

Use of Messaging Apps and Social Network Sites Among Older Adults: A Mixed-Method Study

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Multi-social media use or use of multiple social media platforms—messaging apps (e.g., LINE) and social network sites (SNSs; e.g., Facebook) in particular—has become increasingly prominent among older adults, but this phenomenon remains understudied. This study uses a nationally representative sample of Taiwanese adults aged 60 years or older (Study 1; $N = 242$) and interview data (Study 2; $N = 26$) to understand antecedents of multi-social media use and its associated outcomes in the older population. Results show that both technological use (mobile and multidimensional Internet use) and social forces (influence from children, friends, and the public) are central factors that operate across older adults' adoption of both messaging apps and SNSs. Findings further indicate that although multi-social media users do not necessarily have more access to strong or emotionally close and weak or emotionally distant relationships than other Internet users, messaging apps and SNSs play different roles in older adults' everyday lives.

Keywords: older adults, social media, messaging apps, social network sites, strong ties, weak ties

As social media use increases rapidly among older adults, many older adult users have begun to embrace multiple social media platforms, messaging apps (e.g., LINE and WhatsApp), and social network sites (SNSs; e.g., Facebook) in particular. In Argentina, Boczkowski, Matassi, and Mitchelstein (2018) find that social media users 60 years of age or older accessed 2.19 platforms on average, and the two most popular social media are a messaging app (WhatsApp) and an SNS (Facebook). In Taiwan, the Taiwan Communication Survey (TCS, 2017) also shows that 57.5% of social media users aged 60 or older adopted both messaging apps and SNSs. However, the phenomenon of multi-social media use—use of more than one social media platform, such as messaging apps and SNSs (Boczkowski et al., 2018; Tandoc, Lou, & Min, 2018)—in the older population remains understudied. Prior work suggests that older adults obtain health benefits from engaging in different social relationships, ranging from strong or emotionally close ties with whom people frequently discuss important matters (e.g., spouses and children) to weak or emotionally less

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Date submitted: 2020-01-15

¹ This work was supported by the Ministry of Science and Technology of the Republic of China (MOST 106-2410-H-009-042). The author thanks Chia-Yun Li for her help with data collection, as well as the editor and the two anonymous reviewers for their thoughtful feedback.

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close ties (e.g., acquaintances; Bruggencate, Luijkx, & Sturm, 2017; Huxhold, Fiori, Webster, & Antonucci, 2020). Because different social media platforms may meet different relational needs among younger age groups (Tandoc et al., 2018), it is increasingly important to understand the ramifications of multi-social media use for older adults' social engagement. Such results could inform the design of technological interventions to help older adults connect with others more effectively (e.g., Waycott, Vetere, & Ozanne, 2019), because they are likely to lose various social ties because of retirement, bereavement, and health decline.

Drawing on the theoretical framework of the digital divide, the goal of the study is twofold. First, because the second-level digital divide concerns inequalities in Internet use (Hargittai, 2002), this study identifies which Internet users are more likely to use multiple social media platforms. Particularly, this study focuses on messaging apps (e.g., LINE) and SNSs (e.g., Facebook), the most widely used social media in Taiwan (Thomala, 2020). Second, based on the third-level digital divide, which addresses the divides in outcomes associated with various types of Internet use (van Deursen & Helsper, 2015), this study examines how use of multiple social media platforms (in particular, messaging apps and SNSs) is associated with relational benefits—that is, access to strong and weak relationships, both of which are essential for adjustment in later life (Bruggencate et al., 2017; Huxhold et al., 2020). This research employs a multimethod approach, specifically combining a nationally representative survey sample of Taiwanese adults aged 60 or older² (Study 1; $N = 242$) and qualitative interview data (Study 2; $N = 26$). Although the quantitative data in Study 1 help to illuminate divides in multi-social media use and the latter's association with access to strong and weak relationships, the data offer no insights regarding specific practices on different platforms or their connections to accessing various relationships. The interview data from Study 2 regarding Taiwanese older adults' use of a messaging app (LINE) and SNS (Facebook) in their daily lives further explain, triangulate, and complement the findings captured by the quantitative data.

Literature Review

Theoretical Framework of Digital Divide and the Context of Taiwan

To better understand the antecedents and consequences of older adults' multi-social media use (use of more than one social media platform, particularly messaging apps and SNSs), this study draws on the theoretical framework of digital divides. The term *digital divide*, which originally referred to the divide between those with and those without Internet access (the first-level digital divide; DiMaggio, Hargittai, Celeste, & Shafer, 2004), has since been expanded to a broader concept that encompasses disparities in Internet use (the second-level digital divide; Hargittai, 2002) and its associated outcomes (the third-level digital divide; van Deursen & Helsper, 2015). Beyond Internet access, the second-level digital divide concerns differences in Internet use ranging from general usage patterns to specific online activities, such

² Although there is no universal agreement on the age that defines older adults, to be consistent with the World Health Organization's (2015) practices, this study uses age 60 as the cutoff. The respondents' ages in Study 1 range from 60 to 83 years and in Study 2 from 59 to 82 years. These age ranges reflect Taiwanese later life; the average retirement age is 61.3 years (Chen, 2019), and the average life expectancy is 80.4 years (Ministry of the Interior, 2018).

as creation of Web content (Brake, 2014) and SNS adoption (Yu, Ellison, McCammon, & Langa, 2016). The third-level digital divide further examines the disparities in returns associated with online practices.

The topic of divides in social media use and its associated outcomes is of interest for many aging societies with high Internet use, particularly Taiwan. With an Internet adoption of 89.6% (Taiwan Network Information Center, 2019), Taiwan is one of the fastest aging societies in the world. It is estimated that the median age of Taiwanese population will rise from 39.9 years in 2015 to 57.8 years in 2065. This increase is higher than that expected in other countries, such as Japan (46.4 years in 2015 to 53.4 years in 2065), Italy (45.5 years in 2015 to 51.6 years in 2065), the U.S. (37.8 years in 2015 to 43 years in 2065), and the UK (40 years in 2015 to 44.4 years in 2065; National Development Council, 2018). In Taiwan, 97.9% of Internet users access it via smartphones (Taiwan Network Information Center, 2019). The dominant social media platforms are Facebook and LINE, with a penetration rate of 89% and 86%, respectively, among Internet users (Thomala, 2020). As older adults increasingly adopt both messaging apps and SNSs, whether and how such use helps them to connect with various relationships becomes an urgent question. The research context of Taiwan may indicate future prospects of social media use in the older population for similar societies.

The article first discusses how different fields of resources—social (age, gender, marital status, and employment status), economic (education and income), health (self-rated health), and/or technological (device type and multidimensional Internet use)—predict older adults' use of multiple social media (messaging apps and SNSs). Then, the article examines how adoption of both messaging apps and SNSs is associated with access to strong and weak relationships.

Who Adopts Both Messaging Apps and SNSs Among Older Internet Users?

Prior work suggests that, once online, technological resources—device type for Internet access and multidimensional Internet use—may differentiate older Internet users who use both messaging apps and SNSs from those who do not. One technological resource is the device type used for Internet access, such as mobile devices or PCs. Prior work shows that mobile Internet use is positively associated with leisure-oriented activities, whereas PC Internet use supports work-related or viewing-intensive activities (e.g., Pearce & Rice, 2013). Because mobile Internet use can satisfy anywhere-anytime ritualistic and sporadic communication needs better than PC Internet use (Humphreys, Von Pape, & Karnowski, 2013), mobile Internet use may be a better predictor of multi-social media use. Another technological resource is multidimensional Internet use, which has been theorized as one's potential to maximize online opportunities and is positively associated with Internet skills and self-efficacy (e.g., Blank & Groselj, 2014). Older adults who use the Internet to perform different types of activities are more likely to use multiple social media platforms.

Moreover, older adults' social backgrounds (e.g., age, gender, and marital and employment status) may be associated with use of multiple social media platforms. Prior work on older Internet users' SNS adoption indicates no significant differences between SNS users and nonusers regarding their access to economic (e.g., income, wealth, and education) and health resources (e.g., self-rated health; Yu et al., 2016). Instead, social background plays a more important role in older adults' SNS adoption; specifically, those who are younger, female, married, and White may be more likely to use SNSs to sustain their existing

larger and more diverse social networks, compared with their older, male, never-married, and non-White counterparts (Yu et al., 2016). Similarly, focusing on college students, Hargittai and Hsieh (2010) find that multi-social media users and nonusers tend to differ on social factors, such as gender and race/ethnicity. In particular, females and Whites are more likely to adopt multiple social media sites compared with their male and Asian American counterparts. These patterns of results suggest that social backgrounds that reflect personal needs may motivate older adults to adopt both messaging apps and SNSs to complement their existing social status.

How Does Use of Messaging Apps and SNSs Facilitate Older Adults' Strong and Weak Relationships?

Drawing on the third-level digital divide literature, this study next evaluates how use of both messaging apps and SNSs relates to older adults' access to the number of strong and weak relationships. Social networks often comprise layers of social relationships that differ in strength, ranging from strong or intimate others with whom people often discuss important matters, to weak or less intimate ties (Granovetter, 1973; Huxhold et al., 2020). Strong ties (e.g., spouse and children) that are emotionally close, stable, and well connected can provide substantive forms of support, such as care in time of illness (English & Carstensen, 2014; Fingerman, 2009). By contrast, weak ties (e.g., acquaintances) that are emotionally less close, unstable, and often unconnected to other ties can help connect individuals with diverse groups and increase access to novel information or compensate for the loss of strong ties (Fingerman, 2009; Huxhold et al., 2020). Given the different functional values of strong and weak ties, existing research shows that older adults are healthier when they are embedded in a more diverse network that consists of both strong and weak ties (Bruggencate et al., 2017; Huxhold et al., 2020).

Messaging App Use and Strong Ties.

While messaging apps are able to support connections with various social relationships, prior work shows that messaging apps tend to cultivate interactions with strong ties because they provide private channels for communication. Focusing on younger age groups, Karapanos, Teixeira, and Gouveia (2016) find that, compared with SNSs, messaging apps such as WhatsApp support interactions with strong ties in a more private setting, where audiences are clearly defined. In messaging apps, individuals can have intimate communication and express negative emotions (e.g., sadness and anger) with closely related others (Karapanos et al., 2016; Waterloo, Baumgartner, Peter, & Valkenburg, 2018). Recent work on the older population also shows that older adults use group features in WhatsApp to contact with their close family or friends, especially with those who are physically distant (Rosales & Fernández-Ardèvol, 2017).

However, it is unclear whether use of messaging apps is positively associated with the number of strong ties. The idea of "media multiplexity" suggests that users employ more channels to communicate with strong ties than weak ones (Haythornthwaite, 2005), however, messaging apps may play little role in shaping older adults' engagement with strong ties with whom they meet in person or talk on the phone frequently. Thus, while messaging apps support interactions with strong ties, it is not clear whether use of messaging apps contributes to the number of strong ties in a personal network.

SNS Use and Weak Ties.

In contrast to messaging apps, SNSs such as Facebook may be well suited for older adults to interact with weak ties. SNSs such as Facebook facilitate connection with a wide variety of social relationships, ranging from close friends to distant acquaintances, while requiring low effort (Bakshy, Rosenn, Marlow, & Adamic, 2012). Prior research on younger adults suggests that SNSs are ideal platforms to access weak or emotionally less close others, such as keeping in touch with old friends (Lampe, Ellison, & Steinfield, 2006). Similarly, older adults often rekindle dormant ties or past acquaintances with whom they have lost touch (e.g., former classmates; Quinn, 2013) or even add new connections through search features and recommendation algorithms provided by SNSs (Khvorostianov, Elias, & Nimrod, 2012).

Prior work on the younger population has documented a positive relationship between SNS use and bridging social capital, which describes the benefits associated with weak ties, such as novel information (e.g., Ellison, Vitak, Gray, & Lampe, 2014). For the older population, there is also preliminary evidence that SNS use is positively associated with weak-tie-related social benefits (Quinn, 2013). Because SNSs may be one of the primary means through which older adults contact weak ties, such as old and new acquaintances, it is reasonable to expect that SNSs may increase older adults' access to weak ties.

Study 1

Study 1, using a nationally representative Taiwanese adult sample aged 60 years or older, categorized Internet users into four types—social media nonusers, SNS users only, messaging app users only, and multi-social media users who use both SNSs and messaging apps—to explore antecedents and possible consequences of multi-social media adoption.

Based on the second-level digital divide literature, the study expects that those who have mobile Internet access and more multidimensional online experiences would be more likely to be multi-social media users. Moreover, as prior work suggests, once online, social backgrounds—as opposed to economic and health resources—better predict SNS use among older adults (Yu et al., 2016); those who are younger, female, married, and employed may use multiple social media to maintain their more advantageous social status as compared with their older, male, unmarried, and unemployed counterparts.

H1: Among older Internet users, those who (a) have mobile Internet access and (b) engage in a higher level of multidimensional Internet use are more likely to be multi-social media users.

H2: Among older Internet users, those who are (a) younger, (b) female, (c) married, and (d) employed are more likely to be multi-social media users.

Further, drawing on the idea of the third-level digital divide, this study examines whether multi-social media users have more access to the number of strong and weak ties as compared with other types of users (i.e., social media nonusers, SNS users only, messaging app users only). Prior work shows that messaging apps tend to support intimate communication with close relationships (Karapanos et al., 2016; Waterloo et al., 2018), whereas SNSs facilitate connections with a diverse array of social contacts

(Khvorostianov et al., 2012; Quinn, 2013). It is expected that, compared with those who do not use SNSs (i.e., social media nonusers and messaging app users only), multi-social media users may have more weak ties. However, given that multiple channels are available to interact with strong ties, it is unclear whether use of messaging apps can help increase the size of strong-tie networks. Thus, a research question is posed to explore whether multi-social media users have a larger strong-tie network than those who do not use messaging apps (i.e., social media nonusers and SNS users only).

RQ1: Among older Internet users, do multi-social media users have a larger number of strong ties than those who do not use messaging apps (nonusers and SNS users)?

H3: Among older Internet users, multi-social media users have a larger number of weak ties than those who do not use SNSs (nonusers and messaging app users).

Study 1: Method

Sample.

The survey data came from the 2017 TCS, an annual computer-assisted personal interviewing survey that used a nationally representative sample of the adult Taiwanese population. The TCS sample used in this study included 242 Internet users (unweighted) aged 60 years or older.

Measures.

Age. Age was constructed based on reported birth year.

Gender. Female was coded as 1, male was coded as 0.

Marital status. Marital status was classified into two categories: unmarried (unmarried, divorced/separated, and widowed; coded as 0) and married (coded as 1).

Employment status. Employment status was classified into two categories: unemployed (unemployed, retired, and disabled = 0) and employed (working full time, working part time, and helping the family business = 1).

Income. Respondents were asked to estimate their personal total income in a month on average, which was the sum of various income types, such as pensions, annuities, and allowances from children. Income was classified into 11 categories, ranging from 1 (*none*) to 11 (*NT\$77,001*).

Education. Education level was classified into seven categories, ranging from 1 (*none*) to 7 (*postcollege*).

Self-rated health. Respondents were asked, "Overall, how satisfied are you with your health condition?" on a scale ranging from 1 (*very dissatisfied*) to 5 (*very satisfied*).

Device type of Internet access—mobile and PC Internet use. Respondents were asked, "How many days in a week do you use mobile phones (or PC) to access the Internet?" Two categories were created: mobile (or PC) Internet nonusers ($0/day = 0$) and mobile (or PC) Internet users ($> 0/day = 1$).

Multidimensional Internet use. Adapted from prior work (Blank & Groselj, 2014), multidimensional Internet use was captured by asking respondents the frequency with which they go online to perform various activities, including "using e-mail," "searching or browsing information," "using a cloud drive to transfer data," "watching online videos," "watching livestreaming," "watching videos or TV programs via video-on-demand (VoD)," and "using dating websites or apps," on a scale from 1 (*never*) to 4 (*frequently*). A composite measure was created by summing the seven items ($\alpha = .70$).

Daily time spent on offline interactions—face-to-face and phone interactions. Respondents were asked to estimate the number of hours and minutes in a typical day during which they interact with others face-to-face or via phone (excluding using messaging apps, such as LINE and FaceTime) for both work and non-work-related reasons. Composite measures of daily time spent on face-to-face and phone interactions (in hours) were formed by summing the time spent on the two forms of interactions for each of the two reasons.

User types. To capture messaging app use, respondents were asked to estimate how many hours and minutes they spent in a typical day on messaging apps (e.g., LINE) to interact with others for both work and non-work-related reasons. Two categories were created: messaging app nonusers (time spent on messaging apps = 0) and users (time spent on messaging apps > 1 minute = 1). To capture SNS use, respondents were asked to estimate how many days a week they use social network sites (e.g., Facebook). The response options ranged from 0 (*0 days*) to 7 (*7 days*). Those who reported 0 days were coded as 0 (nonusers), and those who reported greater than 0 days were coded as 1 (users). Four types of users were further identified: social media nonusers (both messaging app and SNS use = 0; 10.1%), SNS users only (SNS use = 1, messaging app use = 0; 3.4%), messaging app users only (SNS use = 0, messaging app use = 1; 34.8%), and multi-social media users (both messaging app and SNS use = 1; 51.7%).

Network size of strong and weak ties. Adapted from McPherson, Smith-Lovin, and Brashears (2006), strong-tie network size was framed as, "How many people do you feel close to and are you frequently in contact with to discuss important personal issues and feelings?" To estimate weak-tie network size, respondents' global network size of daily contacts was captured. Following Fu (2005), an open-ended question framed global network size of daily contacts this way: "On average, about how many people do you have contact with in a typical day (including all those you say hello to, chat with, talk to, or discuss matters with, whether you do it face-to-face, by telephone, by mail, or on the Internet, or whether you know the person)?" Weak-tie network size was calculated by subtracting the number of strong-tie contacts from the global network size of daily contacts.

Table 1 reports the descriptive statistics of all variables in the study among the full sample and by user type.

Table 1. Descriptive Statistics of All Variables by User Type Among Internet Users Aged 60+.

	All		Nonusers		SNS users		Messaging app users		Multi-social media users	
	<i>M</i> or %	<i>SD</i>	<i>M</i> or %	<i>SD</i>	<i>M</i> or %	<i>SD</i>	<i>M</i> or %	<i>SD</i>	<i>M</i> or %	<i>SD</i>
Age (60–83)	65.44	4.72	66.54	4.49	64.81	4.01	65.74	4.73	65.07	4.81
Female (0–1)	0.48	–	0.43	–	0.48	–	0.58	–	0.41	–
Education (1–7)	4.00	1.39	3.94	1.50	4.66	2.03	3.50	1.26	4.30	1.32
Income (1–11)	4.23	2.94	3.71	2.74	6.89	3.26	3.51	2.47	4.66	3.11
Married (0–1)	0.83	–	0.88	–	0.86	–	0.79	–	0.85	–
Employed (0–1)	0.36	–	0.24	–	0.33	–	0.29	–	0.44	–
Multidimensional Internet use (7–23)	11.49	3.83	9.28	2.33	13.66	4.19	9.75	3.00	12.95	3.87
PC Internet use (0–1)	0.38	–	0.45	–	0.63	–	0.22	–	0.45	–
Mobile Internet use (0–1)	0.88	–	0.48	–	0.60	–	0.93	–	0.95	–
Self-rated health (1–5)	3.68	0.83	3.52	0.81	3.78	0.45	3.70	0.84	3.70	0.86
Meeting (hours) (0–17)	3.27	2.95	2.06	2.00	3.68	3.10	2.95	2.83	3.68	3.12
Calling (hours) (0–6.5)	0.61	1.03	0.59	1.00	0.30	0.49	0.59	1.25	0.65	0.90
Strong tie (0–50)	5.58	5.93	6.00	6.42	4.72	3.26	5.10	7.19	5.87	5.01
Weak tie (0–255)	27.54	39.45	11.26	15.00	63.13	66.22	20.88	24.30	32.28	45.90

Note. Reported means and percentages are survey adjusted and weighted.

Analytic Procedures.

The goal of the study was to explore the predictors and consequences of multi-social media use among older adults. This study used logistic regression to examine the adoption of multiple social media platforms. Then, because the number of strong and weak ties were overdispersed count variables, negative binomial regression analysis was used to investigate the relationships between user types and size of strong and weak ties.

Study 1: Results

Table 2 shows results from the logistic regression analysis, investigating how access to technological (H1) and social resources (H2) explains multi-social media use or use of multiple social media platforms, particularly messaging apps and SNSs. Results show that use of multiple social media is significantly stratified by mobile Internet use (OR = 4.49, $p < .01$; H1a) and multidimensional Internet use (OR = 1.24, $p < .001$; H1b). Contrary to expectations, social resources, including age (H2a), gender (H2b), marital (H2c), and employment status (H2d), are not significant predictors of multi-social media use. Thus, compared with other users, multi-social media users have more technological resources.

Table 2. Logistic Regression Analysis: Predicting Multi-Social Media Users.

	<i>B</i>	<i>SE</i>	Exp(<i>B</i>)
Constant	-5.16*	2.60	0.01*
Age	0.01	0.03	1.01
Female	-0.24	0.32	0.79
Education	0.12	0.13	1.13
Income	0.00	0.06	1.00
Married	0.11	0.41	1.12
Employed	0.03	0.39	1.03
Multidimensional Internet use	0.21	0.05	1.24***
PC Internet	-0.02	0.36	0.98
Mobile Internet	1.50	0.51	4.49**
Self-rated health	0.02	0.19	1.02
Meeting	0.09	0.06	1.10
Calling	-0.06	0.16	0.94
-2 log likelihood			

Notes. Baseline $N = 231$ (unweighted). *SE* = standard error. All models are survey adjusted and weighted. * $p < .05$. ** $p < .01$. *** $p < .001$.

Next, this study examined whether multi-social media users have more strong ties than those who do not use messaging apps (RQ1), and have more weak ties than those who do not use SNSs (H3). As Model 1 in Table 3 shows, there is no significant difference in the number of strong ties between multi-social media users and those who do not use messaging apps—nonusers and SNS users. Turning to weak ties, Model 2 in Table 3 shows that multi-social media users have more weak ties than nonusers (OR = .47, $p < .05$), but fewer weak ties than SNS users (OR = 2.15, $p < .05$). Thus, H3 is partly supported.

Table 3. Negative Binomial Regression Analysis: Predicting Strong-Tie and Weak-Tie Network Size.

	Strong ties (Model 1)			Weak ties (Model 2)		
	<i>B</i>	<i>SD</i>	Exp(<i>B</i>)	<i>B</i>	<i>SD</i>	Exp(<i>B</i>)
Intercept	.19	1.04	1.21	3.75**	1.25	42.34
Age	.01	.01	1.01	-0.02	0.02	0.98
Female	.13	.11	1.14	-0.28	0.15	0.76
Education	.03	.05	1.03	-0.06	0.07	0.94
Income	-.04	.02	.96	-0.03	0.03	0.97
Married	-.01	.15	.99	0.19	0.20	1.22
Employed	-.13	.14	.88	0.15	0.20	1.16
Multidimensional Internet use	.00	.02	1.00	-0.01	0.02	0.99
PC Internet	.18	.14	1.19	0.26	0.17	1.29
Mobile Internet	.38*	.19	1.47	0.38	0.25	1.46
Self-rated health	.14*	.07	1.15	0.03	0.10	1.03
Meeting time	-.01	.02	.99	0.11	0.03	1.12***
Calling time	.07	.06	1.08	0.07	0.08	1.08
Nonusers	.13	.21	1.14	-0.76	0.29	0.47*
SNS users	-.02	.28	.98	0.76	0.35	2.15*
Messaging app users	-.17	.13	.84	-0.24	0.16	0.79
Log likelihood	-612.89			-919.60		

Notes. Baseline $N = 231$ (unweighted). The omitted category is multi-social media users. All models are survey adjusted.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Study 2

Study 1 examines the predictors and outcomes associated with use of both messaging apps and SNSs. The results of Study 1 show that technological resources—mobile Internet use and multidimensional Internet use—are important predictors of older adults' use of both messaging apps and SNSs. Additionally, while multi-social media users and other Internet users do not differ in the number of strong ties, multi-social media users have more weak ties than nonusers, but fewer such ties than SNS users only. Given these associations, however, it remains unclear how older adults adopt and use messaging apps and SNSs to interact with various social relationships in their daily lives. This study thus turns to the qualitative data to explicate the process of adopting and the practices related to strong and weak ties on these social media platforms. In particular, to contextualize the results of Study 1, Study 2 focuses on LINE and Facebook, the most popular messaging app and SNS, respectively, in Taiwan, to explore:

RQ2: Why do older adults adopt LINE and Facebook?

RQ3: How do older adults interact with strong and weak ties on LINE?

RQ4: How do older adults interact with strong and weak ties on Facebook?

Study 2: Method

Sample.

Semistructured face-to-face interviews were conducted in Taiwan between July and September 2017 with 26 participants—16 women and 10 men—who used both LINE and Facebook. The average age was 68 years (59–82). The educational background of the sample was diverse (elementary school = 3; junior high school = 6; high school = 8; college = 8, postcollege = 1). Participants were recruited in two ways. First, the study collaborated with one citizen-learning center and two community associations in Hsinchu (northwestern Taiwan) and Yilan (northeastern Taiwan). Second, the study interviewed the author's distant contacts and then asked the interviewees to suggest the names of other people to be interviewed. The interviews took place based on the participants' preferences. The interview protocol asked about participants' everyday life, adoption of Facebook and LINE, how they used Facebook and LINE, whom they interacted with on Facebook and LINE, and their perceived differences between Facebook and LINE.

Analytic Procedures.

All interviews were audio-recorded and transcribed verbatim. Qualitative data analysis software, ATLAS.ti, was used to code and organize data. Following Strauss and Corbin's (1990) open coding technique, the author and research assistants independently coded the transcripts line by line to identify concepts and then compared results to address any discrepancies. Next, I made connections between concepts and probed deeper to develop the themes described next.

Study 2: Results

Reasons for Adoption: Smartphone Use and Social Influence (RQ2).

The data suggest that the wide dispersion of smartphones combined with social influence are key drivers for older adults to adopt LINE and Facebook. Participants described that their social media use was initiated by the change from second-generation (2G) mobile phones to smartphones. Consistent with prior work (Eynon & Helsper, 2015), the study found that younger generations, especially children, have played an important role in facilitating the replacement process.

I started to use LINE and Facebook because my child asked me to switch to smartphones
. . . I got his used iPhone 3. (P11, male, 66)

My previous phone [2G phone] was broken. At that time, smartphones started to get popular. So my daughter bought me a smartphone and I have started to use LINE since then. (P21, female, 65)

Social influence—from children, friends, or even the public—triggers social media use after switching to smartphones. Several participants shared that their children helped them install LINE and Facebook. P15 (male, 71) said that after his child installed LINE and Facebook for him, “it becomes more and more interesting to use them [social media].” Similarly, P25 (male, 66) said,

When I bought this smartphone, initially, I only used it to make phone calls . . . but when I went out and sat on a bus, all the students surrounding me constantly phubbing [to use social media]. . . . At first, I resisted using [social media], but gave in later because my family, including my children, were using [social media].

The adoption of smartphones also makes the use of social media more likely because of the versatility and ubiquity of mobile devices. A wide variety of activities were conducted via smartphones. P11 (male, 66) said, “I used an app [on my phone] to make doctors’ appointments . . . I also used it to track how many steps I walk every day.” When using smartphones, participants often extend activities to social media use. For example, P7 (female, 68) used to take pictures with a digital camera, but after she adopted a smartphone, she said, “I used my phone to take photos and I can share it with others [via LINE] immediately.” P9 (female, 64) used an app to read the stock market tape, and she explained, “When the app is downloading data, I switch to Facebook. I constantly switch between the tape-reading app and Facebook.”

Because many daily activities are tied to mobile phones, participants increasingly rely on them. P20 (female, 66) commented,

One time when I went out to run errands, I forgot to bring my phone. Suddenly, my mind went blank. It seemed that I lost all the connections to the information. I was supposed to accomplish five to six tasks in a trip. After I rushed to finish two of the more important tasks, I went home directly.

As a result, many participants carry their phones with them all the time. For example, when asked where she put her phone, P19 (female, 66) pointed to the fanny pack in front of her belly and said, “It’s right here. . . . When I’m in the kitchen, the phone is in the kitchen; when I’m in the bathroom, my phone is there too.”

“LINE Is Like a Toll-Free Telephone Allowing Texting”: Micro-Coordination and Relationship Maintenance (RQ3).

Participants pointed out that their contacts on LINE tend to be those they feel closer to and/or are likely to encounter in their daily lives, such as family, fellow members of clubs or volunteer organizations, and past colleagues. In this context, P13 (female, 64) explained, “LINE is like a toll-free telephone allowing texting for coordinating events and maintaining relationships.”

Micro-Coordination.

Regarding event coordination, P5 (female, 70) said, "My daughter-in-law uses LINE to text me about when to pick up my grandchildren from school. . . . When I replied a 'yes' or something, she knew that I got the message." Several participants belonging to clubs or volunteer organizations mentioned that LINE is useful for playing solitaire (Jie long) and to register for group buying, trips, or gatherings. P24 (female, 59) explained, "If you want to attend a trip, you copy the list of those who have registered and then share an updated list with your name added to the list."

For many interviewees, texting via LINE is often preferred over making phone calls to coordinate events for several reasons. First, texting is less intrusive to the message receiver. P7 (female, 68) explained, "Because my son is busy [at work], I text him [via LINE] about the dinner menu and ask him when to come home." Further, for important matters, P21 (female, 65) added, "[Texting via] LINE helps me to keep a record. . . . Unlike phone calls, I forgot what I heard and I said immediately." Finally, texting provides opportunities for self-reflection. P1 (female, 66) commented, "When talking on a phone, I often talk without thinking much. But I think twice before sending a message [on LINE]. If the message looks too direct, I will tone down the message to make it more acceptable." Regarding when they use LINE to call others, participants said that they use it to make phone calls to follow up with important matters and "seen-but-no-reply" messages. P9 (female, 64) said that because phone calls via LINE are free, "I use LINE to call my son or husband when I want to hear their voice, and the phone call may last for a while."

Relationship Maintenance.

Maintaining relationships was another practice routinely and commonly conducted on LINE among participants. Many participants sent "good-morning images" (*Zao-an tu*) as greetings to their social contacts. However, some participants didn't read or respond to these greetings because "they are not important" (P26, female, 60), and "it is not sincere by just forwarding images shared by others" (P13, female, 64). A few participants made the good-morning images themselves. P15 (male, 71) explained, "As people keep forwarding images shared by others, all the pictures look the same." Thus, he downloaded images and edited them by adding greeting words, dates, and his own signature. Another example was P19 (female, 66), who said that her days always began with sending good-morning messages that she edited or made herself to 10 people—a "good-morning group" she called it:

I just want to check if they are okay. . . . As long as they read the message, it doesn't matter if I receive a reply. . . . One time, a retired colleague didn't read my good-morning messages for a few days, so I rushed to his home to check if he was okay. It turned out that his Internet was broken [laughs].

To maintain relationships, participants also send other information via LINE, such as photos, news, and health-related information. For example, P2 (female, 67) said, "I forwarded a message yesterday which says that before driving, you should open the window for the front passenger and open the driver's door five times to make the air flow."

"Facebook Is Like Infrequent-Contact Friends": Old and New Connections, Broadcasting, and Information Gathering Only (RQ4).

Old and New Connections.

Although some participants had contacts, such as family, on both Facebook and LINE, participants generally considered Facebook contacts to be more distant. P10 (female, 70) explained, "Facebook is like infrequent-contact friends." Several participants shared experiences of reconnecting with past acquaintances via Facebook. For instance, P13 (female, 64) said, "It is wonderful that when I think of past colleagues in Hualian, I search their names [on Facebook] and find them. . . . Then, we say hello. . . . Some students find me in the same way."

A few participants even used Facebook to connect with new friends who shared similar interests. P23 (male, 62), a dog lover with a border collie, explained,

If I want to find a group about dogs or pets, I search "pets," and a list of pet groups comes out. . . . In fact, I don't need to search. When I browse information on Facebook, I see pet groups.

P23 joined dog groups on Facebook and said, "The groups arrange meetups with dogs. . . . If I am available, I'll attend. . . . This has become part of my life after getting retired."

Broadcasting.

Some participants strategically share photos or personal information on Facebook with a broad audience in mind. For example, P1 (female, 66) considers Facebook to be an open space where "everyone" can see her posts with the information about locations. She stated, "I share my photos [on Facebook] to tell others where I am and where I have been." The broad connectivity supported by Facebook also facilitates sharing personal interests. For example, P14 (male, 82) is enthusiastic about photography and thus started to share his work on Facebook a few years ago:

I have about 900 followers.

[How many "Likes" do you get for each photo?]

I usually don't get many "Likes," ranging from 100 to 200.

[Do you care about the number?]

The number is only for my reference. I am happy as long as someone sees my work.

Participants who belong to clubs or organizations also use Facebook to advertise their activities. For example, P13 (female, 64) said,

During the folkgame festival, [my community] hosted children from other countries and took them to the festival. I shared photos about hosting on Facebook to show what our

community is doing so that others get to know that there is a Dongshan [township] community in Yilan.

Information Gathering Only.

However, the broad connectivity supported by Facebook also discourages some participants from adding friends or sharing information on the site. For example, P19 (female, 66) said, "I mostly share stuff on LINE. I use Facebook solely for browsing information. [Posting something on Facebook] is like announcing your personal information to the public." Like P19, several participants use Facebook solely to get the information they are interested in. For example, P8 (male, 70) joined Facebook groups of comics artists and in-depth reporting programs because "I am happy to see pretty comics and like to know how the commentators analyze current issues."

Discussion

Drawing on the second- and third-level digital divide literature, this study asks who is more likely to be a multi-social media user (using more than one social media platform, in particular messaging apps and SNSs) and with what relational benefits. Using both quantitative and qualitative data, the study found that technological resources (i.e., mobile Internet use and multidimensional Internet use) and social influence are predictors of multi-social media use. Further, although access to the number of strong ties does not differ between multi-social media users and those who do not use messaging apps (i.e., SNS users only and social media nonusers), multi-social media users have more weak ties than social media nonusers, but they have fewer weak ties than SNS users only. Overall, the mixed-method approach helps shed light on the different but complementary role of messaging apps and SNSs in older adults' lives.

Predictors of Multi-Social Media Use

Regarding multi-social media use, results show that older adults' use of both messaging apps and SNSs is stratified by access to technological resources and social influence. Concerning technological resources, quantitative data indicate that those who use mobile Internet and engage in higher levels of multidimensional Internet use are more likely to use multi-social media. Complementing the findings from the quantitative data, qualitative data show that adoption of smartphones in conjunction with various online activities performed on smartphones, such as taking photos and making doctor's appointments, often strengthens social media use and makes social media an indispensable part of everyday life. These findings highlight the importance of smartphone use in Taiwan—nearly all Internet users access the Internet through smartphones (Taiwan Network Information Center, 2019). Indeed, in keeping with Rainie and Wellman's (2012) idea of "mobile revolution," these results suggest that the versatility and ubiquity of mobile Internet use have made social media use an integral part of people's daily lives and fundamentally changed how individuals communicate with and connect to others. Further, the qualitative data additionally reveal the role of social influence in older adults' multi-social media use (Fulk, Schmitz, & Steinfield, 1990). For some participants, use of smartphones does not necessarily result in social media use; it takes encouragement or

even pressure from younger age groups to connect smartphone use with social media use. Together, these findings reveal that both technological and social forces are central factors that operate across older adults' use of both messaging apps and SNSs.

Consequences of Multi-Social Media Use

Regarding outcomes associated with multi-social media use, the quantitative data suggest that those who use both messaging apps and SNSs do not necessarily have more strong ties than others. Unlike prior work on younger age groups suggesting that messaging apps are primarily used to interact with strong ties (Karapanos et al., 2016; Waterloo et al., 2018), the qualitative data show that older adults use messaging apps to communicate with a wider range of offline contacts in order to coordinate tasks (e.g., negotiating time to pick up grandchildren) and maintain relationships (e.g., sending "good-morning" images) in one-to-one or one-to-many group settings. Consistent with the idea of media multiplexity, which suggests that as tie strength increases, so too does the range of media platforms used to communicate (Haythornthwaite, 2005), messaging apps are one of the ways in which older adults communicate with strong ties. Furthermore, because messaging apps are primarily used to coordinate events with strong ties, it is possible that the lightweight forms of communication may not be sufficient for older adults to maintain their close relationships. Together, messaging apps may play little role in shaping older adults' access to strong ties.

As for weak ties, the quantitative data show that multi-social media users who use both messaging apps and SNSs have more weak ties than social media nonusers, but have fewer such ties than SNS users only. Consistent with prior work (Khvorostianov et al., 2012; Quinn, 2013), the qualitative data indicate that SNSs such as Facebook help older adults reconnect with old acquaintances and even establish new connections based on personal interests. The potential to connect with weak ties enabled by SNSs may help multi-social media users to expand their weak-tie network more effectively as compared with nonusers.

One unexpected finding is that the quantitative data show that multi-social media users have fewer weak ties than those who use SNSs only. A notable trend in the qualitative data is that while the wide connections supported by SNSs such as Facebook are well suited for strategically broadcasting personal status or interests, the broad connectivity simultaneously triggers self-presentational concerns. Several participants considered Facebook as a platform to be used only for searching for and browsing information. If they wanted to share something, they preferred to use LINE. Because multi-social media users can choose to interact with many of the contacts on SNSs via messaging apps, they may view SNSs as a platform to be used more for seeking information than for social interactions. Given the ability to switch between messaging apps and SNSs to communicate with their social contacts, multi-social media users may choose the former, reducing the opportunities to cultivate more weak ties connected via SNSs, as compared with those who use SNSs only.

These findings have significant empirical and theoretical implications. From an empirical perspective, quantitative and qualitative data triangulate and complement each other to offer a richer understanding of older adults' multi-social media use. For instance, the quantitative data identify mobile Internet use and multidimensional Internet use as significant predictors of multi-social media adoption. The

qualitative data not only confirm these findings, but also help explain why adoption of smartphones and various online activities are associated with social media use. Thus, the mixed-method approach may offer a richer set of insights to understand divides in multi-social media adoption.

From a theoretical point of view, the findings of this two-study investigation suggest the importance of considering the ecology of social media use from a life-stage perspective. One interesting finding from the quantitative data is that multi-social media users have fewer weak ties than those who use SNSs only. Our qualitative data suggest that one potential explanation is that multi-social media users prefer to interact with others via messaging apps because SNSs are a more public space that supports connections to irrelevant weak ties or even strangers. These findings are consistent with socioemotional selectivity theory, which suggests that dwindling life spans motivate older adults to purposively withdraw from weak-tie relationships in order to focus on stronger ties (English & Carstensen, 2014). Considering the ecology of social media use from a life-stage perspective, multi-social media users may be situated more advantageously than others because they can choose platforms that better satisfy their life-stage goals.

Limitations and Future Research

Several limitations of the study should be noted because they point out possible directions for future research. First, because the survey data are cross-sectional, longitudinal panel research is needed to clarify the directions of the relationships revealed in the study. Second, to account for the potential influence of age on the outcomes of interests, age was included as a control throughout the analyses of the survey data. However, considering the possible health and social differences across life stages in later life (Hunsaker & Hargittai, 2018), future research should examine how multi-social media use's association with relational outcomes differs across various age groups in the older population. Third, the interview data focused on use of LINE and Facebook in Taiwan, a collectivistic society that emphasizes interdependence and family connectedness. This study reveals that children facilitate older adults' adoption and use of smartphones and social media, but it is unclear whether this result can be generalized to individualistic societies, where parents are less likely to live with or close to their children (Hänninen, Taipale, & Luostari, 2020). Moreover, different messaging apps and SNSs provide different functionalities and affordances that may influence usage patterns (e.g., Tandoc et al., 2018). Thus, future research should investigate how multi-social media use and its associated outcomes differ across cultures and platforms. Finally, this study's focus on the second- and the third-level digital divide is not meant to suggest that the first-level digital divide is no longer a problem in the older population. Given that the survey data show that 64% of adults aged 60 years or older do not use the Internet in Taiwan, future research should continue to investigate ways to mitigate the first-level digital divide in the older population (Hunsaker & Hargittai, 2018).

Conclusion

Together, the two studies help elucidate the different though complementary roles of messaging apps and SNSs in older adults' everyday lives: Messaging apps are used for coordination and relationship maintenance mainly with offline contacts, whereas SNSs are used by older adults to expand their networks, broadcast themselves, and gather information, primarily through weak connections. Hopefully, the study is

an important step in investigating why older adults adopt different social media platforms—messaging apps and SNSs—and what roles these platforms play in older adults' daily lives.

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