.2	[50.2 - 60.2]

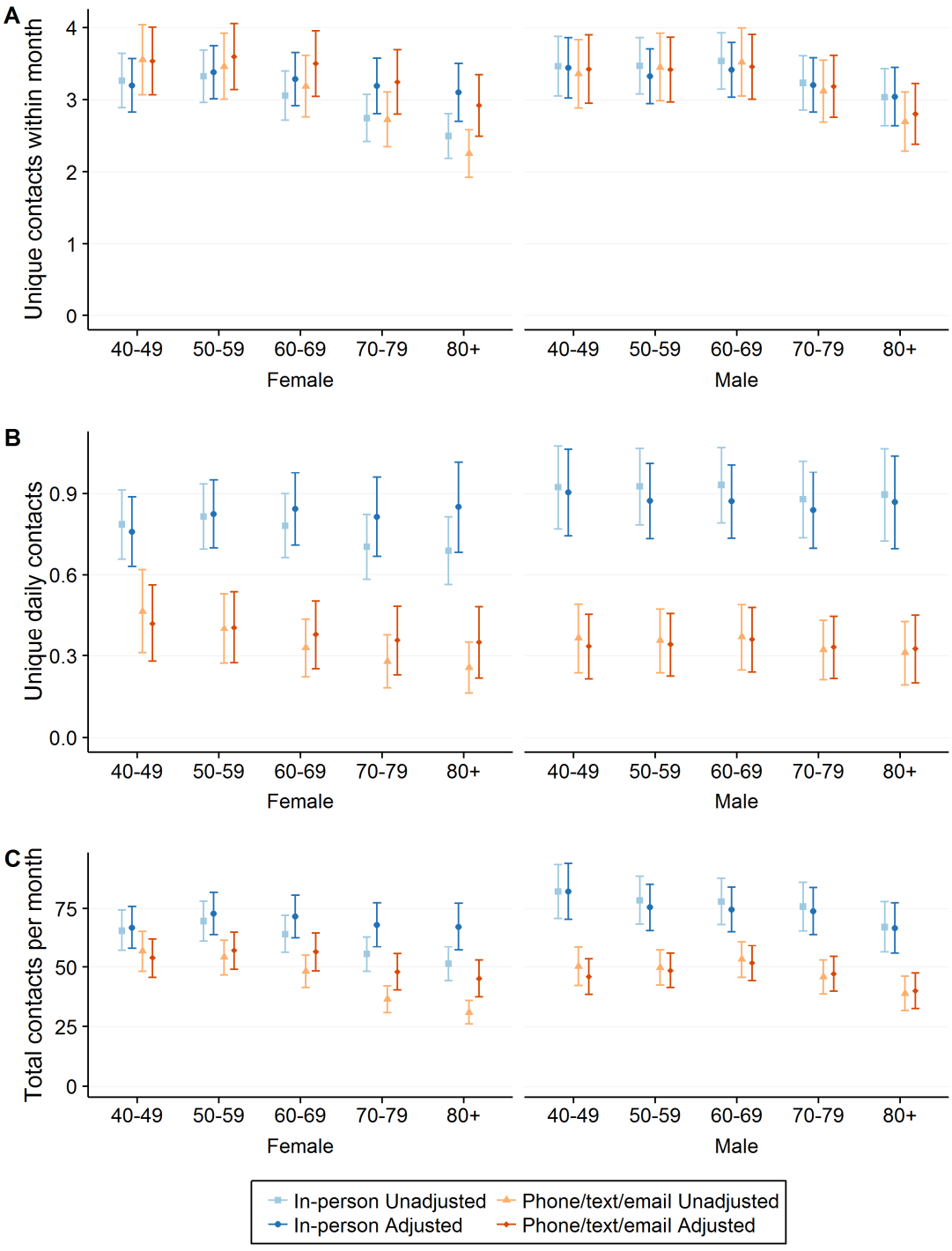
Number of contacts: at least monthly over the past six month; frequency of contacts: approximate number of contacts in a month on average over past six months. Based on Kruskall-Wallis tests, differences in the mean number of respondents reported were significant at $p<0.01$ for all variables. Missing values not shown in table: education level, n=17; country of origin, n=5; marital status, n=4; employment status, n=14; household wealth, n=231.

Table 2: Association between age & gender and unique at-least monthly alters

	In-person communication				Phone/text/email communication			
Age & gender								
Male 40-49	1.00		1.00		1.00		1.00	
Male 50-59	1.00	[0.93 - 1.08]	0.97	[0.89 - 1.05]	1.03	[0.95 - 1.11]	1.00	[0.92 - 1.08]
Male 60-69	1.02	[0.95 - 1.10]	0.99	[0.91 - 1.08]	1.05	[0.97 - 1.13]	1.01	[0.93 - 1.10]
Male 70-79	0.93	[0.86 - 1.02]	0.93	[0.85 - 1.02]	0.93	[0.85 - 1.01]	0.93	[0.85 - 1.02]
Male 80+	0.88	[0.79 - 0.97]	0.88	[0.79 - 0.99]	0.80	[0.72 - 0.89]	0.82	[0.73 - 0.92]
Female 40-49	0.94	[0.87 - 1.02]	0.93	[0.85 - 1.01]	1.06	[0.98 - 1.15]	1.03	[0.95 - 1.12]
Female 50-59	0.96	[0.89 - 1.03]	0.98	[0.91 - 1.06]	1.03	[0.96 - 1.11]	1.05	[0.97 - 1.14]
Female 60-69	0.88	[0.82 - 0.95]	0.96	[0.87 - 1.04]	0.95	[0.88 - 1.03]	1.02	[0.94 - 1.12]
Female 70-79	0.79	[0.73 - 0.87]	0.93	[0.84 - 1.03]	0.81	[0.74 - 0.89]	0.95	[0.86 - 1.05]
Female 80+	0.72	[0.65 - 0.79]	0.90	[0.80 - 1.01]	0.67	[0.61 - 0.74]	0.85	[0.76 - 0.96]
Education level								
No formal education			1.00				1.00	
Some primary (1-7 years)			1.05	[1.00 - 1.10]			1.08	[1.03 - 1.13]
Some secondary (8-11 years)			1.09	[1.02 - 1.17]			1.15	[1.08 - 1.23]
Secondary or more (12+ years)			1.09	[1.02 - 1.17]			1.15	[1.08 - 1.23]
Country of origin								
South Africa			1.00				1.00	
Mozambique/other			0.97	[0.92 - 1.01]			0.99	[0.94 - 1.03]
Marital status								
Currently married			1.00				1.00	
Never married			0.65	[0.60 - 0.72]			0.59	[0.54 - 0.65]
Separated/divorced			0.79	[0.74 - 0.84]			0.75	[0.70 - 0.79]
Widowed			0.75	[0.72 - 0.79]			0.76	[0.72 - 0.79]
Employment status								
Not working			1.00				1.00	
Employed (part or full time)			1.06	[1.00 - 1.12]			1.06	[1.01 - 1.12]
Not working outside the home			1.08	[1.00 - 1.17]			1.15	[1.07 - 1.24]
Household composition								
Living alone			1.00				1.00	
Living with one other person			1.06	[0.97 - 1.16]			1.06	[0.97 - 1.15]
Living in 3-6 person household			1.07	[1.00 - 1.15]			1.07	[1.00 - 1.15]
Living in 7+ person household			1.10	[1.02 - 1.19]			1.08	[1.00 - 1.16]
Wealth index								
Least wealthy quintile			1.00				1.00	
Quintile 2			1.05	[0.99 - 1.11]			1.06	[1.00 - 1.13]
Quintile 3			1.06	[1.00 - 1.13]			1.10	[1.04 - 1.17]
Quintile 4			1.02	[0.96 - 1.09]			1.08	[1.02 - 1.15]
Most wealthy quintile			1.06	[0.99 - 1.13]			1.13	[1.06 - 1.20]
Interviewer-level variance	0.05	[0.02 - 0.08]	0.05	[0.02 - 0.07]	0.10	[0.04 - 0.15]	0.08	[0.04 - 0.13]
Akaike Information Criterion		17,144.3		15,972.5		17,740.2		16,398.4
Number of observations		5,059		4,797		5,059		4,797

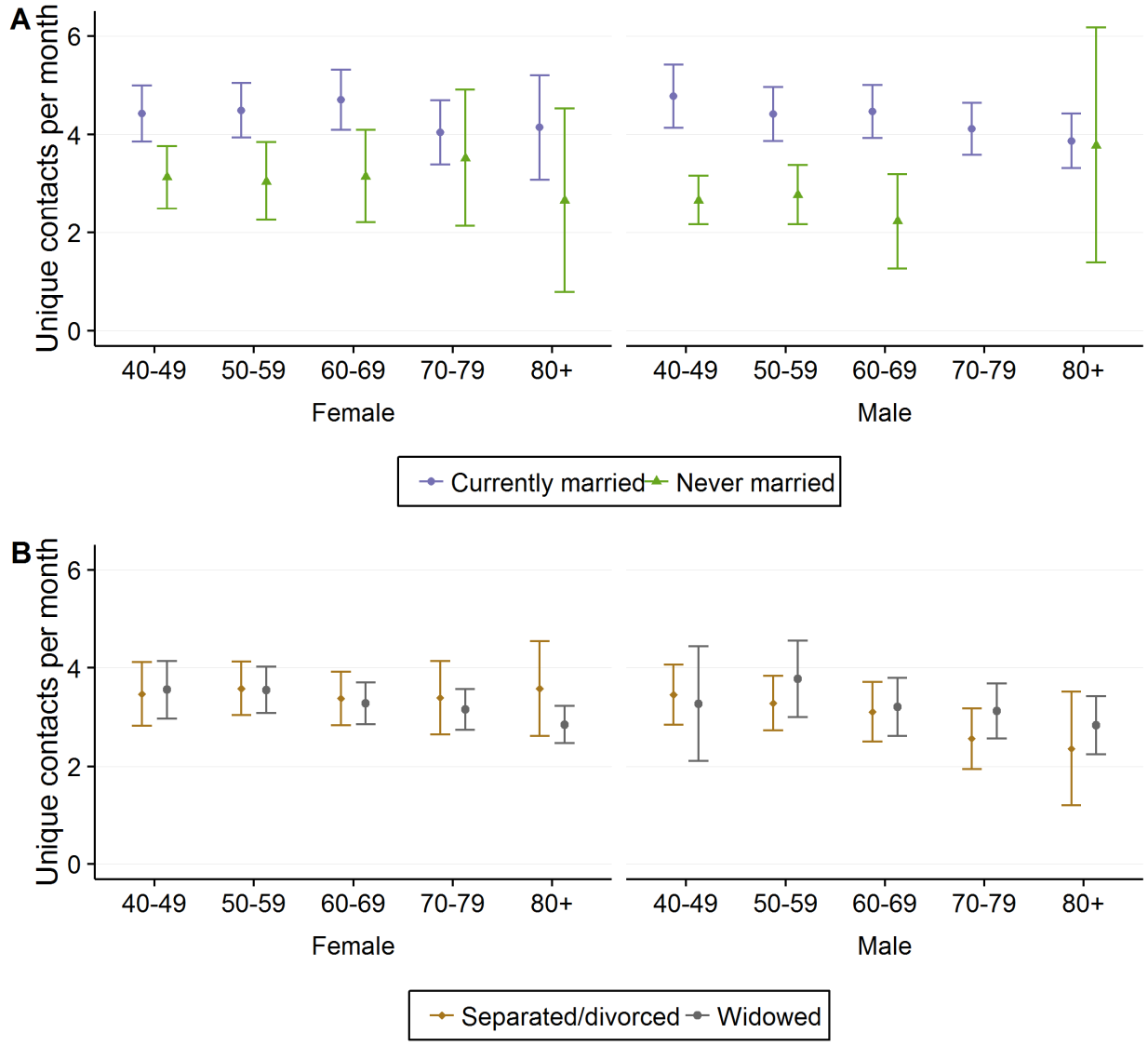
These results are from two-level Poisson regression models also containing indicator variables for month of interview.

Figure 1: Predicted number of contacts with important monthly alters per month (A) and per day (B), and total number of contacts per month (C)



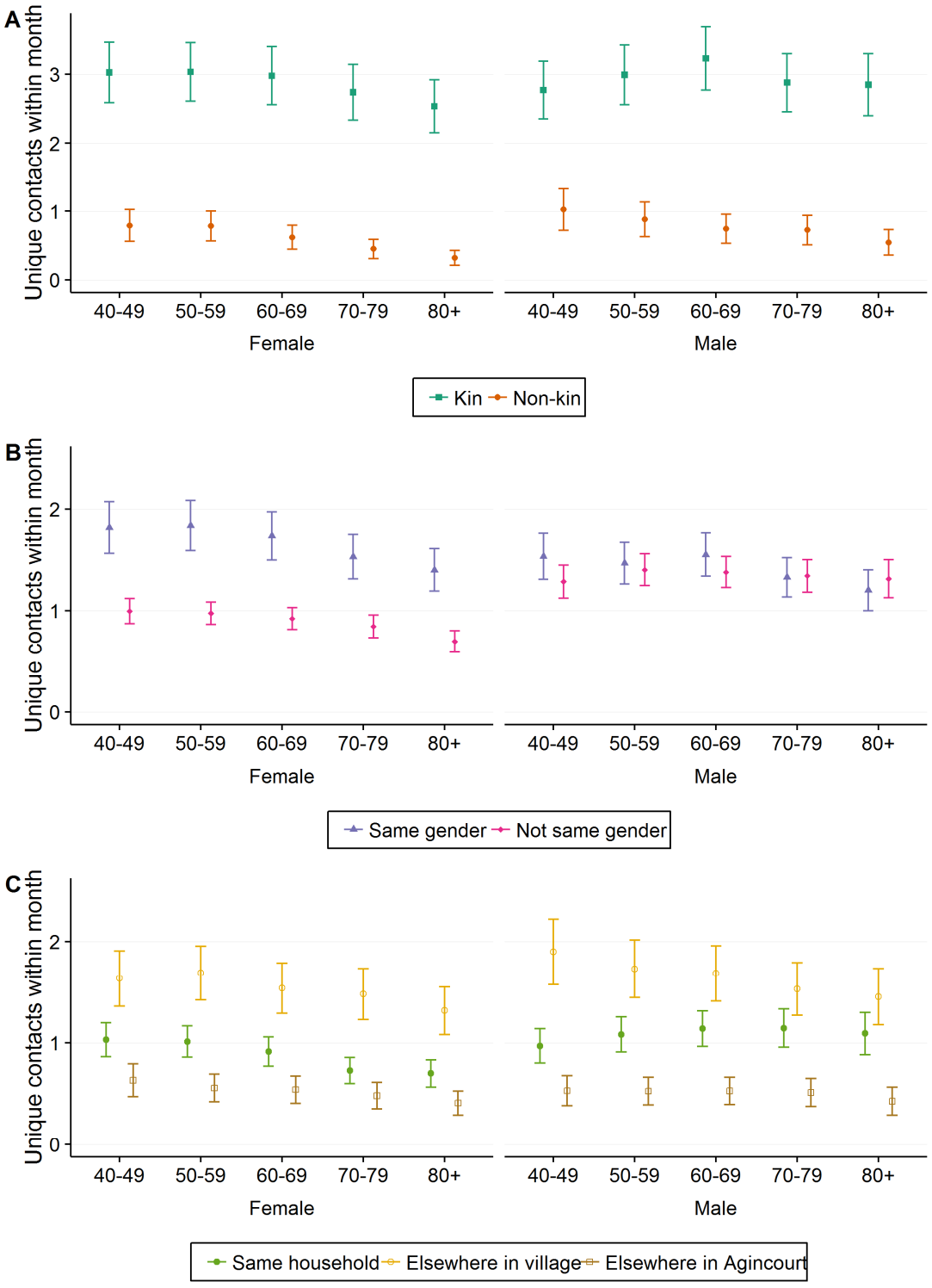
Values from models containing age/sex, month of interview and interviewer identity (unadjusted) plus marital status, country of origin, educational attainment, employment status and household size and wealth (adjusted), at December 2014 response rates.

Figure 2: Predicted number of important monthly alters, stratified by marital status



Values from a single model containing a full interaction of age/sex and marital status, as well as month of interview and interviewer identity, at December 2014 response rates. There were insufficient never married 70-79 year-old men to include this stratum in the model.

Figure 3: Predicted number of important monthly alters, stratified by kin, gender and location



Values from models containing age/sex, month of interview and interviewer identity, at December 2014 response rates.

Supplementary Material

Title: Social networks and social support among older adults in rural South Africa

Supplementary Table 1: Association between age & gender and unique daily/almost-daily alters

	In-person communication				Phone/text/email communication			
Age & gender								
Male 40-49	1.00		1.00		1.00		1.00	
Male 50-59	1.00	[0.87 - 1.15]	0.97	[0.84 - 1.12]	0.98	[0.79 - 1.21]	1.02	[0.82 - 1.28]
Male 60-69	1.01	[0.88 - 1.16]	0.96	[0.83 - 1.12]	1.01	[0.82 - 1.25]	1.08	[0.86 - 1.35]
Male 70-79	0.95	[0.82 - 1.11]	0.93	[0.79 - 1.10]	0.88	[0.70 - 1.11]	0.99	[0.77 - 1.28]
Male 80+	0.97	[0.81 - 1.17]	0.96	[0.78 - 1.17]	0.85	[0.64 - 1.14]	0.97	[0.71 - 1.33]
Female 40-49	0.85	[0.73 - 0.99]	0.84	[0.72 - 0.98]	1.28	[1.03 - 1.58]	1.26	[1.01 - 1.57]
Female 50-59	0.88	[0.77 - 1.01]	0.91	[0.79 - 1.05]	1.10	[0.90 - 1.35]	1.21	[0.97 - 1.50]
Female 60-69	0.85	[0.73 - 0.98]	0.93	[0.79 - 1.10]	0.90	[0.73 - 1.12]	1.13	[0.89 - 1.44]
Female 70-79	0.76	[0.65 - 0.90]	0.90	[0.75 - 1.08]	0.77	[0.60 - 0.98]	1.07	[0.81 - 1.40]
Female 80+	0.75	[0.63 - 0.89]	0.94	[0.77 - 1.15]	0.70	[0.54 - 0.92]	1.05	[0.77 - 1.43]
Education level								
No formal education			1.00				1.00	
Some primary (1-7 years)			1.01	[0.92 - 1.10]			1.12	[0.99 - 1.28]
Some secondary (8-11 years)			1.00	[0.88 - 1.13]			1.28	[1.07 - 1.53]
Secondary or more (12+ years)			0.97	[0.85 - 1.11]			1.45	[1.21 - 1.74]
Country of origin								
South Africa			1.00				1.00	
Mozambique/other			1.00	[0.92 - 1.09]			1.02	[0.90 - 1.16]
Marital status								
Currently married			1.00				1.00	
Never married			0.72	[0.61 - 0.84]			0.72	[0.57 - 0.90]
Separated/divorced			0.76	[0.68 - 0.86]			0.70	[0.59 - 0.84]
Widowed			0.70	[0.64 - 0.77]			0.75	[0.66 - 0.86]
Employment status								
Not working			1.00				1.00	
Employed (part or full time)			1.08	[0.98 - 1.19]			1.08	[0.94 - 1.25]
Not working outside the home			0.97	[0.85 - 1.11]			1.11	[0.88 - 1.40]
Household composition								
Living alone			1.00				1.00	
Living with one other person			1.16	[0.99 - 1.36]			1.10	[0.87 - 1.38]
Living in 3-6 person household			1.23	[1.07 - 1.40]			1.09	[0.90 - 1.32]
Living in 7+ person household			1.24	[1.08 - 1.43]			1.08	[0.88 - 1.32]
Wealth index								
Least wealthy quintile			1.00				1.00	
Quintile 2			1.01	[0.91 - 1.12]			1.06	[0.90 - 1.25]
Quintile 3			0.97	[0.87 - 1.09]			1.08	[0.92 - 1.27]
Quintile 4			0.96	[0.86 - 1.07]			1.07	[0.90 - 1.26]
Most wealthy quintile			0.98	[0.88 - 1.10]			1.18	[1.00 - 1.39]
Interviewer-level variance	0.01	[0.00 - 0.02]	0.01	[0.00 - 0.02]	0.49	[0.21 - 0.78]	0.49	[0.21 - 0.77]
Akaike Information Criterion		9,784.9		9,202.6		6,767.3		6,409.2
Number of observations		5,059		4,797		5,059		4,797

These results are from two-level Poisson regression models also containing indicator variables for month of interview.

Supplementary Table 2: Association between age & gender and approximate monthly frequency of communication

	In-person communication				Phone/text/email communication			
Age & gender								
Male 40-49	1.00		1.00		1.00		1.00	
Male 50-59	0.95	[0.85 - 1.07]	0.92	[0.82 - 1.03]	0.99	[0.87 - 1.13]	1.06	[0.92 - 1.21]
Male 60-69	0.95	[0.85 - 1.06]	0.91	[0.80 - 1.02]	1.06	[0.93 - 1.21]	1.13	[0.98 - 1.30]
Male 70-79	0.92	[0.81 - 1.05]	0.90	[0.79 - 1.03]	0.91	[0.79 - 1.05]	1.03	[0.88 - 1.19]
Male 80+	0.82	[0.70 - 0.95]	0.81	[0.69 - 0.95]	0.77	[0.65 - 0.92]	0.87	[0.72 - 1.05]
Female 40-49	0.80	[0.71 - 0.90]	0.81	[0.72 - 0.92]	1.13	[0.98 - 1.30]	1.17	[1.02 - 1.35]
Female 50-59	0.85	[0.76 - 0.95]	0.89	[0.79 - 0.99]	1.08	[0.95 - 1.22]	1.24	[1.09 - 1.42]
Female 60-69	0.78	[0.70 - 0.88]	0.87	[0.77 - 0.99]	0.96	[0.84 - 1.10]	1.23	[1.06 - 1.42]
Female 70-79	0.68	[0.60 - 0.77]	0.83	[0.72 - 0.95]	0.73	[0.63 - 0.84]	1.04	[0.89 - 1.23]
Female 80+	0.63	[0.55 - 0.72]	0.82	[0.70 - 0.95]	0.62	[0.53 - 0.72]	0.98	[0.82 - 1.18]
Education level								
No formal education			1.00				1.00	
Some primary (1-7 years)			1.04	[0.97 - 1.11]			1.16	[1.07 - 1.25]
Some secondary (8-11 years)			1.02	[0.92 - 1.12]			1.32	[1.18 - 1.48]
Secondary or more (12+ years)			0.98	[0.89 - 1.09]			1.39	[1.23 - 1.56]
Country of origin								
South Africa			1.00				1.00	
Mozambique/other			0.97	[0.91 - 1.04]			1.02	[0.95 - 1.10]
Marital status								
Currently married			1.00				1.00	
Never married			0.66	[0.58 - 0.74]			0.57	[0.49 - 0.65]
Separated/divorced			0.73	[0.67 - 0.80]			0.69	[0.62 - 0.76]
Widowed			0.67	[0.63 - 0.72]			0.71	[0.65 - 0.77]
Employment status								
Not working			1.00				1.00	
Employed (part or full time)			1.08	[1.00 - 1.17]			1.08	[0.98 - 1.18]
Not working outside the home			0.90	[0.83 - 0.98]			1.00	[0.91 - 1.10]
Household composition								
Living alone			1.00				1.00	
Living with one other person			1.17	[1.05 - 1.32]			1.18	[1.03 - 1.34]
Living in 3-6 person household			1.24	[1.13 - 1.36]			1.16	[1.04 - 1.29]
Living in 7+ person household			1.28	[1.16 - 1.42]			1.14	[1.02 - 1.28]
Wealth index								
Least wealthy quintile			1.00				1.00	
Quintile 2			1.03	[0.95 - 1.12]			1.07	[0.97 - 1.17]
Quintile 3			1.03	[0.95 - 1.12]			1.24	[1.13 - 1.37]
Quintile 4			0.95	[0.87 - 1.03]			1.13	[1.02 - 1.25]
Most wealthy quintile			1.01	[0.92 - 1.10]			1.28	[1.16 - 1.42]
Interviewer-level variance	0.12	[0.02 - 0.21]	0.14	[0.03 - 0.25]	0.48	[0.11 - 0.85]	0.49	[0.12 - 0.87]
Akaike Information Criterion		49,242.1		46,490.8		45,329.7		42,817.2
Number of observations		5,059		4,797		5,059		4,797

These results are from two-level negative binomial regression models also containing indicator variables for month of interview.

Supplementary Table 3: Association between age & gender and density of at-least monthly contacts between alters

Age & gender				
Male 40-49	-		-	
Male 50-59	- 0.02	[-0.05 - 0.02]	-0.02	[-0.06 - 0.02]
Male 60-69	- 0.01	[-0.05 - 0.03]	-0.03	[-0.07 - 0.02]
Male 70-79	0.03	[-0.01 - 0.07]	0.00	[-0.04 - 0.05]
Male 80+	0.04	[-0.01 - 0.10]	0.01	[-0.04 - 0.07]
Female 40-49	- 0.05	[-0.09 - -0.01]	-0.05	[-0.09 - -0.01]
Female 50-59	- 0.01	[-0.05 - 0.02]	-0.02	[-0.06 - 0.02]
Female 60-69	0.02	[-0.02 - 0.05]	-0.00	[-0.04 - 0.04]
Female 70-79	0.02	[-0.02 - 0.06]	0.01	[-0.04 - 0.06]
Female 80+	0.02	[-0.03 - 0.07]	-0.01	[-0.06 - 0.05]
Education level				
No formal education			-	
Some primary (1-7 years)			-0.00	[-0.03 - 0.02]
Some secondary (8-11 years)			-0.03	[-0.06 - 0.00]
Secondary or more (12+ years)			-0.05	[-0.08 - -0.01]
Country of origin				
South Africa			-	
Mozambique/other			-0.00	[-0.02 - 0.02]
Marital status				
Currently married			-	
Never married			-0.02	[-0.06 - 0.03]
Separated/divorced			-0.02	[-0.05 - 0.01]
Widowed			-0.02	[-0.04 - 0.01]
Employment status				
Not working			-	
Employed (part or full time)			-0.02	[-0.05 - 0.00]
Not working outside the home			-0.05	[-0.08 - -0.01]
Household composition				
Living alone			-	
Living with one other person			0.06	[0.02 - 0.10]
Living in 3-6 person household			0.05	[0.01 - 0.08]
Living in 7+ person household			0.06	[0.02 - 0.09]
Wealth index				
Least wealthy quintile			-	
Quintile 2			-0.00	[-0.03 - 0.03]
Quintile 3			-0.01	[-0.04 - 0.02]
Quintile 4			-0.01	[-0.04 - 0.02]
Most wealthy quintile			-0.02	[-0.05 - 0.01]
Number of monthly contacts				
2			0.06	[0.01 - 0.12]
3			0.03	[-0.02 - 0.09]
4			0.02	[-0.03 - 0.07]
5			0.01	[-0.05 - 0.06]
6			-0.02	[-0.08 - 0.03]
7			-	
Interviewer-level variance	0.02	[0.01 - 0.03]	0.02	[0.01 - 0.03]
Akaike Information Criterion		1,028.8		986.8
Number of observations		4,098		3,907

These results are from two-level linear regression models also containing indicator variables for month of interview; a minimum of two named alters required for calculation.

Supplementary Table 4: Association between age & gender and receipt of social support

A. Alters providing at-least monthly social support

	Informational		Emotional		Financial		Physical	
Male 40-49	1.00		1.00		1.00		1.00	
Male 50-59	0.90	[0.77 - 1.05]	0.94	[0.80 - 1.12]	1.04	[0.84 - 1.29]	1.03	[0.88 - 1.21]
Male 60-69	1.05	[0.90 - 1.21]	1.05	[0.90 - 1.24]	1.19	[0.97 - 1.46]	1.11	[0.95 - 1.30]
Male 70-79	0.86	[0.73 - 1.02]	0.91	[0.76 - 1.09]	0.99	[0.79 - 1.23]	1.06	[0.89 - 1.25]
Male 80+	0.84	[0.69 - 1.03]	0.93	[0.75 - 1.16]	1.11	[0.85 - 1.45]	0.98	[0.80 - 1.20]
Female 40-49	0.90	[0.77 - 1.06]	1.00	[0.84 - 1.20]	0.80	[0.63 - 1.02]	0.72	[0.60 - 0.86]
Female 50-59	0.84	[0.73 - 0.98]	0.95	[0.81 - 1.12]	0.84	[0.68 - 1.04]	0.77	[0.66 - 0.90]
Female 60-69	0.84	[0.72 - 0.98]	0.82	[0.69 - 0.98]	0.68	[0.54 - 0.85]	0.68	[0.58 - 0.81]
Female 70-79	0.70	[0.59 - 0.84]	0.74	[0.61 - 0.90]	0.70	[0.54 - 0.90]	0.64	[0.53 - 0.78]
Female 80+	0.65	[0.54 - 0.79]	0.72	[0.59 - 0.88]	0.76	[0.59 - 0.98]	0.72	[0.59 - 0.88]
Interviewer-level variance	1.29	[0.59 - 1.98]	1.26	[0.58 - 1.93]	0.87	[0.39 - 1.34]	0.57	[0.26 - 0.88]
Akaike Information Criterion		9,167.3		8,134.7		6,517.2		9,097.7
Number of observations		5,059		5,059		5,059		5,059

These results are from two-level Poisson regression models also containing indicator variables for month of interview.

B. Frequency of social support provision per month

	Informational		Emotional		Financial		Physical	
Male 40-49	1.00		1.00		1.00		1.00	
Male 50-59	0.98	[0.85 - 1.12]	1.02	[0.88 - 1.18]	0.98	[0.82 - 1.17]	1.02	[0.88 - 1.18]
Male 60-69	1.09	[0.95 - 1.26]	1.16	[1.00 - 1.34]	1.08	[0.90 - 1.29]	1.05	[0.90 - 1.21]
Male 70-79	0.91	[0.78 - 1.05]	1.01	[0.86 - 1.18]	1.01	[0.83 - 1.23]	1.03	[0.88 - 1.21]
Male 80+	0.87	[0.72 - 1.05]	0.87	[0.72 - 1.06]	1.07	[0.84 - 1.36]	0.93	[0.76 - 1.13]
Female 40-49	0.99	[0.85 - 1.14]	1.11	[0.95 - 1.30]	0.74	[0.61 - 0.89]	0.81	[0.69 - 0.94]
Female 50-59	0.92	[0.81 - 1.06]	1.02	[0.89 - 1.18]	0.87	[0.73 - 1.03]	0.81	[0.70 - 0.93]
Female 60-69	0.91	[0.79 - 1.05]	0.91	[0.78 - 1.05]	0.71	[0.59 - 0.85]	0.71	[0.61 - 0.83]
Female 70-79	0.67	[0.58 - 0.79]	0.72	[0.61 - 0.84]	0.61	[0.49 - 0.74]	0.58	[0.49 - 0.68]
Female 80+	0.65	[0.55 - 0.77]	0.74	[0.62 - 0.88]	0.72	[0.58 - 0.89]	0.70	[0.59 - 0.83]
Interviewer-level variance	1.26	[0.35 - 2.17]	1.06	[0.31 - 1.80]	1.05	[0.35 - 1.75]	0.54	[0.14 - 0.94]
Akaike Information Criterion		43,099		41,790		35,247		41,868
No. of observations		5,059		5,059		5,059		5,059

These results are from two-level negative binomial regression models also containing indicator variables for month of interview.

Supplementary Table 5: Association between age & gender and unique at-least monthly alters, stratified by alter gender

	Same gender				Not same gender			
Age & gender								
Male 40-49	1.00		1.00		1.00		1.00	
Male 50-59	0.96	[0.86 - 1.06]	0.96	[0.87 - 1.07]	1.09	[0.98 - 1.22]	1.00	[0.89 - 1.13]
Male 60-69	1.01	[0.92 - 1.11]	1.04	[0.94 - 1.16]	1.07	[0.96 - 1.20]	0.94	[0.83 - 1.06]
Male 70-79	0.86	[0.77 - 0.97]	0.91	[0.81 - 1.02]	1.04	[0.93 - 1.17]	0.95	[0.83 - 1.08]
Male 80+	0.78	[0.68 - 0.90]	0.82	[0.71 - 0.96]	1.02	[0.88 - 1.18]	0.93	[0.80 - 1.09]
Female 40-49	1.18	[1.07 - 1.31]	1.16	[1.04 - 1.28]	0.77	[0.68 - 0.87]	0.76	[0.67 - 0.87]
Female 50-59	1.20	[1.09 - 1.31]	1.19	[1.07 - 1.31]	0.76	[0.68 - 0.85]	0.80	[0.71 - 0.90]
Female 60-69	1.13	[1.03 - 1.24]	1.14	[1.03 - 1.27]	0.72	[0.64 - 0.81]	0.82	[0.72 - 0.94]
Female 70-79	1.00	[0.90 - 1.11]	1.05	[0.93 - 1.19]	0.66	[0.57 - 0.75]	0.86	[0.74 - 1.00]
Female 80+	0.91	[0.81 - 1.02]	0.98	[0.86 - 1.13]	0.54	[0.46 - 0.63]	0.83	[0.69 - 0.99]
Education level								
No formal education			1.00				1.00	
Some primary (1-7 years)			1.07	[1.01 - 1.13]			1.01	[0.94 - 1.08]
Some secondary (8-11 years)			1.14	[1.05 - 1.24]			1.02	[0.92 - 1.13]
Secondary or more (12+ years)			1.14	[1.05 - 1.24]			1.03	[0.92 - 1.14]
Country of origin								
South Africa			1.00				1.00	
Mozambique/other			0.98	[0.93 - 1.04]			1.03	[0.96 - 1.10]
Marital status								
Currently married			1.00				1.00	
Never married			0.85	[0.76 - 0.94]			0.44	[0.37 - 0.51]
Separated/divorced			1.01	[0.94 - 1.09]			0.51	[0.46 - 0.57]
Widowed			1.03	[0.97 - 1.09]			0.48	[0.44 - 0.52]
Employment status								
Not working			1.00				1.00	
Employed (part or full time)			1.05	[0.98 - 1.12]			1.04	[0.96 - 1.13]
Not working outside the home			1.08	[0.99 - 1.18]			1.24	[1.11 - 1.39]
Household composition								
Living alone			1.00				1.00	
Living with one other person			1.03	[0.93 - 1.14]			1.07	[0.94 - 1.21]
Living in 3-6 person household			1.09	[1.00 - 1.18]			0.97	[0.86 - 1.08]
Living in 7+ person household			1.11	[1.02 - 1.21]			0.99	[0.88 - 1.11]
Wealth index								
Least wealthy quintile			1.00				1.00	
Quintile 2			1.04	[0.96 - 1.11]			1.04	[0.95 - 1.14]
Quintile 3			1.05	[0.98 - 1.13]			1.06	[0.97 - 1.16]
Quintile 4			1.02	[0.95 - 1.10]			1.03	[0.94 - 1.13]
Most wealthy quintile			1.11	[1.03 - 1.19]			1.00	[0.91 - 1.10]
Interviewer-level variance	0.11	[0.05 - 0.18]	0.11	[0.05 - 0.17]	0.06	[0.02 - 0.09]	0.05	[0.02 - 0.08]
Akaike Information Criterion		15,476.1		14,653.8		13,143.6		11,904.9
Number of observations		5,059		4,797		5,059		4,797

These results are from two-level Poisson regression models also containing indicator variables for month of interview.

Supplementary Table 6: Association between age & gender and unique at-least monthly alters, stratified by alter kinship

	Kin				Non-kin			
Age & gender								
Male 40-49	1.00		1.00		1.00		1.00	
Male 50-59	1.08	[0.99 - 1.18]	1.03	[0.94 - 1.13]	0.86	[0.72 - 1.03]	0.88	[0.73 - 1.06]
Male 60-69	1.17	[1.07 - 1.27]	1.08	[0.99 - 1.19]	0.72	[0.60 - 0.87]	0.79	[0.65 - 0.96]
Male 70-79	1.04	[0.95 - 1.14]	0.99	[0.90 - 1.10]	0.71	[0.58 - 0.86]	0.78	[0.63 - 0.98]
Male 80+	1.03	[0.92 - 1.15]	0.98	[0.87 - 1.11]	0.53	[0.41 - 0.69]	0.61	[0.46 - 0.81]
Female 40-49	1.09	[1.00 - 1.20]	1.06	[0.96 - 1.16]	0.77	[0.64 - 0.94]	0.78	[0.64 - 0.95]
Female 50-59	1.10	[1.01 - 1.19]	1.10	[1.01 - 1.20]	0.76	[0.64 - 0.91]	0.79	[0.66 - 0.95]
Female 60-69	1.08	[0.99 - 1.17]	1.14	[1.04 - 1.26]	0.60	[0.50 - 0.73]	0.64	[0.51 - 0.79]
Female 70-79	0.99	[0.90 - 1.09]	1.14	[1.02 - 1.26]	0.44	[0.35 - 0.55]	0.49	[0.38 - 0.64]
Female 80+	0.92	[0.83 - 1.01]	1.14	[1.01 - 1.28]	0.31	[0.24 - 0.40]	0.36	[0.27 - 0.49]
Education level								
No formal education			1.00				1.00	
Some primary (1-7 years)			1.05	[1.00 - 1.10]			1.05	[0.93 - 1.18]
Some secondary (8-11 years)			1.10	[1.02 - 1.18]			1.08	[0.92 - 1.28]
Secondary or more (12+ years)			1.10	[1.02 - 1.18]			1.10	[0.93 - 1.31]
Country of origin								
South Africa			1.00				1.00	
Mozambique/other			1.02	[0.97 - 1.07]			0.96	[0.86 - 1.08]
Marital status								
Currently married			1.00				1.00	
Never married			0.58	[0.53 - 0.65]			0.90	[0.74 - 1.10]
Separated/divorced			0.72	[0.67 - 0.77]			1.02	[0.88 - 1.19]
Widowed			0.71	[0.68 - 0.75]			1.01	[0.90 - 1.15]
Employment status								
Not working			1.00				1.00	
Employed (part or full time)			1.04	[0.98 - 1.10]			1.09	[0.96 - 1.25]
Not working outside the home			1.22	[1.12 - 1.32]			0.84	[0.68 - 1.02]
Household composition								
Living alone			1.00				1.00	
Living with one other person			1.09	[1.00 - 1.19]			0.96	[0.78 - 1.18]
Living in 3-6 person household			1.05	[0.97 - 1.13]			1.11	[0.94 - 1.31]
Living in 7+ person household			1.09	[1.01 - 1.18]			1.03	[0.87 - 1.23]
Wealth index								
Least wealthy quintile			1.00				1.00	
Quintile 2			1.03	[0.97 - 1.10]			1.09	[0.94 - 1.26]
Quintile 3			1.09	[1.02 - 1.16]			0.96	[0.83 - 1.12]
Quintile 4			1.06	[0.99 - 1.13]			0.89	[0.77 - 1.04]
Most wealthy quintile			1.07	[1.00 - 1.14]			1.08	[0.93 - 1.26]
Interviewer-level variance	0.11	[0.05 - 0.16]	0.10	[0.04 - 0.15]	0.32	[0.13 - 0.52]	0.32	[0.13 - 0.51]
Akaike Information Criterion		17,123.4		15,834.0		10,156.8		9,679.9
Number of observations		5,059		4,797		5,059		4,797

These results are from two-level Poisson regression models also containing indicator variables for month of interview.

Supplementary Table 7: Association between age & gender and unique at-least monthly alters, stratified by alter location

	Same household				Elsewhere in same village				Elsewhere in Agincourt			
Age & gender												
Male 40-49	1.00		1.00		1.00		1.00		1.00		1.00	
Male 50-59	1.12	[0.97 - 1.28]	1.01	[0.87 - 1.17]	0.91	[0.82 - 1.01]	0.91	[0.81 - 1.01]	0.99	[0.80 - 1.24]	0.92	[0.73 - 1.16]
Male 60-69	1.17	[1.02 - 1.35]	0.97	[0.83 - 1.12]	0.89	[0.80 - 0.99]	0.92	[0.82 - 1.03]	1.00	[0.80 - 1.24]	1.03	[0.81 - 1.30]
Male 70-79	1.18	[1.02 - 1.37]	1.01	[0.86 - 1.19]	0.81	[0.72 - 0.91]	0.82	[0.72 - 0.93]	0.97	[0.76 - 1.23]	1.08	[0.84 - 1.40]
Male 80+	1.13	[0.94 - 1.35]	0.99	[0.81 - 1.20]	0.77	[0.66 - 0.89]	0.77	[0.66 - 0.91]	0.81	[0.60 - 1.09]	0.92	[0.67 - 1.27]
Female 40-49	1.06	[0.92 - 1.23]	0.99	[0.85 - 1.15]	0.86	[0.77 - 0.96]	0.89	[0.79 - 1.00]	1.20	[0.96 - 1.49]	1.15	[0.92 - 1.44]
Female 50-59	1.04	[0.91 - 1.20]	1.04	[0.90 - 1.21]	0.89	[0.80 - 0.99]	0.91	[0.82 - 1.02]	1.05	[0.85 - 1.30]	1.03	[0.83 - 1.29]
Female 60-69	0.94	[0.82 - 1.09]	1.11	[0.95 - 1.30]	0.81	[0.73 - 0.90]	0.82	[0.72 - 0.93]	1.02	[0.82 - 1.27]	1.10	[0.86 - 1.40]
Female 70-79	0.75	[0.64 - 0.88]	1.04	[0.86 - 1.26]	0.78	[0.69 - 0.88]	0.79	[0.69 - 0.91]	0.91	[0.72 - 1.15]	1.12	[0.85 - 1.46]
Female 80+	0.72	[0.60 - 0.86]	1.21	[0.98 - 1.50]	0.69	[0.61 - 0.79]	0.71	[0.61 - 0.83]	0.77	[0.59 - 1.01]	1.07	[0.79 - 1.45]
Education level												
No formal education			1.00				1.00				1.00	
Some primary (1-7 years)			0.96	[0.88 - 1.04]			1.04	[0.98 - 1.11]			1.22	[1.07 - 1.39]
Some secondary (8-11 years)			0.90	[0.79 - 1.01]			1.07	[0.97 - 1.18]			1.38	[1.15 - 1.66]
Secondary or more (12+ years)			0.93	[0.82 - 1.05]			1.00	[0.91 - 1.11]			1.22	[1.01 - 1.47]
Country of origin												
South Africa			1.00				1.00				1.00	
Mozambique/other			1.11	[1.02 - 1.20]			0.94	[0.88 - 1.00]			0.97	[0.85 - 1.10]
Marital status												
Currently married			1.00				1.00				1.00	
Never married			0.43	[0.35 - 0.52]			0.83	[0.73 - 0.93]			0.69	[0.54 - 0.89]
Separated/divorced			0.43	[0.38 - 0.50]			1.06	[0.97 - 1.15]			0.81	[0.69 - 0.96]
Widowed			0.40	[0.36 - 0.44]			1.01	[0.95 - 1.08]			0.85	[0.75 - 0.97]
Employment status												
Not working			1.00				1.00				1.00	
Employed (part or full time)			1.04	[0.94 - 1.14]			1.03	[0.95 - 1.12]			1.34	[1.15 - 1.55]
Not working outside the home			1.06	[0.92 - 1.22]			1.07	[0.96 - 1.20]			1.42	[1.18 - 1.71]
Household composition												
Living alone			1.00				1.00				1.00	
Living with one other person			2.98	[2.31 - 3.85]			0.95	[0.86 - 1.06]			0.97	[0.78 - 1.21]
Living in 3-6 person household			3.63	[2.87 - 4.60]			0.92	[0.84 - 1.01]			0.90	[0.74 - 1.08]
Living in 7+ person household			4.05	[3.18 - 5.14]			0.87	[0.79 - 0.96]			0.81	[0.67 - 0.99]

	Same household				Elsewhere in same village				Elsewhere in Agincourt			
Wealth index												
Least wealthy quintile			1.00				1.00				1.00	
Quintile 2			1.04	[0.93 - 1.16]			1.01	[0.93 - 1.09]			1.16	[0.97 - 1.37]
Quintile 3			1.18	[1.06 - 1.32]			0.97	[0.89 - 1.05]			1.21	[1.02 - 1.43]
Quintile 4			1.17	[1.05 - 1.31]			0.86	[0.79 - 0.93]			1.28	[1.08 - 1.52]
Most wealthy quintile			1.22	[1.09 - 1.37]			0.81	[0.74 - 0.89]			1.47	[1.23 - 1.75]
Interviewer-level variance	0.04	[0.01 - 0.07]	0.04	[0.01 - 0.06]	0.11	[0.05 - 0.18]	0.12	[0.05 - 0.19]	0.20	[0.08 - 0.32]	0.16	[0.06 - 0.26]
Akaike Information Criterion		11,359.7		9,725.2		14,895.4		14,100.3		7,791.4		7,330.3
Number of observations		5,059		4,797		5,059		4,797		5,059		4,797

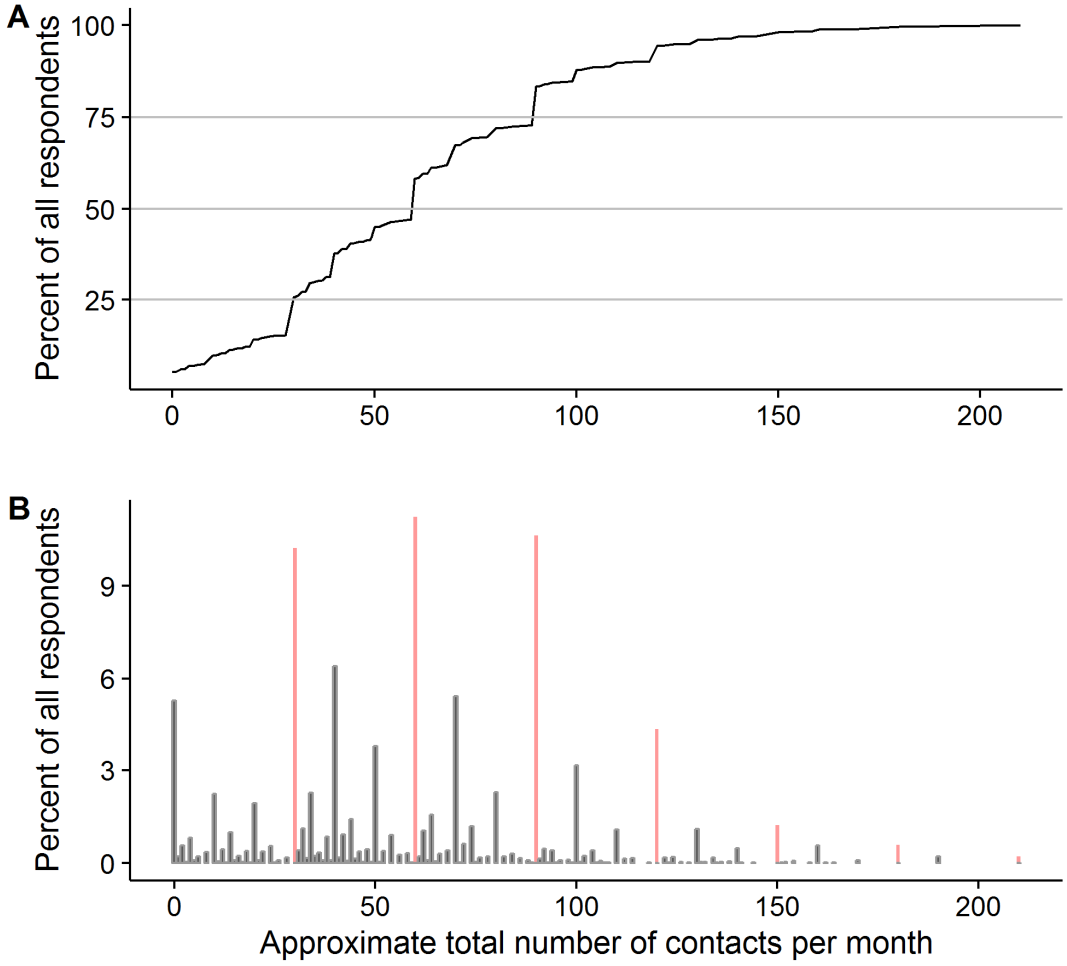
These results are from two-level Poisson regression models also containing indicator variables for month of interview.

Supplementary Table 8: Association between age and gender and unique at-least monthly alters, stratified by respondent's marital status

	Currently married		Never married		Separated/divorced		Widowed	
Age & gender								
Male 40-49	1.00		0.56	[0.47 - 0.66]	0.72	[0.62 - 0.84]	0.68	[0.48 - 0.97]
Male 50-59	0.92	[0.84 - 1.01]	0.58	[0.47 - 0.71]	0.69	[0.59 - 0.79]	0.79	[0.66 - 0.95]
Male 60-69	0.93	[0.86 - 1.02]	0.47	[0.30 - 0.71]	0.65	[0.55 - 0.77]	0.67	[0.57 - 0.79]
Male 70-79	0.86	[0.78 - 0.95]	-	-	0.54	[0.43 - 0.67]	0.65	[0.56 - 0.77]
Male 80+	0.81	[0.72 - 0.91]	0.79	[0.42 - 1.48]	0.49	[0.30 - 0.80]	0.59	[0.49 - 0.72]
Female 40-49	0.93	[0.84 - 1.02]	0.66	[0.54 - 0.79]	0.73	[0.61 - 0.86]	0.74	[0.65 - 0.86]
Female 50-59	0.94	[0.86 - 1.03]	0.64	[0.50 - 0.82]	0.75	[0.66 - 0.85]	0.74	[0.67 - 0.82]
Female 60-69	0.98	[0.89 - 1.09]	0.66	[0.49 - 0.88]	0.71	[0.62 - 0.81]	0.69	[0.62 - 0.76]
Female 70-79	0.85	[0.74 - 0.97]	0.74	[0.50 - 1.08]	0.71	[0.58 - 0.87]	0.66	[0.60 - 0.73]
Female 80+	0.87	[0.68 - 1.11]	0.56	[0.28 - 1.12]	0.75	[0.58 - 0.97]	0.60	[0.54 - 0.66]
Interviewer-level variance							0.07	[0.03 - 0.11]
Akaike Information Criterion								17,260.2
Number of observations								5,055

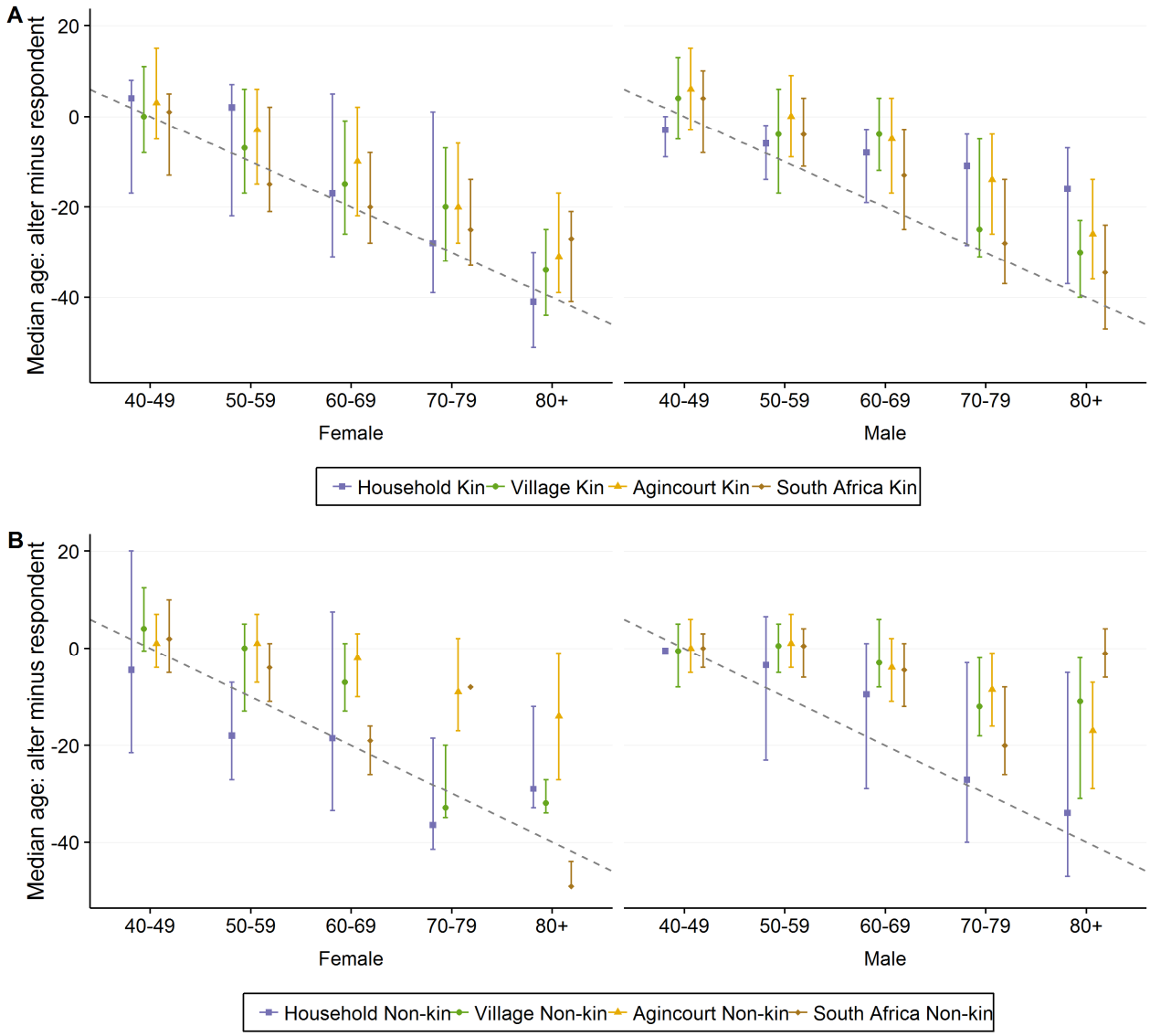
These results are from a single two-level Poisson regression model containing indicator variables for month of interview and an interaction of age/gender categories and marital status categories. All values are thus relative to a married 40-49 year old man. Insufficient never married men present to estimate.

Supplementary Figure 1: Distribution of monthly communication contacts from important others



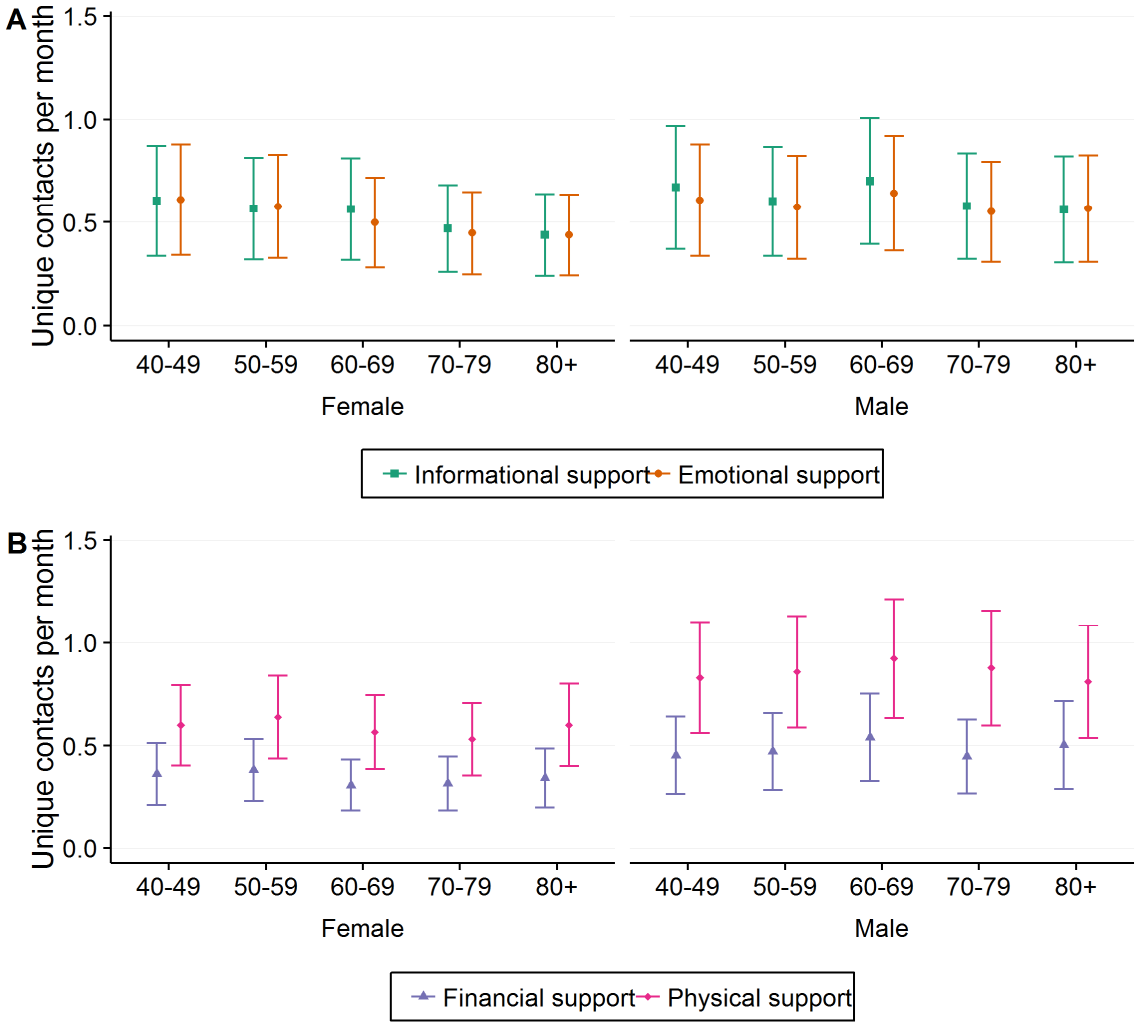
Cumulative distribution (panel A) and point frequency (B) of number of average monthly communication contacts with important others. Pale red bars in panel B are at multiples of 30 contacts.

Supplementary Figure 2: Distribution of age-differences between alters and respondents, stratified by alter location and kin status



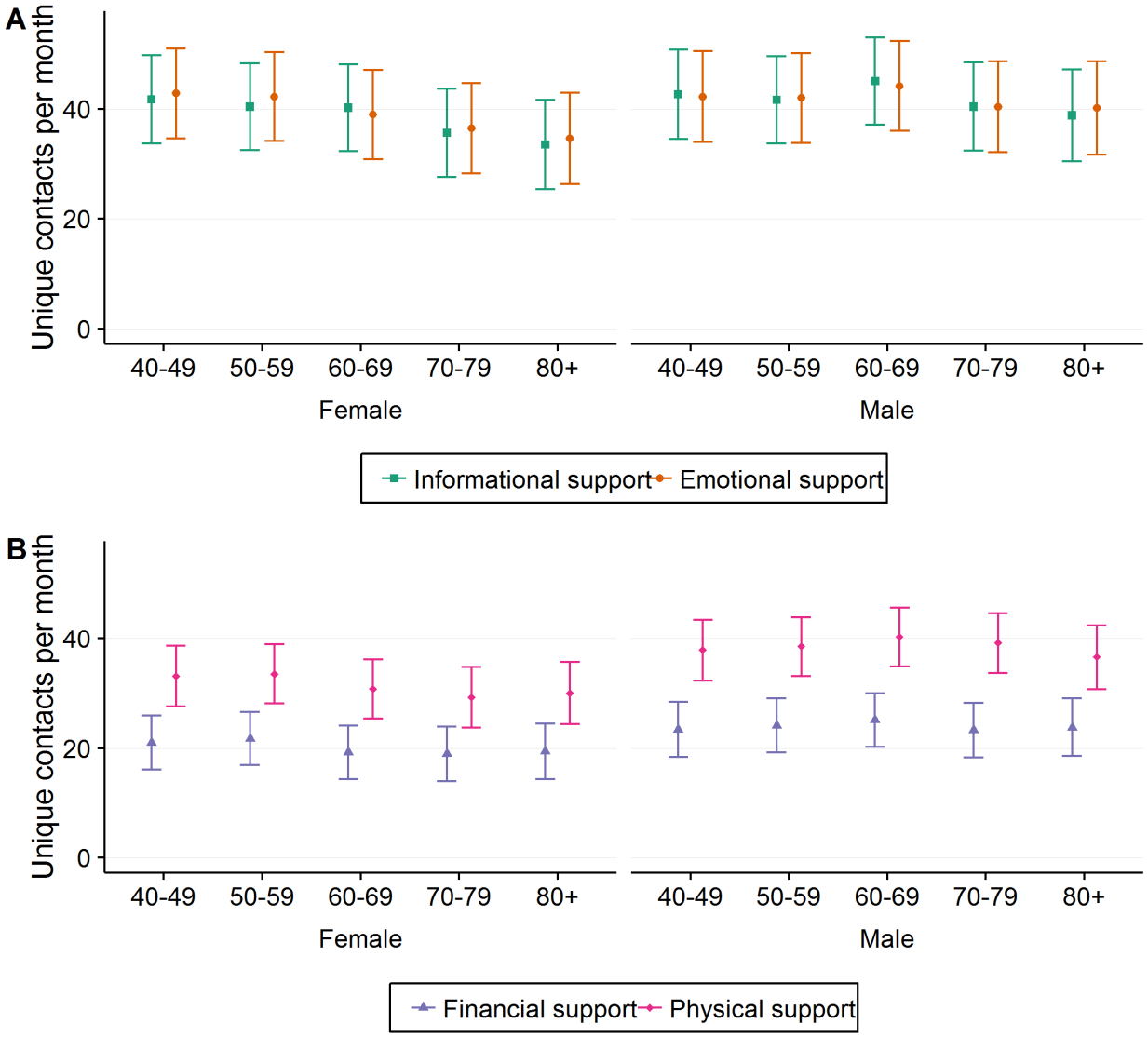
Plots show median and interquartile range of age differences in each category. Data covers the 10,575 of 12,994 alters (81.4%) reported to have at-least monthly contact with respondents, for whom an age was provided. Grey dashed line is of consistent age ~45 across respondent age categories.

Supplementary Figure 3: Predicted number of important monthly alters providing social support per month



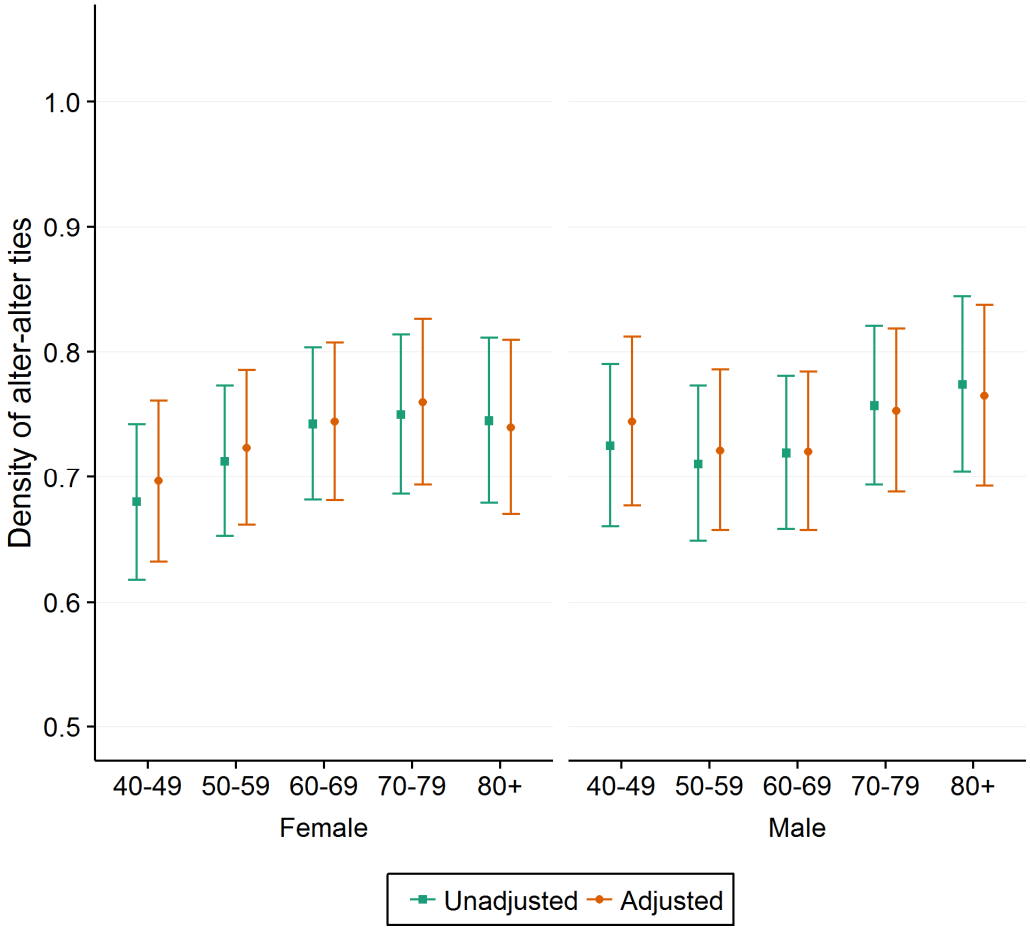
Values from models containing age/sex, month of interview and interviewer identity, at December 2014 response rates.

Supplementary Figure 4: Predicted approximate frequency of social support provided per month



Values from models containing age/sex, month of interview and interviewer identity, at December 2014 response rates.

Supplementary Figure 5: Predicted density of at-least monthly communication amongst at-least monthly alters



Values from models containing age/sex, month of interview and interviewer identity (unadjusted) plus marital status, country of origin, educational attainment, employment status and household size and wealth (adjusted), at December 2014 response rates.