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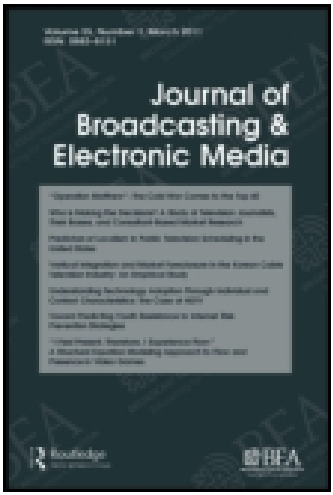

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Journal of Broadcasting & Electronic Media
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/hbem20

Age Differences in Online Social Networking: Extending Socioemotional Selectivity Theory to Social Network Sites

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Published online: 28 May 2015.

To cite this article: Pamara F. Chang, Yoon Hyung Choi, Natalya N. Bazarova & Corinna E. Löckenhoff (2015) Age Differences in Online Social Networking: Extending Socioemotional Selectivity Theory to Social Network Sites, Journal of Broadcasting & Electronic Media, 59:2, 221-239, DOI: 10.1080/08838151.2015.1029126

To link to this article: http://dx.doi.org/10.1080/08838151.2015.1029126

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Age Differences in Online Social Networking: Extending Socioemotional Selectivity Theory to Social Network Sites

Pamara F. Chang, Yoon Hyung Choi, Natalya N. Bazarova, and Corinna E. Löckenhoff

This article extends socioemotional selectivity theory to online social networking by examining age differences in the size and composition of Facebook networks across a wide age range of Facebook users (18 to 93 years old) in a nationally representative sample. Findings suggest increasing selectivity of Facebook social partners with age. Compared to younger adults, friend networks of older adults are smaller but contain a greater proportion of individuals who are considered to be actual friends. Moreover, a higher proportion of actual to total Facebook friends is associated with lower levels of social isolation and loneliness across the life span.

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Social network sites (SNSs) offer novel communication forms and tools that enable online social networking. The resulting networks have the potential to complement other communication channels in satisfying social needs (Bazarova & Choi, 2014), support relationships with family and friends (Papacharissi & Mendelson, 2011; Raacke & Bonds-Raacke, 2008), and facilitate information sharing and acquisition (Southwell, 2013). Their social functions and effects vary depending on users'

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Journal of Broadcasting & Electronic Media 59(2), 2015, pp. 221–239
DOI: 10.1080/08838151.2015.1029126 *ISSN: 0883-8151 print/1550-6878 online*

individual characteristics, such as age, gender, and personality factors (Forest & Wood, 2012; Orr et al., 2009), and network characteristics, such as network size, density, and composition (Southwell, 2013).

Understanding user characteristics is particularly important, given the increasing diversity of SNS populations. As recent statistics show, 65% of online adults in the 50–64 age group and 46% of online adults in the 65 years and older age group use social network sites (Smith, 2014). Moreover, individual differences associated with life position are important predictors of communication needs and media use as applied to traditional media (e.g., Rubin & Rubin, 1982) and the Internet as a whole (e.g., Papacharissi & Rubin, 2000), but the effects of age and developmental processes across the lifespan remain largely unexplored in online social networking. To address this gap, we draw on socioemotional selectivity theory (SST; Carstensen, 2006), which associates age-related changes in motivational priorities with changes in social network size and composition. Whereas this association has been firmly established in offline networks (e.g., Fung, Carstensen, & Lang, 2001; Green, Richardson, Lago, & Schatten-Jones, 2001), our study examines age differences in online social networking in a nationally representative sample of Facebook users. Specifically, we test theoretically derived predictions regarding age differences in (1) the size and composition of online social networks, including the self-reported proportion of actual friends, (2) the communicative uses of SNSs, including self-posting and viewing of others' information, and (3) the adaptive implications of SNSs use for social isolation and loneliness. The findings have implications for understanding uses and effects of online social networking associated with age-related differences in motivational perspectives predicted by SST.

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Online Social Networking and Socioemotional Selectivity Theory

SNSs tap a large and diverse network of relationships typically exceeding the size of traditional estimates of active social relations in an offline network (Parks, 2010). However, many of these online relationships are weak or superficial, and some of them are no longer active (Ellison, Steinfield, & Lampe, 2007). For example, more than one third of the relationships in college students' Facebook networks are either lapsed friendships or people of whom users have little knowledge (Sosik & Bazarova, 2014). Only about a quarter of total Facebook friends are identified as actual friends, people with whom users have common personal history and meaningful connections (Ellison, Steinfield, & Lampe, 2011). Furthermore, the proportion of superficial relations tends to increase with the size of college students' networks (Manago, Taylor, & Greenfield, 2012).

While most SNS research is conducted on younger adults, studies comparing users of different ages suggest differences in network composition across the life span. Compared to younger MySpace users, older adults have smaller networks with more diverse age distributions (Pfeil, Arjan, & Zaphiris, 2008). As personal relationships

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reflect peoples' salient social motivations and since motivational priorities change with age (Carstensen, 2006), the size and composition of online social networks may reflect age-related goal shifts. Understanding such effects is important because network characteristics affect behaviors such as information sharing (e.g., what is shared, how it is shared, and with whom it is shared). For example, the size and composition of one's network may result in differing levels of knowledge gain and social norm awareness, which affect overall well-being and socialization (Southwell, 2013).

SST posits that social motivations differ across the life span due to individuals' increasing awareness of limitations on future time (Carstensen, 1993; Carstensen, 1998; Carstensen, 2006). Younger adults have open-ended time horizons, leading them to prioritize goals aimed at optimizing the future. This may involve the acquisition of new information, the pursuit of career goals, and the establishment of new social ties that can serve as important future resources. Older adults are increasingly aware of time limitations and tend to prioritize present-oriented goals aimed at avoiding negative emotional states and experiencing positive ones, satisfying a need for social belonging, finding meaning in life, and maintaining relational intimacy with others.

SST offers concrete and testable predictions about age differences in the size and composition of social networks as well as the amount and quality of social contacts sought (Fung, Carstensen, & Lang, 2001; Lang & Carstensen, 2002). Specifically, younger adults' future-oriented goals may lead them to compose their social networks from a broad range of social partners including a large number of distant and novel acquaintances who may be potentially useful resources for information gathering and career networking (Lang & Carstensen, 2002). As individuals age and their perceptions of future time become more limited, they increasingly value close and emotionally gratifying relationships and prioritize quality over quantity in offline social networks (Carstensen, 2006; Carstensen, Isaacowitz, & Charles, 1999). Consistent with these theoretical predictions, older adults have a greater proportion of close social partners and fewer peripheral partners in their offline networks compared to younger adults (Fung et al., 2001; Green et al., 2001). Importantly, such reductions in network size appear to occur as a result of active paring of distant social ties in order to prioritize closer ones (Lang, 2000; Lang & Carstensen, 2002). Furthermore, in line with the idea that age-related shifts in social networks are adaptive, older adults are more likely than younger adults to be satisfied with their current network size and do not want to increase it by adding new friends (Lansford, Sherman, & Antonucci, 1998).

Although the tenets of SST are well-supported in the realm of offline social networks, much less is known about them in online contexts. One study found that age differences in the size of online networks mirror the patterns observed offline (Pfeil et al., 2008). However, age differences in the specific composition of online social networks have yet to be examined. Extending SST to SNSs, we argue that, like offline networks, the size and composition of online social networks should reflect age-related differences in social motivations. Consistent with SST propositions, we

predict that online networks of older adults are smaller in size but are composed of more meaningful relations compared to online networks of younger adults.

H_1: Age is negatively associated with online network size.
H_2: Older adults have a greater proportion of meaningful social relationships in their online networks than younger adults.

Age differences in social motivations may also be reflected in the types of social interactions that users engage in online. SNSs offer a variety of communication activities, including self-posting and checking social information about others. Such activities could support both present- and future-oriented social goals depending on the content of information and the type of social connections (e.g., close vs. peripheral friends). However, given previous findings suggesting age-related reductions in the frequency of contact with offline networks (Lansford et al., 1998), we expect young adults to self-post and check information about others more actively than older adults on SNSs.

H_3: Age is negatively associated with a) self-posting and b) checking information on others on SNSs.

Internet Use, Social Network Composition, and Well-Being

The association between Internet use and psychological well-being and health (e.g., depression and loneliness) has been studied over the years, but different studies have produced conflicting findings suggesting that Internet use can have both positive and negative effects on interpersonal relationships, loneliness, and depression (Caplan, 2003). Early Internet research showed decreases in psychological wellness with increasing time spent online, linking Internet usage to loneliness and depression (Kraut et al., 1998). However, the results of that initial study were controversial because, as Kraut and colleagues noted themselves, the study had no control group for comparison, no discussion of the generalizability of the results over people and time, and no validation of measures of social involvement and well-being (Kraut et al., 2002). Therefore, they conducted a 3-year follow-up study with 208 of the respondents from the original 1998 study; and also conducted a second study with a new sample examining the impact of Internet use on a broader variety of social and psychological outcome measures (Kraut et al., 2002).

In particular, these studies investigated whether Internet use had different consequences for specific individuals by examining additional variables, such as extraversion, perceived social support, social involvement, computer skills, and closeness of friends, which were not included in the initial study. In contrast to earlier findings, these studies found a positive effect of Internet use on communication, social involvement, and well-being. Other follow-up studies on the Internet paradox also found that Internet use could expand social networks and increase psychological

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well-being (e.g., Amichai-Hamburger & Furnham, 2007; Campbell, Cumming, & Hughes, 2006; Hamburger & Ben-Artzi, 2000; Shaw & Gant, 2002). In contrast, Caplan's (2003) study on psychosocial health and Internet use found that individuals' preference for online social interaction (POSI) predicted negative behaviors associated with Internet use (e.g., Internet addiction) that may lead to a decrease in well-being. Looking across these findings, it appears that Internet use may result in both increases and decreases in well-being depending on specific characteristics of Internet use, individuals' characteristics, and their perceptions of online interactions (e.g., perceived social support, social networks). Therefore it is important to parse out specific characteristics of Internet use that could lead to either the increase or decrease of well-being. The present study specifically examines the association between characteristics of online social networks (i.e., size and composition) and well-being.

People derive valuable resources from their social networks, including new information, emotional support, and feelings of social embeddedness (Fung et al., 2001). According to SST (Carstensen, 1998), people create social networks that satisfy their social goals and improve their well-being, and emphasize characteristics that are specific to their age group. When personal goals are not satisfied in existing social networks, people are likely to feel dissatisfied, disconnected, and lonely (Fung et al., 2001; Green et al., 2001). Consistent with this notion, correlates of loneliness in offline social networks vary by age such that loneliness in younger adults is linked to smaller total network size whereas loneliness in older adults is linked to lower closeness to network members (Green et al., 2001).

Online social networking provides new modes of sociability through which users can gratify their relational needs (Bazarova, Choi, Sosik, Cosley & Whitlock, 2015; Papacharissi & Mendelson, 2011; Sundar & Limperos, 2013) and derive important social benefits as well as social bridging and bonding capital (Ellison et al., 2007). Social bonding, derived from close relationships (e.g., social and emotional support), is closely related to present-oriented emotional regulatory goals, whereas social bridging, derived from casual relations and distant connections (e.g., finding new information), is related to future-oriented information acquisition goals. Recent work that distinguishes between total Facebook friends and self-perceived actual friends found that the number of total Facebook friends did not predict either social bonding or bridging capital among college students; however, the number of perceived actual friends predicted both social bridging and bonding capital, suggesting that only those considered to be actual friends on Facebook provide meaningful social connections and valuable network resources (Ellison et al., 2011). Integrating these results with SST's argument that network composition constitutes an adaptive response to specific goals and motivations, we argue that people value a higher proportion of actual to total friends on Facebook, and when their Facebook network is perceived to be low in actual friends, people are likely to feel lonely. Therefore, we predict:

H_4: The proportion of actual to total Facebook friends is negatively associated with loneliness across the life span.

Finally, it is important to examine factors that were previously shown to be associated with chronological age, Internet and SNS use patterns, and/or loneliness (e.g., Papacharissi & Mendelson, 2011). These include demographics (gender, marital status, income, and education), mental and physical health, as well as rates of Internet use and comfort with the Internet.

Method

Data Collection

Data were collected through a national telephone survey using a representative sample of adults, aged 18 and older, who were residents of the continental United States. A random digit dialing approach included household and cell phone numbers to ensure that all households with a phone had an equal chance of being selected. Within households, participants were selected using the ''most recent birthday'' method (O'Rourke & Blair, 1983), ensuring that all adults in the household had an equal chance of being surveyed. The data collection was conducted between July 29 and December 2, 2012, with a total number of 8,927 telephone numbers used, which yielded 1,000 completed responses (579 refused; 3,015 bad numbers—fax lines, non-working numbers, disconnected numbers, and temporarily out-of-service numbers; 352 business number/not a household; 31 incapable of responding; 161 language barrier; 1,553 pending—called more than 5 times without resolution; 2,236 inactive numbers). According to the American Association for Public Opinion Research (AAPOR) calculations, the response rate was 30.1%, and the cooperation rate was 63.3%.

Measures

Demographics. Our sample only included people 18 years of age and older, and age was calculated based on the self-reported date of birth. The average age in the total sample of respondents ($N = 1000$) was 48.16, $Mdn = 49.00$, $SD = 17.18$. The sample was 48.8% male and 56.8% married, with 1 = ''not married'' (single, divorced, separated, and widowed) and 2 = ''married.'' The median age of our sample was slightly older than that of the U.S. population ($Mdn = 37.2$) due to sampling only people over 18 years old, but the sample is comparable to other characteristics of the U.S. population (i.e., 49.1% male and 51% married; U.S. Census Bureau, 2010). Household income was measured on a scale of 1 to 9 with 1 = *less than $10,000* and 9 = *$150,000 or more*, and education level was measured on a scale of 1 to 7 with 1 = *none or grades 1–8* and 7 = *post-graduate* (see Table 1 for descriptive statistics).

Since some respondents reported that they had never used social networking sites for checking and updating posts, we focused on the subsample of Facebook

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Table 1
Descriptive Statistics for Dependent Variables and Covariates for Facebook Users Only (i.e., Users Who Have at Least One Facebook Friend)

Variable	*Mean*	*Mdn*	*SD*
Age	42.64	43.00	15.61
Internet use (greater values indicate more Internet use)	3.02	3.00	.98
Comfort with Internet (greater values indicate more comfort)	4.66	5.00	.71
Income	5.94	6.00	2.06
Education	5.36	6.00	1.35
Poor overall health (higher numbers indicate more poor health)	2.19	2.00	.98
N of days with poor physical health in the past 30 days	2.51	.00	6.43
N of days with poor mental health in the past 30 days	4.05	.00	8.13
Checking about others on Facebook	3.49	3.00	1.18
Self-posting on Facebook	2.87	3.00	1.22
Total *N* of FB friends	291.79	150.00	463.83
Total *N* of actual FB friends	85.91	40.00	148.71
Ratio of actual to total FB friends	.45	.40	.35
Social isolation/loneliness (higher numbers indicate more loneliness)	1.67	1.33	.82

Note: $^{**}p < .01$ (2-tailed), $^{*}p < .05$ (2-tailed). FB = Facebook

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users ($N = 577$), that is, those who reported having at least one Facebook friend. Descriptive statistics in Table 1 as well as the analyses reported in the results section are based on the sample of Facebook users only. The average age of Facebook users was slightly younger than the average age in the total sample, $M = 42.64$, $Mdn = 43.00$, and $SD = 15.61$, with the youngest user being 18 years old and the oldest being 93 years old. There were fewer males (41.1%) and slightly fewer married individuals (53.7%) in the Facebook sample compared to the total sample of respondents.

Internet Use. Overall, 87% of the full sample was Internet users, reporting that they used the Internet at least every few weeks. This is slightly higher than the overall U.S. population Internet use estimate of 74.7% (U.S. Census Bureau, 2012). Since SNS use may be related to comfort with the Internet and the amount of time spent online, participants rated how comfortable they felt using the Internet (other than for email) on a 5-point scale, with 1 = *very uncomfortable*, to 5 = *very comfortable*. Participants also indicated how frequently they used the Internet at home (other than for email), with 1 = *less than 1 hour/week*, to 4 = *more than 10 hours/week*.

Online SNS Use. Using measures adapted from Madden (2012), participants indicated if a) they ever used a social network site, such as Facebook, Google+, or MySpace, to check information about others, and b) they ever used a social network site, such as Facebook, Google+, or MySpace, to share information about themselves, on a 5-point scale from 1 = *never* to 5 = *all the time*.

Network Size and Quality. For Facebook, the specific SNS of interest, participants were asked to provide information about their Facebook network size and quality. Participants were asked to estimate the total number of Facebook friends (''If you are a Facebook user, approximately how many total Facebook friends do you have?''), in order to assess network size. To assess the quality of their relations on Facebook, respondents were asked to provide the number of people who they considered actual friends out of their total Facebook friends (''If you are a Facebook user, approximately how many of your total Facebook friends do you consider to be actual friends?''). The measure of ''actual friends,'' adapted from Ellison et al. (2011), taps into perceptions of real friends as opposed to anyone in the network whom Facebook labels a ''friend.'' Ellison et al. (2011) suggest that ''actual friends'' may not truly be intimate friends or close ties, but are likely to be individuals with whom respondents have a stronger offline connection (i.e., friends in real life). These two measures were used to compute the ratio between actual and total friends. These items were pilot tested using a representative sample ($N = 25$) drawn from the same population as in the main survey.

Loneliness. Three items were selected from the UCLA loneliness scale (Russell, 1996) and assessed how often participants felt ''alone,'' ''isolated,'' and ''lacking companionship'' on a scale from 1 = *never* to 5 = *always*. Scores from the three items were averaged to compute the overall level of loneliness (Cohen's *alpha* = .85), with higher scores signifying higher loneliness.

Mental and Physical Health. We assessed the self-reported number of days in the past 30 days that participants experienced poor mental and physical health. Participants also provided an overall rating of their overall health on a 5-point scale from 1 = *excellent* to 5 = *poor*.

Results

Table 1 reports descriptive statistics for dependent variables and covariates, and Table 2 shows bivariate correlations among all variables. Exploratory analyses also tested for curvilinear effects of age by including quadratic and cubic age variables, but there were no such effects in any of the reported analyses. There was no evidence of multicollinearity in all of our models, with VIFs for all predictors being under 10.

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Table 2
Bivariate Correlations between Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1) Age	—	−.16**	−.28**	.17**	.08	.09*	.06	.01	−.25**	−.30**	−.37**	−.25**	.36**	−.10*
2) Internet Use		—	.36**	.11*	.06	−.06	.06	−.03	.21**	.23**	.14**	.07	−.08*	.00
3) Comfort with Internet			—	.14**	.18**	−.17**	−.08	−.04	.16**	.22**	.15**	.07	−.21**	−.05
4) Education				—	.26**	−.17**	−.10*	−.11**	.00	.00	.01	−.08	.03	−.09*
5) Income					—	−.22**	−.17**	−.20**	.00	−.02	.05	.02	−.02	−.18**
6) Poor Overall Health						—	.42**	.20**	−.08*	−.05	−.09*	−.10*	.04	.21**
7) Poor Physical Health							—	.32**	.09*	.03	−.04	.01	.13**	.11**
8) Poor Mental Health								—	.10*	.04	.05	.06	−.02	.41**
9) Checking Others on Facebook									—	.60**	.19**	.19**	−.14**	.06
10) Posting on Facebook										—	.24**	.16**	−.17**	.06
11) Total Friends											—	.54**	−.28**	.05
12) Actual Friends												—	.22**	.03
13) Actual/Total Ratio													—	−.12**
14) Loneliness														—

Note: **. Correlation is significant at the .01 level, *. Correlation is significant at the .05 level (2-tailed).

H_1 predicted a negative association between age and the total network size. To test H_1, we regressed the total number of Facebook friends on age controlling for home Internet use, comfort with the Internet, gender, marital status, household income, education level, and health status indicators. Prior to the analysis, the total number of Facebook friends was transformed using a log transformation, which reduced the skewness of the distribution from 5.57 ($SE = .10$) to −.47, and kurtosis of the distribution from 44.83 ($SE = .20$) to .42. The results of the regression lend support to H_1, indicating that age is negatively associated with the total number of Facebook friends, as shown in Table 3.

H_2 predicted that the proportion of meaningful social relationships would increase with age. To test this hypothesis, we regressed the proportion of actual Facebook friends on age controlling for the same factors as in the previous analysis. As predicted, age was positively associated with the proportion of actual Facebook friends (see Table 3). Thus, while the number of overall Facebook friends is lower for older adults than for younger adults, the proportion of actual friends is higher, suggesting that age is linked with a selective reduction in peripheral network partners.

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Table 3
Regression of the Number of Total Facebook Friends and the Proportion of Actual to Total Facebook Friends on Age and Relevant Covariates

	Total Facebook Friends (log)		Proportion of Actual to Total Facebook Friends	
Predictor	*B* (*SE*)	*β*	*B* (*SE*)	*β*
Age	−.02(.01)	−.56**	.74 (0.10)	.33**
Comfort with Internet	.03(.03)	.03	−5.46 (2.38)	−.11*
Internet use	.05(.02)	.09*	−.16 (1.54)	−.01
Gender	.07(.04)	.06	−1.24 (2.91)	−.02
Married	−.09(.05)	−.08*	.39 (3.15)	.01
Income	.03(.01)	.12**	−.51 (0.76)	−.03
Education	.03(.02)	.07^	.01 (1.12)	.01
Poor overall health	−.06(.02)	−.09*	−1.76 (1.63)	−.05
Poor physical health in the past 30 days	.01(.01)	.04	.71 (0.26)	.13**
Poor mental health in the past 30 days	.01(.01)	.09*	−.28 (0.19)	−.06

Note: **$p < .01$, *$p < .05$, ^$p < .10$. For total Facebook friends: $F(10, 537) = 34.85$, $p < .001$, adjusted $R^2 = .38$. For the proportion of actual to total Facebook friends: $F(10, 536) = 9.71$, $p < .001$, adjusted $R^2 = .14$.

The next hypothesis had to do with communicative uses of SNSs predicting that age was negatively associated with both self-posting (H_{3a}) and checking information (H_{3b}) on SNSs. To test this hypothesis, we regressed communicative uses on age controlling for the same covariates as in the previous analyses (see Table 4). As predicted, the age of Facebook users was negatively associated with both checking information about others and self-posting behaviors suggesting lower use of social networks for information exchange in older adults.

Finally, we examined the relationship between online social network composition and loneliness across age. We regressed loneliness on the ratio of actual to total friends controlling for age and other covariates. Consistent with H_4, a higher proportion of actual to total Facebook friends was associated with lower levels of loneliness (see Table 5). In contrast, neither the number of total Facebook friends, $\beta = -.02$, $t = -.37$, $p = .71$, nor the number of actual Facebook friends, $\beta = -.02$, $t = -.47$, $p = .64$, was a significant predictor of loneliness. Furthermore, the interaction of age and percentage of actual to total Facebook friends was not significant, $\beta = -.01$, $t = -.02$, $p = .99$, suggesting that this relationship was consistent across the life span.

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Table 4
Regression of the Frequency of Facebook Checking Information about Others and Self-Posting on Age and Relevant Covariates

	Checking Info about Others		Self-Posting	
Predictor	*B* (*SE*)	*β*	*B* (*SE*)	*β*
Age	−.02(.01)	−.26**	−.02(.01)	−.26**
Comfort with Internet	.07(.08)	.04	.19(.08)	.10*
Internet use	.18(.05)	.15**	.18(.05)	.15**
Gender	.42(.10)	.18**	.30(.10)	.12**
Married	−.10(.11)	−.04	−.11(.11)	−.05
Income	.03(.03)	.05	.01(.03)	.01
Education	.01(.04)	.01	.02(.04)	.02
Overall health	−.12(.05)	−.10*	−.01(.06)	−.01
Poor physical health in the past 30 days	.02(.01)	.12**	.01(.01)	.04
Poor mental health in the past 30 days	.01(.01)	.08*	.01(.01)	.04

Note: **$p < .01$, *$p < .05$, ^$p < .10$. For checking information about others: $F(10, 537) = 10.95$, $p < .001$, adjusted $R^2 = .15$. For self-posting: $F(10, 537) = 9.69$, $p < .001$, adjusted $R^2 = .14$.

Table 5
Regression of Loneliness on Percentage of Actual to Total Facebook Friends, Age, and Relevant Covariates

Predictor	*B* (*SE*)	*β*
Ratio of actual to total FB Friends	−.01(.01)	−.08*
Age	−.01(.01)	−.05
Comfort with the Internet	−.08(.05)	−.07
Internet use	.03(.03)	.04
Gender	−.10(.07)	−.06
Married	−.24(.07)	−.15**
Income	−.02(.02)	−.04
Education	.01(.03)	.02
Overall health	.11(.04)	.13**
Poor physical health in the past 30 days	−.01(.01)	−.09*
Poor mental health in the past 30 days	.04(.01)	.40**

Note 1: $^{**}p < .01$, $^{*}p < .05$, $^{\wedge}p < .10$; $F(11, 535) = 15.29$, $p < .001$, adjusted $R^2 = .22$.
Note 2: Higher numbers for loneliness indicate more loneliness.

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Discussion

This study used a nationally representative sample of demographically diverse Facebook users to examine the association of age with online social networking. The findings are consistent with the age-related changes in social network size and composition proposed by SST (Carstensen, 2006). Specifically, while network size is negatively associated with age, the proportion of meaningful ties, operationalized as proportion of Facebook friends considered to be actual friends, is positively associated with age. Furthermore, consistent with the tenets of SST that age differences in network size and composition are an adaptive response to changing social motivations, a higher proportion of actual to total Facebook friends is associated with lower levels of social isolation and loneliness. Thus, the results suggest that the online social networks of older adults are more conducive to well-being than those of their younger counterparts.

Theoretical Contributions

This study provides novel findings regarding age-related differences in the network composition of SNS users and its association with loneliness and social isolation. Although the average proportion of actual to total friends in our sample was similar to the average proportion obtained from a student sample in previous research (Ellison et al., 2011), the developmental perspective offered by SST allowed us to

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uncover differences both in the network size and the proportion of actual to total friends along the age spectrum. These patterns are consistent with previous findings about peripheral connections driving the growth of young adults' online networks (Manago et al., 2012) and provide new evidence for age differences in the proportion of actual versus total friends in online social networks. Furthermore, since actual friends are valued social ties associated with both social bonding and social bridging capital (Ellison et al., 2011), a higher proportion of actual to total Facebook friends is an asset, and a lower proportion of actual friends is associated with feelings of loneliness. However, whereas younger adults may be willing to trade off emotional well-being for the potential benefits of network growth and thus tolerate a lower proportion of actual friends, older adults are more likely to maintain emotionally rewarding networks with a high ratio of actual social partners.

These findings contribute to our understanding of online social networking in several ways. First, this is one of the few studies that examined all Facebook users in a representative sample instead of targeting and recruiting a self-selected sample of Facebook users. Thus, we had a broad representation of Facebook experience levels. Second, our findings demonstrate the applicability of SST to online social networking by showing that the theoretical predictions regarding age-related changes in network size and composition extend from offline networks to online SNS-based networks. The utility of this theory lies in its dynamic view on peoples' social motives, which are not stable, but instead vary with age. The SST perspective can thus complement motivational perspectives on social media use, such as uses and gratifications theory (Katz, Blumler, & Gurevitch, 1974), that link peoples' salient goals determined by their social-psychological characteristics with SNS use (e.g., Papacharissi & Mendelson, 2011; Raacke & Bonds-Raacke, 2008). Third, the application of SST to online social networking also contributes to the social capital literature by aligning present-oriented emotional regulatory goals and future-oriented information acquisition goals with social bonding and social bridging capital, respectively. As the salience of these goals varies with age, individuals may place a differential value on social bonding versus social bridging and adaptively adjust their networks to satisfy age-differentiated goal priorities.

Although the cross-sectional data in our study do not allow us to empirically test for cohort effects, research conducted on offline social networks yielded similar age patterns. As noted earlier, Fung et al. (2001) found that older adults have a greater proportion of close social partners and fewer peripheral partners in their offline networks than do younger adults. Another study found that correlates of loneliness vary by age in offline social networks, showing that loneliness in older adults is linked to lower closeness to network members (Green et al., 2001). Given similar patterns of results in offline and online networks from different periods of time, we interpret the patterns documented in our study as age-related differences that are likely to hold up over time and in different eras rather than cohort effects.

The observed effects of age on network size and composition are especially interesting in light of previous communication research findings indicating that

chronological age is a weak predictor for media uses and gratifications, which prompted researchers to develop alternative life-position indexes such as contextual age (Rubin & Rubin, 1986). Contextual age incorporates several life-position dimensions including physical health, economic security, social activity, mobility, interpersonal interaction, and life satisfaction, and recent research found correlations between some of those dimensions and motives for using SNSs (Papacharissi & Mendelson, 2011). Since the present study found an effect of chronological age on Facebook network size and composition, future research would need to examine whether this effect is mediated by age-based differences in SNS use motives, as predicted by uses and gratification theory, which would require the analysis of age and life position factors on time horizons, SNS use motives, and SNS network characteristics.

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Future Directions

The application of SST to online social networks opens up exciting future research directions. For example, it would be important to observe how online networks change across the life span using a longitudinal design. This would allow us to answer questions, such as when do younger people start to actively pare or decrease their network size? Also, is such paring due to excessively large networks or due to a reduced desire for tangential acquaintances in their network? Moreover, although SST emphasizes that changes in social goals and motivations are associated with chronological age, future time horizons and associated patterns of social preferences may also shift in response to life events including geographical relocation, college graduations, and severe illness, as well as societal-level events (e.g., 9/11, the SARS epidemic; Fung & Carstensen, 2006). Thus, SST could provide important insights into temporary shifts in the composition of online social networks and SNS use in response to personal and societal events.

As scholars become increasingly interested in understanding the effect of age differences on online social networking (Pfeil et al., 2008; Wohn, Lampe, Vitak, & Ellison, 2011), SST provides a conceptual framework for linking age-related differences with a range of social and cognitive processes, including social processing, information-seeking behaviors, and decision-making (Löckenhoff & Carstensen, 2004; Löckenhoff, Cook, Anderson, & Zayas, 2012). For example, in addition to age differences in network size and the proportion of actual to total Facebook friends, SST predicts that age-related motivational changes can affect other characteristics of network composition such as strength of network ties (Löckenhoff & Carstensen, 2004). Furthermore, although our findings point to different communicative uses of SNSs—self-posting and checking information about others—across age groups, future studies could integrate the changes in network structure with communication processes, as people adapt their communication behaviors to attain age-relevant social goals in interactions with network members (Nussbaum, 2007; Nussbaum & Baringer, 2000).

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Future research should also consider alternative explanations for age differences in technology use beyond SST. Of particular interest are theoretical frameworks such as diffusion of innovation theory (Rogers, 1995) and the unified theory of the acceptance and utilization of technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003) which propose that adoption, acceptance, and utilization of new technology depend to a great extent on the circumstances under which it is being introduced, the people exposed to the innovation, and their perception of its usefulness (e.g., benefits). Several studies have used these theories as frameworks to examine the effect of age differences on technology adoption and use by investigating older adults' adoption of new technologies (e.g., mobile phones; van Biljon & Renaud, 2008), motivation for accepting technological innovation (e.g., benefit-driven selectivity and perceived ease; Melenhorst et al., 2006; Pan & Jordan-Marsh, 2010), and usage of the technology (e.g., usage behavior and intention to keep using the adopted technology; Karahanna et al., 1999; Venkatesh et al., 2003). Because the present study did not collect any data on the adoption process, we were not able to directly explore such mechanisms in the realm of online social networking. Future studies could empirically investigate the interplay among age differences in social network preferences and technology adoption in the context of online social networking patterns. Furthermore, although we did examine age differences in select usage behaviors (e.g., self-posting on Facebook), we did not examine other components of usage behavior as defined by UTAUT (e.g., image management and intention for continued use; Venkatesh et al., 2003). Future studies could test components of UTAUT in the realm of social networking sites across the life span.

Limitations

Several important limitations qualify our findings. First, we used a short measure of loneliness and single-item measures of online social network characteristics and subjective health. Multiple-item measures may be inherently more reliable (Rossiter, 2002), but in certain contexts, single item measures can be as effective as multiple item scales (e.g., quality of life or health measures, DeSalvo et al., 2006; Zimmerman et al., 2006). Nonetheless, future studies should utilize more comprehensive assessments of key variables. Another measurement concern is that we assessed general comfort with the Internet rather than measuring specific comfort levels with Facebook or other SNSs. Moreover, although our findings are consistent with hypotheses based on SST, the present study did not directly assess time horizons, and we relied on a simple marker for social network composition (i.e., proportion of Facebook contacts considered as ''actual'' friends). Furthermore, directly assessing time perspective and capturing a more nuanced assessment of online and offline social networks constitute important goals for future research. Finally, the present study used a survey method, which relied exclusively on self-reports. Because age-associated deficits in memory may affect the validity of retrospective self-reports

(Southwell et al., 2010), future research should complement self-report data with behavioral and network data that can be collected by using the Facebook API (e.g., Bazarova et al., 2015; Sosik & Bazarova, 2014) or at least control for respondents' cognitive abilities.

Conclusion

In conclusion, this research is one of the first applications of SST to online social networks. Using a nationally representative sample, this study extends the current understanding of how the size and composition of online social networks vary across age, and establishes an association between the proportion of actual to total Facebook friends and feelings of social isolation and loneliness across the adult life span.

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Funding

The data were collected as part of the Cornell National Social Science Survey conducted by Cornell University Survey Research Institute. This research was supported in part by the USDA NIFA Hatch project No. 227270 awarded to the third author.

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