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Personal Network Size and Social Accompaniment: Protective or Risk Factor for Momentary Loneliness, and for Whom?

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Abstract

Personal networks yield important health benefits for individuals, in part by providing more opportunities to be in the company of others throughout daily life. Social accompaniment is generally believed to protect against momentary feelings of loneliness, although this hypothesis remains understudied. We examine how personal network size shapes older adults' experiences of momentary loneliness and whether this association varies by momentary social accompaniment. We use three waves of ecological momentary assessments (EMA; N = 12,359) and personal network data from 343 older adults in the Chicago Health and Activity Space in Real-Time study. Older adults with large personal networks experienced more intense momentary loneliness compared with those with smaller social networks when they were momentarily alone. This association was more pronounced among men. We discuss how research approaches that bridge global and momentary measures of social connectedness can reveal important nuances of our understanding of how interpersonal factors influence later-life well-being over time.

Keywords

loneliness, older adults, social networks, ecological momentary assessments, gender

INTRODUCTION

Increasing scholarly and public health attention focuses on an epidemic of loneliness among the older adult population (e.g., Prohaska et al. 2020), which carries implications for increased risks of poorer health and early mortality (Holt-Lunstad and Smith 2016). Personal networks—referring to one's core set of social confidants—play a significant role in shaping feelings of loneliness. Indeed, having fewer ties with close friends and family is associated with feeling lonely (Hawkley et al. 2019), while increases in socializing and network expansion can support transitions between lonely and nonlonely status (Dykstra, van Tilburg, and de Jong Gierveld 2005; Hawkley and Kocherginsky 2018). Loneliness is typically defined as a perceived deficiency or mismatch between actual and desired social relationships (Peplau and Perlman 1982). Therefore, it is not entirely surprising that having more social ties is associated with less loneliness. Greater social integration—conceptualized as the availability of or involvement with social ties (Berkman et al. 2000; Holt-Lunstad and Lefler

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2019), or the converse of social isolation, which is the absence of such ties—can provide more opportunities to engage with social connections in ways that buffer against feelings of loneliness (e.g., Cacioppo et al. 2015; Hawkley et al. 2008; Holt-Lunstad and Lefler 2019).

To date, the role of social network relationships in shaping loneliness has been largely studied using standard survey questions that ask respondents to report on the general characteristics of their personal relationships and their overall or "average" levels of loneliness (e.g., Schafer, Sun, and Lee 2022). More recently, however, studies have begun to examine loneliness in the shorter term, revealing that feelings of loneliness can fluctuate significantly over weeks or even days and that these fluctuations can depend on the social-contextual characteristics that an individual experiences in a given moment (Compernolle et al. 2021). Spending time in the company of someone else, for example, is associated with lower-intensity loneliness at that moment (Compernolle et al. 2021).

The sometimes fleeting nature of loneliness raises new questions about the relationship between *overall* social integration and *overall* ("trait-like") loneliness. Key assumptions in the literatures on personal networks, social isolation, and loneliness are that larger personal networks represent greater social integration, more structural opportunities for social engagement and spending time with or otherwise interacting with others (i.e., "social accompaniment"), and more potential sources of advice and support (Berkman et al. 2000; Holt-Lunstad and Steptoe 2022; Marsden 1987). These factors can protect against loneliness directly or by providing structural opportunities to potentially enhance relationship quality (Domènech-Abella et al. 2017; Holt-Lunstad and Steptoe 2022). Nevertheless, opportunities to empirically examine the relationship between personal network size, momentary social accompaniment, and momentary loneliness have been scarce, rendering the implications of having an overall larger or smaller personal network for *momentary* feelings of loneliness unclear and difficult to study. Indeed, many proposed mechanisms through which personal networks shape health and well-being often occur through routine activities with others (e.g., Berkman et al. 2000), including social interaction, social accompaniment, joint activity engagement, and support exchange, yet data limitations often preclude gaining insight into the intersection of personal networks overall and day-to-day social activity. The overarching question we pursue in this study is as follows: How is personal network size, as a frequently used measure of individuals' overall social connectedness, relevant to associations between social accompaniment and loneliness in a real-time framework?

In this study, we draw on three waves of novel data collected as part of the Chicago Health and Activity Space in Real-Time (CHART) study that included baseline survey reports of personal network characteristics and real-time reports of social accompaniment and loneliness collected throughout three 1-week periods via smartphone-based ecological momentary assessments (EMAs). We use these data to shed light on the question of how exactly personal network size (i.e., overall social connectedness) is relevant to real-time social experiences and feelings of loneliness. Understanding patterns in shorter-term fluctuations can inform research on the longer-term effects of these fluctuations on health and well-being, while also highlighting potential areas for intervention research. Our findings suggest that older adults who have larger personal networks experience more intense momentary loneliness, particularly when momentarily alone (i.e., lacking social accompaniment). We conclude by discussing the broader implications for understanding the relationship between social ties and loneliness.

BACKGROUND

Personal Social Networks and Global Loneliness

Personal ("egocentric") social networks refer to an individual's core set of social confidants, which typically includes long-standing social relationships that are frequently accessed and that are key sources of social support (Marsden 1987) and that carry significant implications for health and well-being (Smith and Christakis 2008; Valente 2010). Survey methods typically collect personal network data by administering a name generator to survey respondents, asking such questions as "Thinking back over the past 12 months, who are the people with whom you discuss matters of personal importance?" (Bailey and Marsden 1999). Such name generators effectively prompt respondents to enumerate their

personal network members, often including follow-up questions on the characteristics of each social network relationship and collectively creating an overall summary portrait of respondents' "personal community" of significant social ties (Small et al. 2021:5).

Social network size, measured as the number of network members that a respondent includes in their network, is often used as a quantitative, objective indicator of overall social integration or social connectedness. Indeed, social integration is often operationalized using a structural indicator of the presence (or absence) of social ties (Holt-Lunstad and Lefler 2019), with social network size reflecting the number of social connections with whom an individual is regularly involved and that represent potential sources of social support and other social resources (Berkman et al. 2000; Nicholson 2012; Perry, Pescosolido, and Borgatti 2018). Likewise, social isolation is an objective measure of the *lack* of social integration, referring to the absence of social connections, and is quantified as a relatively smaller social network size or few network ties (Freak-Poli et al. 2022; Nicholson 2012; Steptoe et al. 2013).

Loneliness, too, is often conceptualized as "trait-like" in social surveys and empirical research. Often, researchers measure loneliness globally using single-item measures or a scale of items (e.g., UCLA [University of California, Los Angeles] Loneliness Scale) that ask respondents to rate the extent to which they believe that a series of statements describes them (e.g., "I lack companionship"). Items are then aggregated to measure an individual's general or overall level of loneliness (e.g., Warner and Adams 2016). Importantly, social isolation and loneliness are distinct concepts, even though both relate to social relationships, can inform one another, and are both associated with poor health and increased mortality (Freak-Poli et al. 2022; Holt-Lunstad 2017; Steptoe et al. 2013). For example, smaller social networks and less frequent contact with network members are risk factors for loneliness (Hawkley et al. 2008; Rico-Uribe et al. 2016), whereas network expansion over time is associated with a reduction in loneliness among older adults (Dykstra et al. 2005). Nevertheless, whereas social integration and isolation refer to the objective assessment of the presence and absence of social ties, respectively, loneliness refers to the subjective adverse experience of perceiving a deficit in one's desired social relationships (Dykstra et al. 2005). In this sense, someone can have many social ties yet still feel lonely, while someone else may have a small social network yet still feel satisfied with their social ties. For the present study, a key implication is that someone can be temporarily alone (i.e., momentarily socially isolated or momentarily lacking social accompaniment) without necessarily feeling lonely at that moment, and vice versa (Cacioppo et al. 2015). In the following sections, we elaborate on different ways in which older adults' social network size, as a measure of global social integration and connectedness, may inform experiences of momentary loneliness and its intersection with momentary social isolation.

Social Context and Loneliness: In Real Time

Recently, innovative methods have begun to examine loneliness on a more frequent, momentary basis (e.g., on a given day). These studies reveal that individuals can experience considerable fluctuations in how lonely they feel within relatively short periods, departing from traditional ways of treating loneliness as a general trait or an average experience. Importantly, these studies also highlight the relevance of social interactions at a particular moment or across a short interval of time in shaping these loneliness fluctuations. Being in the company of family and/or friends at a given moment and higher levels of daily in-person social interactions protect against momentary and daily reports of loneliness, respectively (Compernolle et al. 2021; Macdonald, Luo, and Hülür 2021). Likewise, active engagement in social interactions may reduce feelings of momentary loneliness (Rinderknecht, Doan, and Sayer 2021).

Collectively, this research suggests that the associations between social integration and loneliness at the global level operate at the real-time level as well. In this sense, the state of being alone in a particular moment (i.e., a lack of social accompaniment) can be considered a real-time measure of social isolation or disconnect, reflecting the absence of social ties in a particular moment. Importantly, we underscore that we operationalize social isolation in this context as the *objective state* of being alone or without the company of social ties, which is not the same as one's *subjective* assessment of feeling lonely, or even

one's *subjective* assessment of how integrated or socially connected one perceives themselves to be (Newall and Menec 2019; York Cornwell and Waite 2009). Yet existing research on these global and real-time associations renders questions about their intersection. Global measures of loneliness are in part a function of daily and even momentary experiences of social accompaniment (Hawkley et al. 2003). What remains unclear, however, is whether and how more global measures of social integration and connectedness (e.g., number of personal network members) are relevant to these shorter-term fluctuations in momentary social isolation and loneliness. In the following section, we consider *why* global measures of social integration may be relevant to both momentary social accompaniment and loneliness. We use personal network size to operationalize global social integration reflecting the objective quantification of involvement and connection with social ties (Berkman et al. 2000; Holt-Lunstad 2017; Marsden 1987; Nicholson 2012). Although personal (or egocentric) networks tend to be close relationships by virtue of representing one's core set of social confidants and potential sources of social resources, personal network size by itself does not invoke assumptions about relationship quality such as emotional closeness.

Personal Network Size, Real-time Social Integration, and Loneliness: Two Potential Pathways

Individuals can vary in how much time they spend alone or in the company of others throughout their day (Compernolle et al. 2021). Although some of this variation may be shaped by where and how individuals spend their time (e.g., at home, at work), individuals who have larger personal networks may have more *potential* individuals with whom they would spend time during their day. In other words, global social integration can represent available opportunities for experiencing social accompaniment, which could lead to lower levels of *perceived* social isolation. This pathway can be considered the more tangible experience of personal networks, whereby larger personal networks function to surround an individual with more people in their day-to-day lives, actively serving as a source of real-time social integration, which buffers against day-to-day feelings of loneliness (Compernolle et al. 2021). Individuals who have larger personal networks may also be more involved in social activities (e.g., volunteering, organized group activities, religious services), which could increase opportunities for developing emotionally fulfilling and satisfying social relationships, thereby protecting against moments of loneliness. Therefore, we expect that older adults who have larger personal networks experience less intense momentary loneliness, on average, than do older adults with smaller personal networks (Hypothesis 1: general network effect).

We further consider that the influence of personal network size on momentary loneliness may vary by momentary social accompaniment—that is, whether an individual is alone or in the company of someone else when reporting on momentary loneliness. One possibility is that having a larger personal network buffers against any influence of momentary isolation (i.e., being alone) on momentary loneliness. Indeed, a primary way that personal networks shape loneliness is through providing a range of supports that "sustain the ego both materially and emotionally, in times of hardships as well as in every-day life" (Binder et al. 2012:208). Individuals who have a larger personal network may go about their day-to-day activities carrying an implicit, underlying sense of security in their social relationships and available social resources, perceiving that they *can* draw upon more potential social ties and sources of social support as needed, regardless of whether they are actually in the company of any social tie at a particular moment (in the personal network or otherwise; Cacioppo et al. 2015). Indeed, individuals' perceptions of their ability to meet unmet needs are strongly associated with lower levels of loneliness (Newall, Chipperfield, and Bailis 2014). In this regard, having a larger personal network may protect against momentary loneliness regardless of momentary social accompaniment by serving as a psychosocial resource "in reserve" that can be activated "as needed," much like the concept of collective efficacy in neighborhood effects research (Sampson, Morenoff, and Earls 1999). Put differently, we consider that any protective effect of momentary social accompaniment on momentary loneliness may be less pronounced among individuals who have larger personal networks. Likewise, social accompaniment may be more protective for the momentary loneliness of those who have smaller personal networks who have fewer close confidants to draw on and are less socially connected

overall (Hypothesis 2a: the social network buffering hypothesis).

At the same time, there is reason to consider that being alone at a given moment of the day is more likely to induce feelings of momentary loneliness for individuals who have larger personal networks. Individuals who have larger social networks may be more accustomed to being in the company of others more often, have stronger preferences to be in the company of others, or simply be more social individuals. Individuals who have larger personal networks may therefore be more vulnerable to feelings of loneliness when actually by themselves, finding momentary loneliness undesirable or more contrary to typical or expected patterns of daily company compared with individuals who have smaller social networks. In addition, a large literature establishes the generally positive association between network size and access to social support and other social resources (Berkman et al. 2000; Ellwardt et al. 2015; Thoits 2011). Larger personal networks could reflect higher levels of individual need with respect to these resources, such that momentary well-being—including momentary loneliness—is more dependent on being in the company of a social tie. Therefore, a second possibility is that momentary social isolation (i.e., a lack of momentary social accompaniment) will be more strongly associated with momentary loneliness for individuals who have larger personal networks compared with those who have smaller personal networks (Hypothesis 2b: the deviation-from-baseline hypothesis).

The Role of Gender

We also consider that there may be significant differences in these associations by gender. Prior literature on summary measures of loneliness has reached varied conclusions about whether men or women tend to be lonelier (Barreto et al. 2021; Pinquart and Sörensen 2003). Some work, however, finds that men report more intense momentary loneliness compared with women (Compernolle et al. 2021). Generally speaking, women tend to have larger and more diverse personal networks than men (Ajrouch, Blandon, and Antonucci 2005; Cornwell 2011), although sociodemographic characteristics and certain life-course events such as retirement, divorce, and widowhood can differentially shape these associations (Ajrouch et al. 2005; Wrzus et al. 2013). Despite the generally supportive function of discussion networks, women may become more involved in emotional support exchange than men (e.g., Liebler and Sandefur 2002) and may consequently experience greater stresses and strains from more demanding personal network ties (e.g., Offer 2020). Therefore, it is possible that any relationship between personal network size, momentary social accompaniment, and momentary loneliness is moderated by gender.

The Present Study

We use three waves of novel data from the CHART study to examine (1) the role of personal network size in shaping momentary loneliness (*general network effect*), (2) how momentary social accompaniment moderates this association, testing the *buffering* and *deviation-from-baseline* hypotheses, and (3) whether this moderation varies by gender. Our study focuses on the experiences of older adults in the United States. Although loneliness is prevalent across age groups (DiJulio et al. 2018), loneliness experiences are more prevalent at "older-old" ages (80 and older; Dykstra 2009; Pinquart and Sörensen 2003). Loneliness is also a risk factor for morbidity and mortality at older ages, given its association with a number of indicators of physical and mental health, including functional health, health behaviors (e.g., smoking, physical activity), cognition, depression, and biological risk factors (Holt-Lunstad et al. 2015; Ong, Uchino, and Wethington 2016). In addition, widowhood, retirement, grandparenthood, and age-related declines in health and mobility are among the life-course events often experienced at older ages that can lead to shifts in individuals' social lives, affecting personal network size and interaction patterns, as well as social activity more broadly (Wrzus et al. 2013). Thus, momentary loneliness at older ages may be especially shaped by personal network characteristics, with close network confidants serving as key sources of social accompaniment in the face of age-related challenges in cultivating broader opportunities for social-tie development.

DATA AND METHODS

The CHART Study

The CHART study was designed to capture the social and spatial environments in which older

adults spend their time and how these environments shape health outcomes in real time. The CHART study is ideal for assessing our research questions, as it collects both global personal network measures through baseline surveys and real-time loneliness and social accompaniment measures through smartphone-based EMAs. A key advantage of using EMAs to assess momentary loneliness and social accompaniment is that it circumvents issues of retrospective reporting that can be problematic in other means of reporting daily symptoms, such as end-of-day diaries. Smartphone-based EMAs that "ping" respondents several times throughout the day are advantageous in collecting real-time, detailed measures of the social context and social experience that can be otherwise difficult to remember at the conclusion of a day.

The CHART study recruited a probability-based sample of 455 older adults across 10 Chicago neighborhoods, who were selected to ensure variation in race/ethnicity and socioeconomic status across residential areas. The CHART study consisted of three waves of EMA data collection. Each survey wave included seven consecutive days, and the three waves were conducted approximately five to six months apart. At the beginning of each wave, participants completed a baseline interview, which collected global measures of physical and mental health, marital and employment status, social networks, and neighborhoods. The Wave 1 interview also collected respondent demographic characteristics.

After completing the baseline interviews that preceded each of the three waves, the study staff provided respondents with an Android smartphone installed with the MetricWire application that collected GPS information as respondents carried their phones throughout their daily activities. Respondents were given a tutorial on how to use the smartphone and were asked to carry it with them for seven consecutive days for each of the three waves of data collection. During each wave, the study administered five EMAs ("pings") per day for each of the seven days via the app, which captured respondents' real-time social environments (e.g., if they were alone) and various emotions, including the intensity with which they felt lonely. The EMAs were programmed to follow a variable-schedule EMA design, sending pings at random times within five survey windows: 8:00 to 10:00 a.m., 10:30 to 12:30 a.m., 1:00 to 3:00 p.m., 3:30 to 5:30 p.m., and 6:00 to 8:00 p.m. Reminder ping alerts were automatically sent via the app 10 and 20 minutes after the initial ping if a participant did not yet open the survey. EMAs were administered in respondents' preferred language, which was self-reported at baseline (English or Spanish).

Measures

Momentary loneliness. As part of each EMA, respondents were asked, referring to how they felt at the time they were pinged, "Did you feel lonely?" with response options *not at all* (1), *slightly* (2), *moderately* (3), *very* (4), or *don't know* (coded as missing). For descriptive analyses, we created a within-respondent mean loneliness score that derived the sum of all loneliness reports across an individual respondent's total EMAs across all three waves and divided this by the total number of EMAs the respondent submitted throughout the entire study observation period.

Social accompaniment. Respondents were asked, "At the time of the ping, who were you with?" and indicated in a select-all-that-apply format from a list of options, including *nobody*, *spouse/romantic partner*, *family member*, *friend*, *pet*, *neighbor*, *other*, or *don't know*. Our main analyses used a dichotomous measure of social accompaniment indicating that the respondent was alone (i.e., they selected *nobody* or they were only with a pet) or not alone (reference; that is, whether they selected any other category). Respondents who selected *don't know* as their only response were coded as "missing" for social accompaniment.

Physical context. Respondents reported their physical context at the time of the ping, which was reported from a list of six options: *at home; at someone else's home; in transit by bus, train, subway, taxi, or car; in transit by foot; at work*; or *someplace else*. Analyses included a dichotomous measure indicating that the respondent was at home (reference: not at home).

Social network measures. At the baseline survey, interviewers administered the "important matters" name generator (Marsden 1987), which asks respondents to name up to five individuals with whom they discussed topics that were important to them over the prior six months. After naming their network members (e.g., "alters"),

respondents were prompted to describe their relationship with each network member, selecting from a list of 19 different categories (*spouse; ex-spouse; romantic/sexual partner; parent; parent-in-law; child; stepchild; brother or sister; grandchild; other relative; other in-law; friend; neighbor; coworker or boss; minister, priest, or other clergy; psychiatrist, psychologist, counselor, or therapist; caseworker/social worker*; *housekeeper/home health care provider, other [specify]*). Respondents were also asked to indicate how often they interact with each social network member named, using the following response categories: 1 = *daily*; 2 = *a few times a week*; 3 = *a few times a month*; 4 = *once a month*; 5 = *a few times a year*; 6 = *not at all*; or *don't know* (coded as missing).

This name generator is widely used in survey-based assessments of personal networks, eliciting information about respondents' core confidants that is significantly associated with a range of health and well-being measures (Paik and Sanchagrin 2013). We focus primarily on personal network size, measured as the sum of all network members named. Network size is a widely used measure of social integration and social connectedness (e.g., Berkman et al. 2000; Brissette, Cohen, and Seeman 2000; Pressman et al. 2005), representing the number of potential close social contacts on whom an individual could call on if seeking momentary companionship or social support. In theory, network size could range from 0 (*no network members named*) to 5 (*the maximum number of network members respondents could name*). However, the CHART study does not include information about whether respondents who are missing information about network size represent refusals to complete the social network module or whether these respondents indeed have a network size of zero. Without additional details about the meaning of missing values on network size, we excluded these 12 respondents from our main analyses. (Our findings are generally consistent when coding these individuals as having a network size of zero.) Our main analyses use a measure of network size that reflects whether respondents have a network size of either one, two, three, four, or five. The categorical coding allowed us to examine whether a certain level or threshold of social network connectedness is more or less associated with momentary loneliness, permitting a more nuanced understanding of any meaningful differences in social outcomes among individuals with distinct personal network sizes (e.g., Cornwell et al. 2008). We further consider that because the respondents were limited to naming up to five network members, individuals who named five members (i.e., who maxed out their network roster) may actually have more network members than are captured in this roster. In additional analyses, we therefore used a dichotomous measure indicating whether respondents named five network members ("large network") or fewer to examine potentially meaningful differences at this cutoff. We note that our main findings are also consistent when using a continuous measure of network size.

Other covariates. Gender was included as a dichotomous measure, indicating whether the respondent self-reported as female. Race/ethnicity was constructed using two self-reported items: race (White, Black/African American, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaskan Native, Other) and ethnicity (Hispanic/Latino or not Hispanic/Latino). We created a categorical measure of respondents' race/ethnicity as non-Hispanic White (reference), non-Hispanic Black, non-Black Hispanic, or another racial/ethnic group. Educational attainment was categorized as less than high school (reference), high school graduate or General Educational Development (GED), some college but no degree, and college graduate. Age was a continuous measure constructed by subtracting respondents' date of birth from the date of Wave 1 baseline interview.

At each of the three baseline interviews, respondents reported their physical health on a scale from 1 (*excellent*) to 5 (*poor*). We created a categorical measure of health status indicating whether respondents reported their physical health as excellent/very good (reference), good, or fair/poor. Marital status was a dichotomous measure indicating whether a respondent was currently married or living with a partner at the time of the survey (reference group includes separated, divorced, widowed, or never married). Employment status indicated whether or not a respondent reported being employed in any capacity. Health status, marital status, employment status, and network size were each time-varying measures by survey wave, as respondents were asked these survey questions at each of the three baseline surveys.

Analytic Sample

Of the 455 older adults who participated in Wave 1 baseline interview, we restricted our sample to the 383 who went on to participate in at least one wave of EMA collection. Of these, we excluded eight respondents due to missing values on one or more covariates included in our models. An additional 14 respondents were excluded because they did not complete at least two EMAs throughout the observation period. All models included a measure of respondents' prior loneliness report to account for autocorrelation between EMA reports. We therefore excluded those who had no lagged values to include in the models (Compernolle et al. 2021; York Cornwell and Goldman 2020). Ten additional respondents were excluded whose network size was recorded as zero and could not be ascertained as missing or truly zero (see above). Six additional respondents were excluded due to technical issues with EMA. Because EMAs are designed to capture real-time experiences, we excluded from analysis EMAs that took longer than 30 minutes to complete and those that a participant did not begin within 30 minutes of receiving the ping, following prior research (Hektner, Schmidt, and Csikszentmihalyi 2007; Shiffman, Stone, and Hufford 2008). These exclusion criteria, and additional analytic decisions regarding the validity of EMAs, followed previous studies using these data (Compernolle et al. 2021, 2022). Missingness on any of these measures was not strongly correlated with loneliness, social accompaniment, sociodemographic, or time-varying measures. As a robustness check, we ran models using less stringent exclusion criteria, and our main findings did not change. The final analytic sample includes 12,359 total EMAs collected from 343 respondents.

Analytic Approach

We modeled older adults' reports of momentary loneliness intensity by fitting multilevel linear regression models that account for the clustering of reports of loneliness, social accompaniment, and other time-varying characteristics (EMAs; Level 1) within individual respondents (Level 2) over the observation period. Our models pool respondent EMAs across all three waves of data collection. We first consider the association between personal network size and momentary loneliness (Hypothesis 1). In this model, a hierarchical linear model defining two levels is specified as follows, with *i* for a given EMA and *j* for a given respondent:

$$\text{Level 1}: Y_{ij} = \beta_{oj} + \beta_1 X_{1ij} + \cdots + \beta_k X_{kij} + e_{ij}$$

$$\text{Level 2}: \beta_{oj} = \gamma_{01} W_j + \gamma_{00} + u_{oj}$$

In the Level 1 equation, Y_{ij} represents reported loneliness in EMA i submitted by respondent j; β_{oj} are respondent-specific intercepts; e_{ij} is the error term; β_1 to β_k are the effect parameters of the explanatory context, key time-varying covariates (e.g., social network size) that are taken from the baseline surveys that were collected at the beginning of each survey wave, momentary social accompaniment, and respondent's lagged loneliness report; and X_{1ij}—X_{kij} are these variables in the model. All models also include a control at Level 1 for the survey wave (1, 2, or 3) in which each observation (EMA as well as time-varying respondent-level covariates such as employment and marital status) was collected. In the Level 2 equation, γ_{00} represents the respondent-level intercept, u_{oi} is the respondent-level error term, W_j are fixed effects, and γ_{01} are time-invariant covariates at the respondent level such as gender, race/ethnicity, and others listed in Table 1 that are taken from the Wave 1 baseline survey, respectively.

In additional models, we test our competing hypotheses (*Hypotheses 2a* and *2b*) by interacting personal network size with momentary social accompaniment, allowing us to examine whether having a larger personal network buffers against or contributes to greater intensity of loneliness depending on whether someone is in the company of someone else. In a final model, we explore three-way interactions between personal network size, momentary social accompaniment, and gender to consider whether associations in the previous model differ between men and women. Results from multilevel ordinal logistic regression models yielded similar results (Supplemental Table A1). Additional models that account for the time between loneliness reports, season, time of day, and day of the week also yielded nearly identical results.

Across models, a positive coefficient indicates a more intense feeling of loneliness. We present estimates from the fixed effect portion of the

Table 1. Patterns in Loneliness Across Sample Characteristics and EMA Social Context.

	Mean or proportion		Momentary loneliness, within-respondent		
Respondent level (N = 343)	*M*	*SD*	*M*	*SD*	*p*
Network size (baseline)					
One person	0.10		1.23	0.43	
Two persons	0.24		1.18	0.39	
Three persons	0.29		1.19	0.33	
Four persons	0.19		1.24	0.49	
Five persons	0.18		1.12	0.24	
Network size < 5	0.82		1.20	0.40	
Network size = 5	0.18		1.12	0.24	
Gender					***
Men	0.40		1.28	0.49	
Women	0.60		1.13	0.27	
Race/ethnicity					
Non-Hispanic White	0.27		1.19	0.37	
Non-Hispanic Black	0.49		1.19	0.38	
Non-Black Hispanic	0.22		1.20	0.40	
Another racial/ethnic group	0.03		1.11	0.18	
Education					
Less than high school	0.26		1.24	0.42	
High school	0.20		1.17	0.44	
Some college	0.25		1.21	0.39	
Bachelor's degree or more	0.30		1.14	0.26	
Self-reported health status (Wave 1)					**
Excellent/very good	0.35		1.13	0.27	
Good	0.40		1.18	0.31	
Fair/poor	0.25		1.29	0.55	
Marital status (Wave 1)					*
Not married or living with a partner	0.65		1.23	0.41	
Married or living with a partner	0.35		1.12	0.29	
Employment status (Wave 1)					
Not employed	0.80		1.18	0.36	
Employed, any	0.20		1.20	0.40	
Age (years)	73.61	6.60			

	Proportion		Momentary loneliness		
EMA level (N = 12,359)	Percent	*SD*	*M*	*SD*	*p*
Social accompaniment					***
Alone	0.50		1.27	0.62	
With someone	0.50		1.10	0.36	
Location					***
At home	0.74		1.20	0.53	
Not at home	0.26		1.14	0.46	

Note. EMA = ecological momentary assessment.
*$p < .05$. **$p < .01$. ***$p < .001$ (two-tailed tests). Asterisks are used to indicate statistical significance in mean momentary loneliness between categories of each variable.

Table 2. Coefficients from Multilevel Models Predicting Momentary Loneliness as a Function of Social Network Size, Momentary Social Accompaniment, and Their Interaction.

	Model 1	Model 2	Model 3	Model 4
Network size (reference = 5)				
Four persons		–.05**	–.05*	–.01
		(.02)	(.02)	(.02)
Three persons		–.08***	–.07***	–.03
		(.02)	(.02)	(.03)
Two persons		–.04	–.04	–.005
		(.03)	(.03)	(.03)
One person		–.05	–.05	.02
		(.04)	(.04)	(.04)
Network size × alone				
Four persons × alone				–.07**
				(.02)
Three persons × alone				–.08*
				(.02)
Two persons × alone				–.06**
				(.02)
One person × alone				–.11*
				(.03)
Alone (ref: not alone)			.07***	.12***
			(.01)	(.02)
At home	.05***	.05***	.03***	.03***
	(.01)	(.01)	(.01)	(.01)
Self-rated health (ref: excellent/very good)				
Good	.01	.01	.01	.005
	(.01)	(.01)	(.01)	(.01)
Fair/poor	–.001	–.002	.01	.002
	(.02)	(.02)	(.02)	(.02)
Married/living with a partner	–.05*	–.05*	–.04	–.04
	(.02)	(.02)	(.02)	(.02)
Currently working	.04*	.03	.03	.03
	(.02)	(.02)	(.02)	(.02)
Female	–.14***	–.14***	–.14***	–.14***
	(.03)	(.03)	(.03)	(.03)
Race/ethnicity (ref: Non-Hispanic White)				
Non-Hispanic Black	–.02	–.01	–.01	–.003
	(.04)	(.04)	(.04)	(.04)
Non-Black Hispanic	–.–.05	–.04	–.05	–.03
	(.05)	(.05)	(.05)	(.05)
Another racial/ethnic group	–.04	–.03	–.02	–.02
	(.10)	(.10)	(.10)	(.10)
Education (ref: less than high school)				
High school	–.01	–.01	–.01	–.01
	(.05)	(.05)	(.05)	(.05)
Some college	–.03	–.03	–.03	–.03
	(.05)	(.05)	(.05)	(.05)
Bachelor's or more	–.08	–.09	–.09	–.09
	(.05)	(.05)	(.05)	(.05)
Age (in years)	–.003	–.002	–.002	–.002
	(.003)	(.003)	(.003)	(.003)

(continued)

Table 2. (continued)

	Model 1	Model 2	Model 3	Model 4
Lagged momentary loneliness report	.23***	.23***	.23***	.23***
	(.01)	(.01)	(.01)	(.01)
Constant	1.22***	1.25***	1.20***	1.19***
	(.19)	(.20)	(.19)	(.19)
Variance components				
EMA-level variance	.12	.12	.12	.12
Respondent-level variance	(.07)	(.07)	(.07)	(.07)
Log likelihood	–5119	–5113	–5076	–5064
R^2	.34	.33	.33	.33
Number of EMA observations	12,359	12,359	12,359	12,359
Number of respondents	343	343	343	343

Note. Standard errors are presented in parentheses. Measures of loneliness are coded so that higher values represent greater momentary loneliness. All models include a fixed effect for survey wave. EMA = ecological momentary assessment.
*$p < .05$. **$p < .01$. ***$p < .001$ (two-tailed tests).

model as well as multiple variance components: Level 1 (EMA) and Level 2 (respondent) variance, the log likelihood, and the pseudo R^2, the latter of which is calculated using the squared correlation between observed and predicted loneliness scores (Singer and Willet 2003) and excluding the error terms. Analyses were conducted using Stata Version 14.

RESULTS

Descriptive Statistics

Descriptive statistics at the respondent level are presented in the top rows of Table 1 (n = 343). Approximately half (49 percent) of the sample self-reported as non-Hispanic Black, with 27 percent identifying as non-Hispanic White, 22 percent as non-Black Hispanic, and 3 percent as another racial/ethnic group. Just over half the sample (55 percent) had some college education or a college degree. The majority of respondents were women (60 percent), in at least good health (75 percent), did not have a spouse/cohabiting partner (65 percent), and were not currently working (80 percent) at the time of Wave 1 baseline survey. On average, respondents were approximately 74 years old at Wave 1.

Regarding social network size, respondents reported an average of 3.10 network members (SD = 1.25). Ten percent reported having one network member, while 18 percent reported five network members—the maximum number of network members respondents could include in their rosters. At the EMA level (N = 12,359), respondents reported being alone in approximately half of the EMAs (50 percent), and at home in nearly three-fourths of EMAs (74 percent).

The right-most columns in Table 1 present bivariate statistics illustrating how momentary loneliness varies by respondent-level characteristics and the EMA-level context. Overall, individuals reported a mean loneliness score of 1.19 (SD = 0.38) on average, falling between *not at all* and *slightly*. Although momentary loneliness is skewed toward lower intensity, over half of the sample (52 percent) reported feeling at least *slightly* lonely at some point during the observation period, and 10 percent reported feeling *very* lonely at some point. Importantly, mean intensity in momentary loneliness did not significantly differ by network size, with average loneliness intensity ranging from 1.23 (SD = 0.43) among respondents with a network size of 1 to 1.12 (SD = 0.24) for respondents with a network size of five. Aside from network size, t tests demonstrated that momentary loneliness intensity was greater among men than women (1.28 vs. 1.13; $p < .001$), among respondents who were not married or living with a partner versus married or living with a partner (1.23 vs. 1.12; $p < .05$), and increased as health declined ($p < .01$). At the EMA level, loneliness intensity was significantly greater when respondents were alone versus with

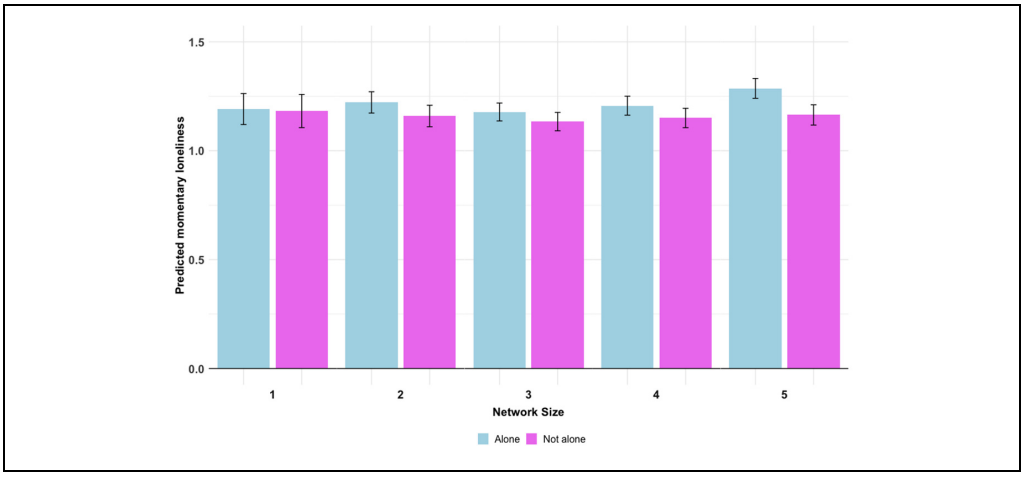

Figure 1. Predicted momentary loneliness by momentary social accompaniment (alone vs. not alone) and by social network size.

others (1.27 vs. 1.10; $p < .001$), as well as when at home versus outside the home (1.20 vs. 1.14; $p < .001$).

Multivariable Models

Next, we used a series of multilevel linear regression models to assess how and to what extent personal network characteristics are associated with momentary experiences of loneliness, adjusting for the individual- and EMA-level covariates. Table 2 presents results from four separate regression models. Model 1 suggests that being at home momentarily is associated with greater momentary loneliness versus being outside the home ($b = .05$; $p < .001$), whereas being married and female are each associated with less intense momentary loneliness ($b = -.05$; $p < .05$ and $b = -.14$; $p < .001$, respectively). As far as variance components, EMA-level variance is larger than respondent-level variance (.12 vs. .07, respectively).

Model 2 adds network size to the same set of variables included in Model 1. Results show that relative to having five network members, respondents with network sizes of 4 ($b = -.05$; $p < .01$) and 3 ($b = -.08$; $p < .001$) report significantly less intense momentary loneliness. Main coefficients for network size are robust to the inclusion of momentary social accompaniment in the model (Model 3), while being alone is associated with significantly greater momentary loneliness ($b = .07$; $p < .001$).

Model 4 examines whether the main effects of social network size vary by momentary social accompaniment. Results suggest that they do, as older adults with smaller network sizes (one, two, three, or four) are significantly *less lonely when they are alone* than are older adults with a large social network (network size of five, that is, the maximum number of network members one can name) when they are alone. Results are consistent when we use a dichotomous indicator of having a large personal network that codes respondents as having either a network size of five or a network size of fewer than five (see Supplemental Table A2). To illustrate the interaction between network size and momentary social accompaniment, we present predicted momentary loneliness values by momentary social accompaniment and network size (one to five persons) in Figure 1. Whereas older adults who are momentarily alone have higher levels of predicted loneliness, on average, than older adults who are momentarily in the company of others at all network sizes, predicted loneliness when alone is highest for those who have a network size of five (1.29). In addition, the difference in predicted loneliness between those who are momentarily alone versus with someone (.12) is greatest for those with a network size of five—over twice the difference in predicted loneliness by momentary social accompaniment (or lack thereof) at other network sizes. As these differences are relatively small given that these are momentary fluctuations in loneliness, it is useful to compare

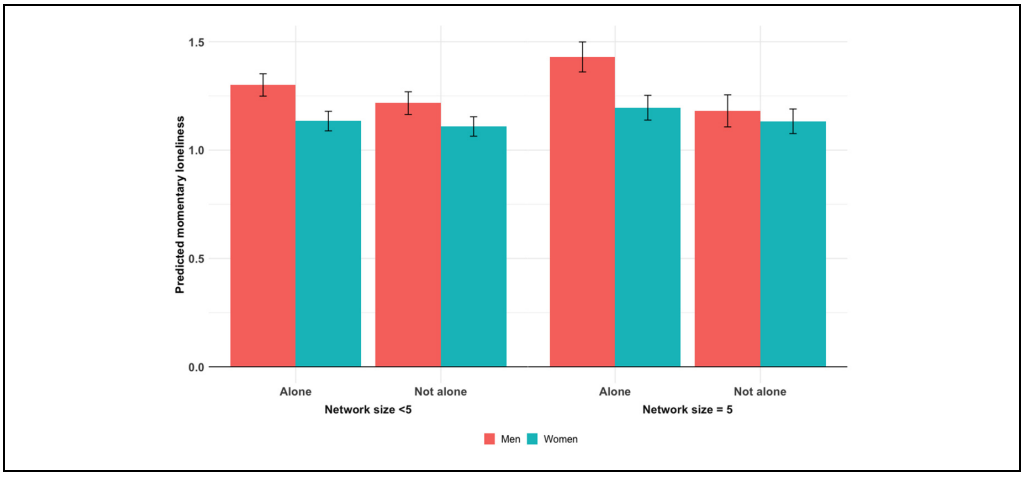

Figure 2. Predicted momentary loneliness by social accompaniment (momentarily alone vs. not alone) and social network size (five vs. fewer than five) for older adult men and women.

their magnitude with other key covariates in the model. For context, the difference in predicted loneliness between being at home and not at home—a significant predictor of momentary loneliness—is .03, while the difference in predicted loneliness between men and women is .14.

We next examine whether the links between momentary social accompaniment, network size, and loneliness vary by gender. Table 3 presents results from multilevel linear regression models with a three-way interaction between network size, momentary social accompaniment, and gender. Model 1 uses a dichotomous measure of network size (five or fewer than five). Results indicate that women with larger personal networks reported *less intense loneliness* when they were momentarily alone than did men with larger personal networks who were alone ($b = -.13$; $p < .001$). Figure 2 illustrates the interaction in terms of predicted loneliness, revealing that men who have larger networks and are alone have the highest predicted loneliness levels (1.43), approximately .24 more than women who have larger networks and are alone. The difference in predicted loneliness among men and women who have smaller networks and are alone is .17.

Model 2 substitutes the dichotomous measure of network size for a categorical measure. This model allows us to further explore the deviation-from-baseline hypothesis, including whether gender differences are evident at network sizes smaller than five. Predicted loneliness values from this model indicate little difference among women by network size and social accompaniment. Among men, however, differences in predicted momentary loneliness by social accompaniment begin to increase among those with three network members, with the largest differences among men who are alone and men who are not alone who report a network size of five (Supplemental Figure A1).

Additional Analyses

We leveraged additional EMA and social network data to explore gender differences in social accompaniment in greater depth. At the EMA level, women were less likely to be with a spouse/partner (.24 vs. .46; $p < .001$), friends (.17 vs. .20; $p <$. 01), and/or neighbors (.04 vs. .06; $p < .001$) at a given moment and more likely to be with family (other than a spouse; .53 vs. .32; $p < .001$). We also examined a version of the analyses presented in Table 3 Model 2 that substituted the dichotomous measure of social accompaniment (alone vs. not alone) with a five-category measure reflecting the people whom respondents reported being with during each EMA. Because respondents could report being with multiple categories of social company, we coded these categories as alone, family—no friends or neighbors, friends or neighbors—no family, family *and* friends or neighbors, or some other category of social accompaniment only. The results of these analyses reveal few significant differences in momentary loneliness based on who respondents reported being with when they are not alone.

Table 3. Coefficients from Interaction Models Predicting Momentary Loneliness as a Function of a Three-way Interaction among Social Network Size, Momentary Social Accompaniment, and Gender.

Variable	Model 1	Model 2
Network size (reference = 5)		
Four persons		–.01
		(.04)
Three persons		–.02
		(.04)
Two persons		.08
		(.05)
One person		.10
		(.06)
Network size × alone		
Four persons × alone		–.13***
		(.04)
Three persons × alone		–.14***
		(.04)
Two persons × alone		–.20***
		(.04)
One person × alone		–.22***
		(.05)
Network size × female		
Four persons × female		.02
		(.05)
Three persons × female		–.06
		(.05)
Two persons × female		–.11
		(.06)
One person × female		–.13
		(.09)
Network size × alone × female		
Four persons × alone × female		.08
		(.04)
Three persons × alone × female		.09*
		(.04)
Two persons × alone × female		.21***
		(.05)
One person × alone × female		.14*
		(.06)
Network size = 5 (ref <5)	–.04	
	(.03)	
Network size = 5 × alone	.17***	
	(.03)	
Network size = 5 × female	.06	
	(.04)	
Network size = 5 × alone × female	–.13***	
	(.04)	
Alone × female	–.06**	–.19***
	(.02)	(.03)
Female	–.11**	–.04
	(.04)	(.05)

(continued)

Table 3. (continued)

Variable	Model 1	Model 2
Alone (ref: not alone)	.08***	.25***
	(.01)	(.03)
At home	.03***	.03***
	(.01)	(.01)
Self-rated health (ref: excellent/very good)		
Good	.005	.005
	(.01)	(.01)
Fair/poor	–.001	–.002
	(.02)	(.02)
Married/living with a partner	–.04	–.04
	(.02)	(.02)
Currently working	.04*	.04*
	(.02)	(.02)
Race/ethnicity (ref: Non-Hispanic White)		
Non-Hispanic Black	–.004	–.002
	(.04)	(.04)
Non-Black Hispanic	–.03	–.03
	(.05)	(.05)
Another racial/ethnic group	–.01	–.01
	(.10)	(.10)
Education (ref: less than high school)		
High school	–.01	–.01
	(.05)	(.05)
Some college	–.03	–.04
	(.05)	(.05)
Bachelor's or more	–.01	–.09
	(.05)	(.05)
Age (in years)	–.002	–.002
	(.002)	(.003)
Previous loneliness report	.23***	.23***
	(.01)	(.01)
Constant	1.14***	1.10***
	(.19)	(.20)
Variance components		
EMA-level variance	.12	.12
Respondent-level variance	(.07)	(.07)
Log likelihood	–5045	–5035
R^2	.34	.34
Number of EMA observations	12,359	12,359
Number of respondents	343	343

Note. Standard errors are presented in parentheses. Measures of loneliness are coded so that higher values represent greater. EMA = ecological momentary assessment.
*$p < .05$. **$p < .01$. ***$p < .001$ (two-tailed tests).

Generally, men and women, regardless of personal network size, demonstrate similar levels of predicted momentary loneliness regardless of whether they are with family, friends, or another category (Figure 3). Of note is that men who have smaller personal networks report being lonelier when they are with family only compared with women who have smaller networks ($p < .01$); however, the highest levels of predicted loneliness remain among men who are momentarily alone and who

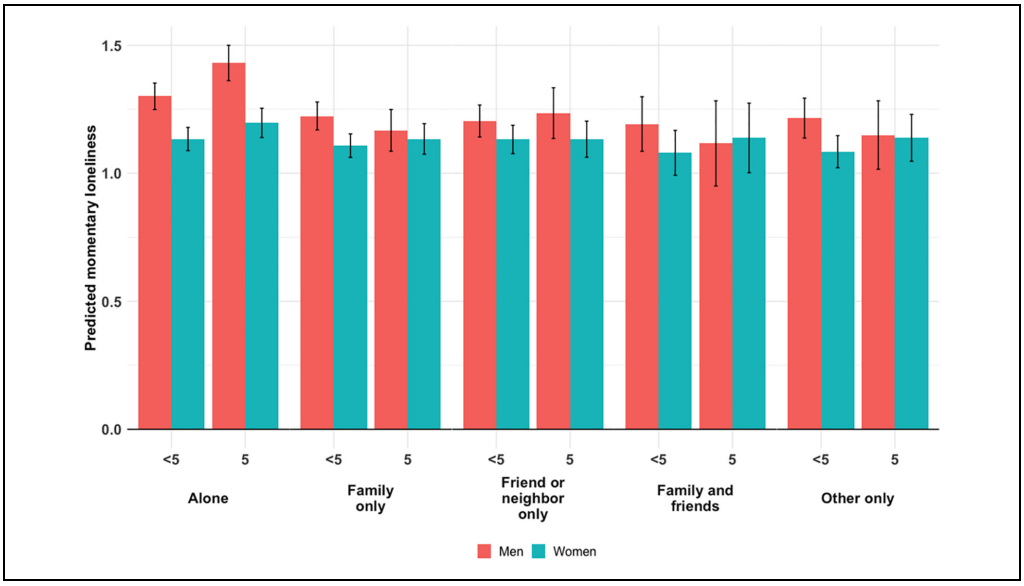

Figure 3. Predicted momentary loneliness by network size (five vs. fewer than five) among men and women by type of social accompaniment.

have network sizes of five (see Supplemental Table A3 for full model).

Second, we used Wave 1 network data to examine the role of respondents' average frequency of interaction (only collected at Wave 1) with their network members and its interaction with social accompaniment as an alternative exploration of personal network characteristics and momentary loneliness. Whereas social network size is operationalized as an objective measure of social connectedness, average frequency of interaction represents a more qualitative dimension of personal networks, a reflection of the opportunity structure for support exchange, and the potential for social accompaniment. Our findings suggest that older adults who interact more frequently with their personal network members are neither more nor less lonely when alone versus those who interact less frequently with their network members. We used these findings to aid in the interpretation of our results and their implications in the "Discussion" section.

DISCUSSION

Research has linked social integration and connectedness with a lower risk of loneliness using global summary measures to assess these associations. Separate but related streams of research have begun to examine correlates of momentary loneliness, which fluctuates over discrete time periods (e.g., Compernolle et al. 2021; Macdonald et al. 2021) and can accumulate over time to potentially carry longer-term health implications. These studies linked real-time social accompaniment (being with others) with lower-intensity momentary loneliness. Despite reason to consider that personal network size is strongly related to opportunities to experience social company, few studies have tested these assumptions to examine whether and how personal network size, as a commonly used global assessment of social integration and connectedness, interacts with momentary social company to shape momentary loneliness.

We found that older adults who have larger networks experienced greater momentary loneliness, contrary to our expectations. We tested two competing hypotheses regarding how real-time social accompaniment may modify the relationship between network size and momentary loneliness: the buffering hypothesis and the deviation-from-baseline hypothesis. Our results lend greater support for the latter; older adults who reported large personal networks were significantly lonelier when alone than older adults who reported fewer than five network members. One possible explanation is that older adults who have large networks

may have qualitatively different personal networks from those who have smaller networks. Older adults who filled the allotted five slots provided in the name generator may have included more peripheral, weaker social ties, whereas those who named fewer individuals may have made more meaningful distinctions between close versus more peripheral social ties. Indeed, supplemental findings that draw on additional network member characteristics collected at Wave 1 reveal that individuals who max out their network rosters (network size = five) have significantly less kin-centric networks ($t = 3.15$; $p < .01$), and interact with their network members significantly less frequently, on average, compared with those with fewer than five network members ($t = 3.99$; $p < .001$). As the personal network represents individuals' closest social confidants (e.g., Marsden 1987), larger personal networks may reflect a less frequently accessed and less tightly knit, coordinated core of social support, given a higher proportion of ties outside of the kin context (Burt, Jannotta, and Mahoney 1998; Feld 1981). These characteristics may lead older adults who have large personal networks to rely more on the physical copresence of others to buffer against spikes in momentary loneliness and to feel lonelier as a result of a less frequently accessible, coordinated personal network to call on when needed.

We also found that women with larger social networks are less lonely when alone than men with larger social networks. This finding is noteworthy. Given gender differences in family obligations, expectations about social roles, and network composition, women may experience higher levels of stress and strain that emanate from network ties ("tethering"; Leupp 2019; Simon 2020; Thoits 2011). For example, a larger personal network may reflect more caregiving obligations and other support demands. Therefore, momentary social isolation may be a welcome reprieve from otherwise challenging or demanding social relationships. Indeed, we find at the respondent level that women in our study were more likely than men to report being with familial ties, on average, across all EMAs when not alone ($t = 6.59$, $p < .001$), which could include ties that are often characterized by caregiving (e.g., children, grandchildren), making momentarily being alone a reprieve from familial obligations (e.g., Cacioppo et al. 2015). On average, men reported being "with a spouse or partner" across all EMAs when not alone more often than women ($t = 6.05$, $p < .001$) which, considered alongside our finding that men with larger networks are lonelier when alone, suggests that men who have larger networks may have more shared network ties with their spouses. Indeed, prior literature suggests that older men are more likely than older women to have network members who are also socially connected to their spouse (Cornwell 2011; Cornwell and Laumann 2011) and that married men spend less time engaging in nonspousal social interactions outside of work settings as they age (Roth 2021). Taken together, our results suggest that at older ages, men may depend more on being in the company of their spouse to feel more socially connected to their network ties (particularly those outside of the kin context) and, ultimately, less momentarily lonely.

Importantly, we found in supplemental analyses that men and women did not differ significantly in network size, how often they interacted with their network members, or the proportion of their network that is kin. Women do, however, report significantly higher levels of average closeness with network members compared with men ($t = 2.40$; $p < .05$). One possibility is that if women feel emotionally closer, on average, to their network members compared with men, they may feel more generally socially supported throughout their day, making momentary loneliness less dependent on momentary social accompaniment.

We did not find support for the buffering hypothesis, suggesting that while larger personal networks may signal more options for activating social support "as needed," this higher level of social integration does not translate into a protective effect on momentary loneliness when respondents who have larger networks are spending time alone. One possibility is that for older adults who have larger personal networks, being alone at a particular moment is especially undesirable or uncomfortable, particularly if they are accustomed to being in the company of social ties. Another possibility is that people who have larger social networks are more extroverted individuals and thus more susceptible to feeling lonely without the company of others. More broadly, these findings push on the link between personal network size and loneliness, revealing nuances in

the function of personal network social integration in a real-time framework.

Limitations and Future Directions

Several limitations are important to consider. For one, these findings may be specific to the older adult population. Younger segments of the population may face fewer age-related health declines or other life-course transitions that tend to characterize later life and that can limit broader opportunities to seek out social company or cultivate network ties from diverse foci of social life (Feld 1981; Litwin 2001), such that momentary loneliness may be less dependent on personal network size and its intersection with social accompaniment earlier in the life course. We also note that patterns of EMA missingness may be related to social network characteristics and/or momentary social accompaniment or loneliness, although available data suggest that this is not the case. Individuals who are spending time with someone at a given point in their day may be less likely to notice or respond to a ping on the smartphone; however, in most cases, EMA nonresponse occurred when respondents were driving. Older adults who are feeling lonelier at a particular point in their day may also be more likely to notice and respond to the ping, although mean loneliness was not strongly correlated with the number of EMAs completed throughout the study ($r = -.01$).

Although our study supports the idea that larger personal networks provide more opportunities for momentary social accompaniment, we cannot definitively determine whether individuals whom someone is with at the time of an EMA response are also personal network members. Future studies could use additional EMA questions to discern whether social accompaniment corresponds with personal network membership. Other work could investigate the role of specific activities and other aspects of the social context that could shape how social network properties intersect with social accompaniment to shape loneliness. Relatedly, we are unable to draw insights from the role of more expansive social network ties, including those relationships beyond one's core network confidants. It is possible that having a large set of comparatively weaker social connections increases the likelihood of experiencing momentary social accompaniment *and* has implications for loneliness. For example, an older adult who spends their day in an occupational setting may report less loneliness in the company of coworkers, even if coworkers are considered to be relatively weaker ties. Future work may include a more detailed survey of respondents' social connections and their role in momentary loneliness. On this note, literature comparing social isolation and loneliness often points to the quality of social interactions as a key factor. Future work should examine the extent to which average emotional closeness interacts with social accompaniment. It could be that individuals who have larger personal networks have fewer quality interactions and are thus more likely to be "lonely in the crowd" when alone. In addition, the CHART study includes only a single question to measure momentary loneliness, while the concept of loneliness can be highly nuanced, distinguishing, for example, between emotional and social loneliness (Green et al. 2001). Future research could incorporate additional EMA questions or a revised single item to assess multiple types of loneliness on a momentary basis.

CONCLUSION

Extending the links between global measures of social integration and loneliness by using a real-time framework offers novel insight into how personal networks interact with momentary social contexts to influence older adults' feelings of loneliness. Our findings more broadly suggest that overall measures of social integration, which are often used to infer available support and companionship, may reveal certain social and health vulnerabilities when conceptualized as the backdrop of daily fluctuations in social company and perceptions of loneliness. Whereas increasing research highlights nuances in the mental health implications of the quality or demands of personal network ties (Felix and Lynn 2022; Offer 2021), this study further suggests that common markers of social integration may actually signal a greater potential for distress in the physical absence of social ties. Future research should deepen investigations into the social, health, and environmental factors that influence the intersection between global and momentary measures of social and personal well-being.

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SUPPLEMENTAL MATERIAL

Supplemental material for this article is available online.

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