How do older Chinese immigrants use mobile apps for digital storytelling? An exploratory study

Older Chinese immigrants and mobile apps for digital storytelling

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Poor social engagement may cause isolation and loneliness among older adults. Digital storytelling could provide the opportunity to enhance their social engagement, especially for older Chinese immigrants who face language barriers and cultural hurdles. This study aimed to learn the features, purposes and platforms of digital storytelling preferred by older Chinese immigrants in Australia. The survey study included 139 respondents. Four scales were employed to measure their relative loneliness, social support, digital literacy, and purposes of digital storytelling. Descriptive analyses, correlations, hierarchical multiple regression analyses, binary logistic regression analyses and t-tests were utilised to examine the relationship between variables in SPSS. Results reflected their user experiences and the usability of digital storytelling media. We discuss the relationships between demographic factors and these usability variables. These findings could inform design guidelines for future app development by improving our understanding of how this group use social media for digital storytelling.

CCS CONCEPTS • **Human-centered computing → User studies**

Additional Keywords and Phrases: Digital storytelling, Older Chinese immigrants, Social media, App development, Social engagement, User experience

1   INTRODUCTION

Immigrants may suffer from a lack of social engagement due to cultural gaps and language barriers, which may cause them to live alone and become isolated, this is especially the case for certain immigrant groups in Australia, such as Chinese immigrants [1, 2, 3]. Hamilton-West et al. found that social isolation could be a risk factor in the onset of mental health issues for older adults and further impact their health and wellbeing [4]. To address this, online communication has been shown to contribute to alleviating older adults' isolation and improving their mental health [5]. In recent years, online communication such as social media and digital storytelling has become increasingly popular in older adults' lives [6]. Digital storytelling has been defined as a narrative-based method that involves the creation of personal narratives and stories using digital media such as photographs, artwork, music, voice-overlay, video clips, and text [7]. Like young adults, many older Chinese immigrants also use online communication in their daily lives [8]. Research has found WeChat and Facebook to be the two main social media widely used among the Chinese people living overseas for online communication and digital storytelling [9]. Moreover, researchers found that conducting studies on user habits among older adults could identify the factors that influence their perceptions and decisions around the adoption and use of new technologies [10]. Thus, there is an opportunity to learn more about how older Chinese immigrants use storytelling applications online, which could provide guidelines for researchers to design and develop better online solutions to assist them to engage with their local community, family and friends. To address the gap in research with the target population, this study conducted a survey to understand how older Chinese immigrants use social media for digital storytelling with the aim of informing the design and development of apps that appeal to and engage older Chinese Australians.

Previous studies have found that digital storytelling can enhance social connection among older adults in various ways, including: 1) social media can help older adults to reintegrate into the community [11]; 2) storytelling can enhance intergenerational communication between young and older adults [12]; and 3) storytelling activities contribute to keeping older adults active in community [13]. Limited studies have examined this issue, and identified that language barriers and cultural hurdles could further impact social isolation. For example, Gao et al. found that many older Chinese immigrants in Australia had language barriers to taking public transportation, so they relied on their children when they needed to go out [14]. Moreover, according to Guo et al., lower social capital led to social isolation among Chinatown residents [15]. These studies highlight the actions required to address social engagement and connect older Chinese immigrants with their local communities. However, we are unaware of any studies that have examined this research topic. Therefore, this study explores the use of digital storytelling for older Chinese immigrants to inform better design of digital storytelling applications to enhance their social connection.

To examine how older Chinese immigrants use social media for digital storytelling and how digital storytelling benefits their wellbeing and social connection, four dimensions were measured, including their relative loneliness, social support, digital literacy, and purpose of digital storytelling. The types of digital storytelling and social media used were also measured. To measure different dimensions of this study, four scales were selected, including the UCLA 3-items Loneliness Scale [16, 17], Duke Social Support Index (DSSI) 11 items [18], Mobile Device Proficiency Questionnaire (MDPQ) [19], and Purposes of Online Memory Sharing Scale (POMSS) [20]. The UCLA 3-items Loneliness Scale only included three questions [16, 17], which has been adopted in several research projects for older adults, including a study for Chinese older adults, with the results showing good validation [21, 22]. The social support scale was adopted in this study to provide a better understanding of the level of social connectedness among older Chinese immigrants in Australia. In a similar setting, Neves et al. employed Duke Social Support Index (DSSI) 11 items in a study of how to use digital technologies to enhance social connectedness among older adults [18]. To measure digital literacy, the Mobile Device Proficiency Questionnaire (MDPQ) short version, which includes 16 items in eight elements was used in this study to

provide a holistic understanding of participants' digital literacy [19]. This scale was designed for mobile device proficiency, thus, matching the setting of this study perfectly. To gain a better perception of digital storytelling motivations and user experiences, the Purposes of Online Memory Sharing Scale (POMSS) was employed for this study [20]. Moreover, to gain more specific insights into functionalities and design features, this study developed user experience questions to measure respondents digital storytelling likelihood, types of digital storytelling and hours of daily use of digital storytelling, which could provide a holistic understanding of digital storytelling usability [23]. Finally, analyses were conducted to compare two main digital storytelling platforms to address the factors that influence older Chinese immigrants' decisions regarding the use of social media platforms.

Chinese immigrants are the third largest population in Australia, at 655,000, or 2.5% of the total population [24]. There is a huge cultural gap between the Chinese immigrants and the Australian-born population, compared to other immigrant groups. Chinese immigrants are more spatially concentrated and separated from the mainstream of society in Australia [25]. This study may, therefore, inform future design research of developing digital storytelling solutions to enhance cross-cultural communication aimed at improving the lives of older Chinese Australians. To target the participants from different locations, an Australia wide online survey was conducted. To fill the gap of how to develop digital storytelling apps for older Chinese immigrants in Australia, this survey conducted different scales to provide a better understanding of the usability and user experiences of digital storytelling among these potential users. The research questions for this study are: "How do older Chinese immigrants in Australia use social media for digital storytelling"? and "How does the perceived usability of digital storytelling platforms differ between WeChat and Facebook among older Chinese immigrants in Australia"? To answer these research questions, an exploratory study was designed to analyse the factors related to the likelihood of use, the main purposes and the types of digital storytelling, in addition to the relative loneliness and social support among the survey respondents. Furthermore, this study compared two platforms; Facebook and WeChat, to address which factors and features influenced digital storytellers' decisions regarding platforms. The findings show that storytelling features must be taken into consideration to design future apps targeting elderly immigrants in Australia.

2 METHODS

2.1 Participants and recruitment

This survey was initially online only, as it has been identified as an efficient and low-cost survey tool [26], and was distributed in many Chinese public groups on WeChat, with flyers also posted containing a QR code in local libraries, churches, and shopping centres in Brisbane, Gold Coast, Sydney, Melbourne and Perth. However, during recruitment, many older adults shared that they did not trust online surveys due to privacy concerns. Therefore, the researcher also distributed paper-based surveys (with the same question items) in Chinese churches, Asian groceries, Chinese fraternities, and Chinese community events in the greater Brisbane area. Due to budget limitations the paper-based survey was not implemented in other cities in Australia. Participants preferred a face-to-face survey, as they could ask questions if they were confused. One hundred and thirty-nine participants were recruited, 117 from Brisbane, four from Melbourne, three from Sydney, two from Perth, two from the Gold Coast, while 11 had missing location values. The survey was conducted from October 2022 to February 2023, with the following inclusion criteria, participants: 1) had to be Chinese Australians 55 years of age or older, 2) had to be born overseas, and with Chinese as their first language, 3) had to have immigrated to and be residing in Australia, and 4) still had family or relatives in their home country. All participants signed the consent form before undertaking the survey. This study received ethics approval from the ethical committee of the authors' institution.

2.2 Measurement

The survey comprised five sections that incorporated questions drawn from a number of validated instruments. Section one consisted of sociodemographic questions, section two was designed to gather data about relative loneliness, section three was developed to measure participants' digital literacy, section four used scales to determine motivation and user experience of digital storytelling, while the last section measured participants' social connectedness. All scales and survey questions were provided in three languages for participants: English, simplified Chinese, and traditional Chinese. Details of the self-developed or adopted scales are shown below.

The survey included a sociodemographic section, with 12 items: age (1 = 55–64, 2 = 65–74, 3 = 75–84, and 4 = 85 and above); gender (1 = male, 2 = female); number of years residing in Australia (1 = less than 1 year, 2 = 1–5 years, 3 = 6–10 years, and 4 = more than 10 years); postcode (number), place of birth (1 = Mainland China, 2 = Hong Kong, Taiwan, Singapore, Malaysia and other); frequency of visits to their home country (1 = less frequent [more than 2 years since last visit] 2 = more frequent [2 years and less since last visit]); living arrangement (1 = living without their children, 2 = living with their children); languages spoken at home (1 = do not speak English at home, 2 = speak English at home); oral English proficiency (1 = cannot speak English, 2 = only simple words and phrases, 3 = medium, 4 = fluent); and highest education attainment attained (1 = no university degree, 2 = bachelor's degree and above). The sociodemographic section also asked a number of questions about the participants self-reported perception of their health and mental health conditions using a 5-point Likert scale, response options included "1 = Extremely poor", "2 = Poor", "3 = Okay", "4 = Good", "5 = Very good".

The UCLA Loneliness Scale (3-item short version) was employed to measure participants' self-perception of relative loneliness [17], including respondents' "Feelings of companionship", "Disregard", and "Isolation". The responses for all items used a 3-point Likert scale, response options included "1 = Hardly ever", "2 = Some of the time", and "3 = Often" and sums items for the final score. The total scores ranged from 3 to 9, and researchers grouped respondents who scored 3–5 as "not lonely" and who scored 6–9 as "lonely" [21], Cronbach's alpha was employed as an indicator for the survey reliability and internal consistency. The general rule of thumb is that a Cronbach's alpha of 0.70–0.79 is acceptable, 0.80–0.89 is good, and 0.90 and above is excellent [27, 28]. In this study, Cronbach's alpha coefficient was 0.70 for this scale (0.73, 0.71, and 0.70 with English, Simplified Chinese, and Traditional Chinese versions separately), which was deemed to be an acceptable level of reliability.

The 11 item Duke Social Support Index (DSSI) was adapted and translated to measure participants' social connectedness in two dimensions: social interaction and satisfaction with social support [29]. The social interaction subscale comprised four items: "Other than members of your family, how many persons in your local area do you feel you can depend on or feel very close to?", "During the past week, how frequently did you spend time with someone who does not live with you, that is, you went to see them or they came to visit you or you went out together?", "How many times did you talk to someone (friends, relatives or others) on the telephone in the past week (either they called you, or you called them)?" and "How often did you go to meetings of clubs, religious meetings, or other groups that you belong to in the past week?". All but the first item, which used a 3-point Likert scale with response options that included "1 = None", "2 = 1–2 people", and "3 = More than 2 people", used a 7-point Likert scale with scores ranging from "1 = None" to "7 = Seven or more times a week". The satisfaction with social support subscale included seven items: "Family and friends understand you", "Do you feel useful to family and friends", "Do you know what is going on with family and friends", "Do you feel listened to", "Do you feel you have a definite role", "Can you talk about your deepest problems" and "How satisfied are you with relationships". All seven items employed a 3-point Likert scale, with response options including "1 = Hardly ever", "2 = Some of time", and "3 = Most of the time". The scores for each item were tallied separately in both subscales

and then added to create one total score for DSSI. The total score ranged from 12 to 33. Based on Strodl et al.'s suggestion, the DSSI score for the 11 items was categorised as low–fair (score ≤ 26), high (27–29), and very high (score 30–33). The reliability (Cronbach's Alpha) of this study was 0.71 (0.61, 0.73, and 0.68 with English, Simplified Chinese, and Traditional Chinese versions separately), which was considered an acceptable level [30].

The Mobile Device Proficiency Questionnaire (MDPQ) was adopted and conducted to measure participants' performance of digital literacy [19]. It consisted of 16 items divided into eight subscales: "Mobile devices basics", "Communication", "Data and file storage", "Internet", "Calendar", "Entertainment", "Privacy", and "Trouble shooting and software management". The two items within each of the subscales were then averaged out. Responses to all items included "1 = Never tried", "2 = Not at all", "3 = Not very easily", "4 = Somewhat easily", and "5 = Very easily" in a 5-point Likert scale. All sub-scales were summed up to generate the total score, which ranged from 8 to 40. Respondents with higher score had better digital literacy [19, 31]. The Cronbach's alpha for MDPQ was 0.95 (0.95, 0.94, and 0.96 with English, Simplified Chinese, and Traditional Chinese versions separately), indicating an excellent level of reliability.

The user experience of digital storytelling section included digital storytelling usability with three questions (developed by the authors): the participant's "Digital storytelling likelihood", "Preferred types of digital storytelling", and "Hours of daily use". Digital storytelling likelihood used a 5-point Likert scale, with responses of "1 = Highly unlikely", "2 = Unlikely", "3 = Neutral", "4 = Likely", "5 = Highly likely". Six types of digital storytelling were included in this study, the responses included "1 = Never", "2 = Rarely", "3 = Sometimes", "4 = Very often", "5 = Always" in a 5-point Likert scale. Hours of daily use digital storytelling had four responses, including "1 = Less than 1 hour", "2 = 1–2 hours", "3 = 3–5 hours" and "4 = More than 5 hours". The Cronbach's alpha of user experience of digital storytelling scales is 0.86 (0.89, 0.84, and 0.90 with English, Simplified Chinese, and Traditional Chinese versions separately), which indicates a good level of reliability.

The Purposes of Online Memory Sharing Scale (POMSS) was adopted from Wang's study to measure participants' motivation and intention of digital storytelling [20]. POMSS consists of 20 items with four subscales: "Self (five items)", "Social (six items)", "Therapeutic (five items)" and "Directive (four items)". All responses included "1 = Not at all", "2 = Rarely", "3 = Sometimes", "4 = Very often" "5 = Exactly my reasons" in a 5-point Likert scale. The items within each of the subscales and total score were averaged out, the total score ranged from 1 to 5, with a higher score indicating that respondents had higher endorsement of the purpose of sharing their online stories [20]. The POMSS had an excellent reliability, with a Cronbach's alpha of 0.96 (0.98, 0.94, and 0.98 with English, Simplified Chinese, and Traditional Chinese versions separately).

2.3 Data analysis

Descriptive analyses were conducted for all survey question items. Pearson Correlation coefficients were obtained for all continuous variables. Based on Cohen's suggestion, $|r| < 0.30$ indicated a weak relationship, $|r|$ between 0.30 and 0.50 indicated a moderate relationship, and $|r| > 0.50$ indicated strong relationship [32]. Hierarchical multiple linear regressions were created in three models to identify factors associated with digital storytelling likelihood with selective explanatory variables, which included sociodemographic variables. Finally, binary logistic regressions, independent t-test and effect sizes were employed to identify differences in social demographic factors and the key variables/scales related to whether participants used WeChat or Facebook. Effect sizes for the tests were calculated using Cohen's formula. Effect sizes of 0.2 were considered small, 0.5 was considered medium, and 0.8 was considered large [33]. All analyses were conducted in the SPSS package version 29.0.0.0 (241) (SPSS, Inc. in Chicago, Illinois, USA).

3 RESULTS

In total, n = 139 validated responses were collected. The sociodemographic results are shown in Table 1. Among this group, 70.5% participants were aged between 55 to 74 years of age, and 54% were female. Most came from Mainland China (62.3%), while some came from Hong Kong (8.7%), Taiwan (11.6%), Singapore (1.4%), Malaysia (8.7%) and other countries (7.2%). For their family and relative connections, 53.2% frequently visited their home country, and 50.4% did not live with their children. Most participants (61.2%) had lived in Australia for more than ten years. However, the majority (79.1%) did not speak English at home, and 29.5% did not speak English; while 26.6% described themselves as only being able to use simple words and phrases to communicate in English. More than half the participants had a bachelor's degree or above (56.9%).

Table 1: Social demographic characters of the research participants (N = 139)

Characteristics		Frequency	
		N	%
Age	55–64 yrs	44	31.7
	65–74 yrs	**54**	**38.8**
	75–84 yrs	28	20.1
	85 and above	13	9.4
Gender	Male	64	46.0
	Female	**75**	**54.0**
Length of resided in Australia	Less than 1 year	12	8.6
	1–5 years	20	14.4
	6–10 years	22	15.8
	More than 10 years	**85**	**61.2**
Place of birth	Mainland China	**86**	**61.9**
	Hong Kong, Taiwan, Singapore, Malaysia, Other	52	37.4
	Missing values	1	0.7
Frequency of visit home country	More frequent (2 years and less)	**74**	**53.2**
	Less frequent (more than 2 years)	65	46.8
Living arrangement	Not living with their children	**70**	**50.4**
	Living with their children	69	49.6
English spoken at home	Do not speak English at home	**110**	**79.1**
	Speak English at home	29	20.9
Oral English proficiency (self-evaluate)	Fluent	33	23.7
	Medium	28	20.1
	Only simple words and phrases	37	26.6
	Cannot speak English	**41**	**29.5**
Highest education attainment	Bachelor's degree and above	**78**	**56.1**
	No university degree	59	42.4
	Missing values	2	1.4

Age (y, mean ±SD, Min, Max): (69.86 ± 9.27, 55, 91)

Four adapted scales were measured, and the descriptive statistic results are shown in Table 2 (see appendices). The mean score of relative loneliness was Mean (SD) = 4.08 ± 1.26, indicating that participants generally did not perceive themselves as lonely. The mean score of social support scale was Mean (SD) = 26.44 ± 4.07, which could be identified as between a low to fair or high level (medium level) of social support.

The respondents had good overall digital literacy, with a reasonable score of MDPQ (Mean (SD) = 27.49 ± 9.29), particularly with higher average mean score in two dimensions "(understanding) mobile device basics" (Mean (SD) = 3.97 ± 1.26) and "(using) internet" (Mean (SD) = 3.88 ± 1.37). Table 3 (see appendices) shows the details of these two sub-scale items. The total score of POMSS (Mean (SD) = 2.78 ± 1.01) reflected respondents' overall motivations for digital storytelling (see Table 2), the sub-dimension results emphasised that the "Social" (Mean (SD) = 3.11 ± 1.15) dimension was the main purpose of digital storytelling. Table 4 (see appendices) shows the frequency table of social dimension in POMSS "to stay in touch with my friends and family" (summed up as "Very often" and "Exactly my reasons", 56.8%) was the core purpose of social motives of digital storytelling. This indicates that enhancing the connection of friends and family seemed to be the main motivation of the older Chinese immigrants sharing their stories online.

Table 5 (see appendices) shows the digital storytelling user experience, with 37.2% participants reporting that they liked or highly liked digital storytelling. However, 41.7% responded with a neutral score. The participants most preferred digital storytelling types were photography (43.9%, very often or always), text (36.3%, very often or always), and audio (27.4%, very often or always). Video (51.1% said rarely or never), interactive stories (60.7%, rarely or never), and virtual reality (VR) (85.8%, rarely or never) were less preferred. More than half of participants indicated that they used digital storytelling for less than an hour a day (51.1%).

Table 6 (see appendices) shows participants social media use, with most participants using WeChat (n = 101, 72.7%). Only 45 participants used Facebook (32.4%), while 17 used WhatsApp (12.2%). Very few participants used Line (n = 9, 6.5%), QQ (n = 8, 5.8%), TikTok (n = 5, 3.6%), Twitter (n = 4, 2.9%), or Instagram (n = 2, 1.4%).

Pearson's correlations were conducted to demonstrate the relationship between the variables. The details are shown in Table 7 (see appendices). The purpose of digital storytelling presented a strong positive relationship with audio (r = 0.517) and video (r = 0.524) storytelling. These findings suggest that participants who preferred audio and video storytelling had a higher motivation for digital storytelling than others. POMSS had a moderate positive relationship with digital storytelling likelihood (r = 0.459), text narrative (r = 0.393), photography (r = 0.472), interactive stories (r = 0.411), social support scale DSSI-11 (social interaction (r = 0.468), and satisfaction with social support (r = 0.328), total (r = 0.453)). These findings show that a higher level of digital storytelling likelihood and social support resulted in higher level of motives for digital storytelling.

The types of digital storytelling illustrated a moderate positive relationship with social support, digital literacy, and purposes of digital storytelling. Photography storytelling was the most popular storytelling type, suggesting that only the internal variables (different types of storytelling) had strong positive relationship, which included video storytelling (r = 0.706), text narrative storytelling (r = 0.734), audio storytelling (r = 0.637), and a moderate positive relationship with variables of interactive stories (r = 0.468). These results suggest that participants interested in photography storytelling may also have preferred to use both text narrative and audio storytelling, and some may have also used interactive storytelling. In addition, participants interested in photography storytelling had moderate positive relationship with DSSI-11 (social interaction (r = 0.352), total (r = 0.363)), and most factors of MDPQ-16 (mobile device basics (r = 0.365), internet (r = 0.397), calendar (r = 0.370), entertainment (r = 0.395), privacy (r = 0.403), trouble shooting and software (r = 0.311), total (r = 0.396)). These results demonstrate that participants interested in photography storytelling had relatively high social interaction demands and the ability to use mobile devices. Compared to other dimensions, participants interested

in photography storytelling had higher relation with POMSS. The results illustrate that relatively stronger relationships were social (r = 0.494), self (r = 0.461), and total (r = 0.472) variables in POMSS.

The digital literacy dimension varied by MDPQ scale. The correlation of MDPQ had significant and moderate positive relationship with different digital storytelling types of text narrative (r = 0.389), audio (r = 0.313), photography (r = 0.396), video (r = 0.339), interactive stories (r = 0.321), and virtual reality (VR) (r = 0.375). These results suggest that all types of digital storytelling activities require participants to have good digital literacy. Furthermore, the sub-variable "mobile device basics" had a higher relationship with text narrative (r = 0.442), reflecting that survey respondents using text storytelling had better skills in using basic mobile phone technology.

To examine the prediction of digital storytelling likelihood, a hierarchical multiple regression was conducted with three models. In the first model, only demographic variables were calculated to predict digital storytelling likelihood. Some key wellbeing related variables (e.g., loneliness and social interaction scales) that had significant correlation in the coefficients results were added in the second model. All digital storytelling usability variables that had significant correlation results were added in the third model, including mobile device basics and Internet in MDPQ-16, self, social, therapeutic, directive in POMSS, text narrative storytelling, audio storytelling, photography storytelling, video storytelling and interactive stories, WeChat use, and Facebook use. Table 8 presents the results.

Table 8: Hierarchical multiple regression results (N = 139) (Dependent variable: Digital storytelling likelihood)

| Model / Variables | B | SE | β | 95% CI for B | | R^2 | ΔR^2 |
				LL	UL		
Model 1[a]						0.121	0.055
(Constant)	3.716***	0.898		1.937	5.494		
Age	**-0.305***	0.118	**-0.258***	-0.538	-0.072		
Gender	-0.136	0.200	-0.061	-0.532	0.259		
Length of residing in Australia	0.053	0.121	0.048	-0.187	0.292		
Place of birth	-0.236	0.248	-0.102	-0.728	0.256		
Frequency of visiting home country	0.219	0.204	0.098	-0.184	0.622		
Living arrangements	0.096	0.201	0.043	-0.302	0.494		
English spoken at home	0.201	0.286	0.073	-0.366	0.767		
Oral English proficiency	-0.210	0.128	-0.215	-0.464	0.044		
Highest education attainment	0.152	0.217	0.068	-0.278	0.582		
Model 2[b]						0.172	0.103**
(Constant)	2.875**	0.928		1.038	4.713		
Age	**-0.255***	0.116	**-0.215***	-0.485	-0.025		
Gender	-0.205	0.196	-0.092	-0.594	0.184		
Length of residing in Australia	0.016	0.119	0.014	-0.219	0.251		
Place of birth	-0.289	0.243	-0.126	-0.770	0.192		
Frequency of visit home country	0.212	0.198	0.095	-0.180	0.605		
Living arrangement	0.152	0.197	0.068	-0.238	0.542		
English spoken at home	0.163	0.279	0.059	-0.390	0.715		
Oral English proficiency	-0.160	0.126	-0.163	-0.410	0.090		
Highest education attainment	0.014	0.217	0.006	-0.416	0.445		
DSSI-11 (Social inter.)	**0.133****	0.049	**0.239****	0.036	0.230		
Model 3[c]						0.453	0.334***

	B	SE	Beta	LL	UL
(Constant)	2.034	1.047		-0.041	4.110
Age	-0.157	0.111	-0.132	-0.376	0.063
Gender	-0.326	0.178	-0.146	-0.679	0.026
Length of residing in Australia	0.123	0.109	0.111	-0.094	0.340
Place of birth	0.007	0.246	0.003	-0.480	0.495
Frequency of visit home country	0.285	0.183	0.127	-0.079	0.648
Living arrangement	0.099	0.184	0.044	-0.265	0.463
English spoken at home	0.070	0.264	0.026	-0.454	0.594
Oral English proficiency	-0.145	0.119	-0.148	-0.380	0.090
Highest education attainment	-0.047	0.201	-0.021	-0.446	0.352
DSSI-11 (Social inter.)	-0.040	0.053	-0.071	-0.145	0.066
MDPQ-16 (MDB)	0.186	0.114	0.210	-0.041	0.412
MDPQ-16 (I.net)	-0.115	0.097	-0.141	-0.307	0.076
POMSS (self)	-0.098	0.179	-0.094	-0.454	0.258
POMSS (social)	0.219	0.179	0.225	-0.137	0.575
POMSS (therapeutic)	0.023	0.190	0.022	-0.353	0.400
POMSS (directive)	0.201	0.185	0.188	-0.166	0.568
Text narrative	0.057	0.108	0.067	-0.158	0.271
Audio	0.082	0.102	0.092	-0.121	0.285
Photography	0.202	0.120	0.235	-0.035	0.440
Video	0.016	0.100	0.019	-0.182	0.213
Interactive stories	0.029	0.095	0.031	-0.159	0.216
Social media (WeChat)	-0.005	0.246	-0.002	-0.493	0.483
Social media (Facebook)	**-0.618****	0.231	**-0.259****	-1.075	-0.160

*p < 0.05. **p < 0.01. ***p < 0.001.

Note. CI = confidence interval; LL = lower limit; UL = upper limit;

DSSI-11 (Social inter.) = Duke Social Support Index (DSSI) 11-items (social interaction); MDPQ-16 (MDB) = Mobile Device Proficiency Questionnaire (MDPQ) 16-items (mobile device basics); MDPQ-16 (I.net) = Mobile Device Proficiency Questionnaire (MDPQ) 16-items (Internet); POMSS (self) = Purposes of Online Memory Sharing Scale (POMSS) (self); POMSS (social) = Purposes of Online Memory Sharing Scale (POMSS) (social); POMSS (therapeutic) = Purposes of Online Memory Sharing Scale (POMSS) (therapeutic); POMSS (directive) = Purposes of Online Memory Sharing Scale (POMSS) (directive).

Models' predictors.

a. Predictors: (Constant), Age, Gender, Length of residing in Australia, Place of birth, Frequency of visit home country, Living arrangement, English spoken at home, Oral English proficiency, Highest education attainment

b. Predictors: (Constant), Age, Gender, Length of residing in Australia, Place of birth, Frequency of visit home country, Living arrangement, English spoken at home, Oral English proficiency, Highest education attainment, Duke Social Support Index (DSSI) 11-items (social interaction)

c. Predictors: (Constant), Age, Gender, Length of residing in Australia, Place of birth, Frequency of visit home country, Living arrangement, English spoken at home, Oral English proficiency, Highest education attainment, Duke Social Support Index (DSSI) 11-items (social interaction), Mobile Device Proficiency Questionnaire (MDPQ) 16-items (mobile device basics), Mobile Device Proficiency Questionnaire (MDPQ) 16-items (Internet), Purposes of Online Memory Sharing Scale (POMSS) (self), Purposes of Online Memory Sharing Scale (POMSS) (social), Purposes of Online Memory Sharing Scale (POMSS) (therapeutic), Purposes of Online Memory Sharing Scale (POMSS) (directive), Text narrative, Audio, Photography, Video, Interactive stories, WeChat, Facebook.

Results interpretations.

a. In model 1, digital storytelling likelihood was negatively predicted by Age, which indicated respondents with older age had a lower likelihood of using digital storytelling.

b. In model 2, digital storytelling likelihood was negatively predicted by Age and was positively predicted by Duke Social Support Index (DSSI) 11-items (social interaction), which indicated respondents with older age had a lower likelihood of using digital storytelling and with better social interaction had a higher likelihood of using digital storytelling.

c. In model 3, digital storytelling likelihood was negatively predicted by Facebook, which indicated respondents who use Facebook had a lower likelihood of using digital storytelling.

The first model included sociodemographic characteristics such as age, gender, years residing in Australia, place of birth, frequency of visit home country, living arrangement, English spoken at home, oral English proficiency, and highest education attainment. This model explained 12.1% ($R^2 = 0.121$) of the variance in digital storytelling likelihood. The ANOVA was not significant for Model 1 (F (9, 120) = 1.831; p = 0.069). After entering public health factors such as the social interaction sub-scale of Duke Social Support Index (DSSI) 11-items into Model 2, the total variance explained by the model was 17.2% ($R^2 = 0.172$). The ANOVA was significant for Model 2 (F (10, 119) = 2.478; p<0.01). In Model 3, the variables related to utilisation of the digital technology factors, such as digital literacy (Mobile Device Proficiency Questionnaire 16-items: mobile device basics, internet), purpose of digital storytelling (Purposes of Online Memory Sharing Scale: self, social, therapeutic, directive), types of digital storytelling (text narrative, audio, photography, video, interactive stories), and social media used (WeChat, Facebook) were entered, with the total variance explained by the model at 45.3% ($R^2 = 0.453$). The ANOVA was significant for Model 3 (F (23, 106) = 3.818; p<0.001). Thus, the digital technology factors explained an additional 33.2% (R^2 change = 0.332) compared to the first model.

The digital storytelling likelihood was only negatively predicted by social media used (Facebook) (β = -0.259, p<0.01) in Model 3. The social interaction sub-scale of DSSI-11 (β = 0.239, p<0.01) positively predicted the digital storytelling likelihood, and was negatively predicted by age (β = -0.215, p<0.05) in Model 2. In Model 1, it was negatively predicted by age (β = -0.258, p<0.05).

The binary logistic regression is shown in Table 9. The differences between the "use WeChat" and "do not use WeChat" groups in sociodemographic variables were calculated. Two age groups (age: 65–74 and 75–84), place of birth, and highest education attainment were statistically significant at 0.05 for each variable, except place of birth at the 0.001 level. The use of WeChat decreased as age increased in these two groups. The ages of 65–74 (OR = 0.231, p = 0.032, 95% CI: 0.060–0.884) had more contributions than the ages of 75–84 (OR = 0.200, p = 0.047, 95% CI: 0.041–0.979). Participants born in mainland China were significantly associated with a higher probability of using WeChat compared to people born in Hong Kong, Taiwan, Singapore, Malaysia, or others (OR = 0.067, p <0.001, 95% CI: 0.017–0.261). The data also indicated that participants without university degrees had a higher probability of using WeChat compared with those with bachelor's degree or above (OR = 0.253, 95%, p = 0.015, CI: 0.084–0.767).

Table 9: The binary logistic regression results of WeChat in use (N = 139)

Variables [a]	B	S.E.	Wald	df	P	OR	95% CI for OR	
							Lower	Upper
Age								
55–64 yrs			5.712	3	0.126	1		
65–74 yrs	-1.465	0.685	4.580	1	**0.032**	**0.231**	0.060	0.884
75–84 yrs	-1.608	0.810	3.944	1	**0.047**	**0.200**	0.041	0.979
85 and above	-1.777	1.034	2.956	1	0.086	0.169	0.022	1.283
Gender								
Male						1		

	B	S.E.	Wald	df	Sig.	Exp(B)		
Female	-0.102	0.524	0.038	1	0.846	0.903	0.324	2.520
Length of residing in Australia								
Less than 1 year			3.602	3	0.308	1		
1–5 years	-0.688	1.462	0.221	1	0.638	0.503	0.029	8.824
6–10 years	1.238	1.834	0.455	1	0.500	3.448	0.095	125.496
More than 10 years	-1.054	1.413	0.556	1	0.456	0.349	0.022	5.561
Place of birth								
Mainland China						1		
Hong Kong, Taiwan, Singapore, Malaysia, Other	-2.702	0.694	15.154	1	**0.000**	**0.067**	0.017	0.261
Frequency of visit home country								
Less frequent						1		
More frequent	0.776	0.530	2.147	1	0.143	2.173	0.769	6.139
Living arrangement								
Not living with children						1		
Living with children	-1.013	0.549	3.401	1	0.065	0.363	0.124	1.066
English spoken at home								
Do not speak English at home						1		
Speak English at home	-0.393	0.664	0.351	1	0.553	0.675	0.184	2.479
Oral English proficiency								
Cannot speak English			2.216	3	0.529	1		
Only simple words and phrases	1.224	0.875	1.957	1	0.162	3.399	0.612	18.875
Medium	1.092	0.944	1.338	1	0.247	2.979	0.469	18.945
Fluent	1.234	1.007	1.502	1	0.220	3.436	0.477	24.729
Highest education attainment								
No university degree						1		
Bachelor's degree and above	-1.374	0.566	5.899	1	**0.015**	**0.253**	0.084	0.767

Constant	4.469	1.601	7.791	1	0.005	87.249

a. Variable(s) entered: Age, Gender, Length of resided in Australia, Place of birth, Frequency of visit home country, Living arrangement, English spoken at home, Oral English proficiency, Highest education attainment.

b. Respondents in two age groups (65–74 and 75–84 yrs), born in Mainland China, and without a university degree had a higher possibility of using WeChat.

Independent sample t-tests were employed to identify the differences of key scales related to whether participants used WeChat (see Table 10). The t-test results showed statistically significant differences between "use WeChat" (n = 101) and "do not use WeChat" (n = 38) groups for social interaction in Duke Social Support Index (DSSI), all dimensions of Purpose of Online Memory Sharing Scale (POMSS), and four types of digital storytelling including text narrative, audio, photography, and video. The t-test results revealed that participants who used WeChat scored higher that those who did not use WeChat, including better social interaction (t (df) = -2.582 (134), p = 0.011); stronger purpose of using digital storytelling with four dimensions of self (t (df) = -2.387 (131), p = 0.018), social (t (df) = -3.312 (131), p = 0.001), therapeutic (t (df) = -2.078 (131), p = 0.040), and directive (t (df) = -2.227 (134), p = 0.028); and were more likely to use four type of digital storytelling (including text narrative (t (df) = -3.404 (133), p = 0.001), audio (t (df) = -4.373 (133), p = 0.000), photography (t (df) = -3.465 (53.798), p = 0.001) and video (t (df) = -2.517 (131), p = 0.013)). Audio storytelling indicated a large effect size, with Cohen's d of -0.844. Social (POMSS) and two types of digital storytelling include text narrative and photography were medium to large of effect size, with Cohen's d of-0.646, -0.663 and -0.731, separately. The small to medium effect sizes (Cohen's d) showed in social interaction (DSSI) (-0.498), self (-0.462), therapeutic (-0.405), directive (-0.429) in POMSS, and video storytelling (-0.491).

Table 10: T-test of WeChat in use by all scales (N = 139)

Factors	Not use WeChat (n = 38) M(SD)	Use WeChat (n = 101) M(SD)	t(df)	p	Effect size Cohen's d
Loneliness (UCLA Loneliness Scale 3-items)					
Total score	4.14(1.27)	4.05(1.26)	0.354(131)	0.724	0.069
Social support (Duke Social Support Index (DSSI) 11-items)					
Social interaction	7.57(2.15)	8.55(1.89)	-2.582(134)	**0.011**	-0.498
Satisfaction with social support	17.46(3.04)	18.35(2.69)	-1.655(136)	0.1	-0.318
Total score	25.11(4.05)	26.92(3.98)	-2.322(133)	**0.022**	-0.452
Digital literacy (Mobile Device Proficiency Questionnaire (MDPQ) 16-items)					
Mobile device basics	3.67(1.51)	4.08(1.14)	-1.518(54.311)[a]	0.135[a]	-0.327
Communication	3.47(1.56)	3.66(1.48)	-0.656(135)	0.513	-0.125
Data and file storage	2.84(1.49)	2.99(1.62)	-0.489(135)	0.626	-0.093
Internet	3.53(1.59)	4.01(1.26)	-1.69(55.616)[a]	0.097[a]	-0.357
Calendar	3.03(1.69)	3.06(1.60)	-0.107(137)	0.915	-0.02
Entertainment	3.26(1.38)	3.61(1.30)	-1.356(136)	0.177	-0.258
Privacy	3.32(1.52)	3.50(1.45)	-0.655(134)	0.514	-0.125
Trouble shooting and software management	2.83(1.55)	3.00(1.50)	-0.591(135)	0.556	-0.113
Total score	25.95(10.87)	28.09(8.57)	-1.09(56.122)[a]	0.28[a]	-0.231
Purposes of DST (Purposes of Online Memory Sharing Scale (POMSS))					
Self	2.27(0.98)	2.76(1.08)	-2.387(131)	**0.018**	-0.462
Social	2.59(1.17)	3.31(1.08)	-3.312(131)	**0.001**	-0.646
Therapeutic	2.28(1.05)	2.71(1.06)	-2.078(131)	**0.04**	-0.405
Directive	2.45(1.12)	2.89(1.00)	-2.227(134)	**0.028**	-0.429

Total score	2.40(1.03)	2.92(0.98)	-2.641(130)	**0.009**	-0.516
Types of DST					
Text narrative	2.36(1.38)	3.20(1.23)	-3.404(133)	**0.001**	-0.663
Audio	2.00(1.13)	2.99(1.19)	-4.373(133)	**0**	-0.844
Photography	2.47(1.40)	3.38(1.18)	-3.465(53.798) [a]	**0.001** [a]	-0.731
Video	2.06(1.31)	2.70(1.32)	-2.517(131)	**0.013**	-0.491
Interactive stories	1.89(1.19)	2.24(1.21)	-1.505(133)	0.135	-0.293
Virtual Reality (VR)	1.44(0.88)	1.49(0.94)	-0.251(132)	0.802	-0.049

a. Equal variances not assumed.

The differences between the "use Facebook" and "do not use Facebook" groups in sociodemographic variables were calculated using binary logistic regression (see Table 11). Two age groups (age: 55–64, 75–84), frequency of visit home country, English spoken at home, and oral English proficiency were significantly associated with a higher probability of using Facebook. Respondents aged 55–64 had higher contributions than those aged 75–84 (OR = 0.078, p = 0.007, 95% CI: 0.012–0.502) of using Facebook. The group who had more frequent visits to home countries (OR = 4.592, p = 0.006, 95% CI: 1.539–13.704), those who spoke English at home (OR = 4.160, p = 0.039, 95% CI: 1.073–16.131), and self-estimated as medium oral English proficiency (OR = 15.000, p = 0.011, 95% CI: 1.859–121.062) were more likely to be Facebook users.

Table 11: The binary logistic regression results of Facebook in use (N = 139)

Variables [a]	B	S.E.	Wald	df	P	OR	95% CI for OR	
							Lower	Upper
Age								
55–64 yrs			10.828	3	**0.013**	1		
65–74 yrs	0.131	0.619	0.045	1	0.832	1.141	0.339	3.835
75–84 yrs	-2.545	0.947	7.229	1	**0.007**	**0.078**	0.012	0.502
85 and above	-1.494	1.310	1.301	1	0.254	0.225	0.017	2.925
Gender								
Male						1		
Female	-1.066	0.546	3.814	1	0.051	0.345	0.118	1.004
Length of residing in Australia								
Less than 1 year			0.748	3	0.862	1		
1–5 years	-0.431	1.159	0.138	1	0.710	0.650	0.067	6.295
6–10 years	0.212	1.124	0.036	1	0.850	1.236	0.137	11.195
More than 10 years	0.335	1.056	0.100	1	0.751	1.398	0.176	11.074
Place of birth								

	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Mainland China						1		
Hong Kong, Taiwan, Singapore, Malaysia, Other	0.483	0.626	0.595	1	0.441	1.620	0.475	5.522
Frequency of visit home country								
Less frequent						1		
More frequent	1.524	0.558	7.466	1	**0.006**	**4.592**	1.539	13.704
Living arrangement								
Not living with children						1		
Living with children	-0.465	0.574	0.655	1	0.418	0.628	0.204	1.936
English spoken at home								
Do not speak English at home						1		
Speak English at home	1.425	0.691	4.250	1	**0.039**	**4.160**	1.073	16.131
Oral English proficiency								
Cannot speak English			7.369	3	0.061	1		
Only simple words and phrases	1.000	0.874	1.310	1	0.252	2.719	0.490	15.077
Medium	2.708	1.065	6.460	1	**0.011**	**15.000**	1.859	121.062
Fluent	1.912	1.149	2.771	1	0.096	6.769	0.712	64.332
Highest education attainment								
No university degree						1		
Bachelor's degree and above	-0.267	0.574	0.216	1	0.642	0.766	0.248	2.360
Constant	-2.516	1.250	4.052	1	0.044	0.081		

a. Variable(s) entered: Age, Gender, Length of resided in Australia, Place of birth, Frequency of visit home country, Living arrangement, English spoken at home, Oral English proficiency, Highest education attainment.

b. Respondents in two age groups (55–64 and 75–84 yrs), who frequently visit their home country, speak English at home, and have medium-level oral English proficiency had a higher possibility of using Facebook.

Similar to WeChat, the t-test results between use Facebook and do not use Facebook groups demonstrated the significant differences of key scales related to whether participants used Facebook (see Table 12). Facebook users had better digital literacy, including all subscales of MDPQ-16 containing mobile device basics (t (df) = -3.43 (112.181), p = 0.001), communication (t (df) = -4.893 (109.803), p = 0.000), data and file storage (t (df) = -3.841 (135), p = 0.000), internet (t (df) = -3.376 (116.624), p = 0.001), calendar (t (df) = -5.381 (93.847), p = 0.000), entertainment (t (df) = -5.829 (105.742),

p = 0.000), privacy (t (df) = -5.734 (116.701), p = 0.000), trouble shooting and software management (t (df) = -6.144 (135), p = 0.000). In addition, Facebook users had purpose of digital storytelling in "directive" (a subscale of PMOSS) (t (df) = -2.247 (134), p = 0.026). Facebook users preferred three types of digital storytelling include photography (t (df) = -2.268 (134), p = 0.025), video (t (df) = -2.21 (131), p = 0.029), and virtual reality (VR) (t (df) = -2.453 (59.873), p = 0.017). The effect sizes (Cohen's d) of directive (-0.409) in POMSS and photography (-0.416) and video (-0.407) in types of digital storytelling were between small and medium levels (0.2<Cohen's d<0.5); the subscale of mobile device basics (-0.569), data and file storage (-0.699), internet (-0.547) in MDPQ-16, and virtual reality (VR) storytelling (-0.526) were between medium to large levels (0.5<Cohen's d<0.8); and communication (-0.816), calendar (-0.946), entertainment (-0.983), privacy (-0.927), and trouble shooting and software management (-1.124) in MDPQ-16 were in the large level (0.8<Cohen's d).

Table 12: T-test of Facebook in use by all scales (N = 139)

Factors	Not use Facebook (n = 94)	Use Facebook (n = 45)	t(df)	p	Effect size
	M(SD)	M(SD)			Cohen's d
Loneliness (UCLA Loneliness Scale 3-items)					
Total score	4.22(1.31)	3.80(1.12)	1.818(131)	0.071	0.333
Social support (Duke Social Support Index (DSSI) 11-items)					
Social interaction	8.15(2.17)	8.55(1.59)	-1.192(111.867) [a]	0.236 [a]	-0.196
Satisfaction with social support	18.16(2.85)	18.00(2.74)	0.315(136)	0.753	0.057
Total score	26.34(4.32)	26.64(3.53)	-0.395(133)	0.694	-0.072
Digital literacy (Mobile Device Proficiency Questionnaire (MDPQ) 16-items)					
Mobile device basics	3.74(1.32)	4.43(1.00)	-3.43(112.181) [a]	**0.001 [a]**	-0.569
Communication	3.23(1.50)	4.38(1.16)	-4.893(109.803) [a]	**0.000 [a]**	-0.816
Data and file storage	2.60(1.53)	3.66(1.46)	-3.841(135)	**0.000**	-0.699
Internet	3.64(1.45)	4.37(1.04)	-3.376(116.624) [a]	**0.001 [a]**	-0.547
Calendar	2.60(1.52)	4.00(1.40)	-5.381(93.847) [a]	**0.000 [a]**	-0.946
Entertainment	3.12(1.28)	4.31(1.04)	-5.829(105.742) [a]	**0.000 [a]**	-0.983
Privacy	3.04(1.48)	4.30(1.02)	-5.734(116.701)	**0.000 [a]**	-0.927
Trouble shooting and software management	2.47(1.39)	3.98(1.24)	-6.144(135)	**0.000**	-1.124
Total score	24.64(8.70)	33.31(7.67)	-5.627(132)	**0.000**	-1.035
Purposes of DST (Purposes of Online Memory Sharing Scale (POMSS))					
Self	2.60(1.10)	2.68(1.04)	-0.418(131)	0.677	-0.077
Social	3.07(1.18)	3.22(1.08)	-0.71(131)	0.479	-0.132
Therapeutic	2.48(1.05)	2.82(1.09)	-1.697(131)	0.092	-0.317
Directive	2.63(1.01)	3.05(1.06)	-2.247(134)	**0.026**	-0.409
Total score	2.69(1.02)	2.96(0.99)	-1.387(130)	0.168	-0.259
Types of DST					
Text narrative	2.87(1.38)	3.20(1.15)	-1.486(100.494) [a]	0.14 [a]	-0.256
Audio	2.58(1.26)	3.00(1.19)	-1.867(133)	0.064	-0.341
Photography	2.97(1.33)	3.50(1.17)	-2.268(134)	**0.025**	-0.416
Video	2.35(1.32)	2.89(1.32)	-2.21(131)	**0.029**	-0.407
Interactive stories	2.01(1.14)	2.43(1.32)	-1.909(133)	0.058	-0.35
Virtual Reality (VR)	1.32(0.73)	1.80(1.17)	-2.453(59.873) [a]	**0.017 [a]**	-0.526

a. Equal variances not assumed.

4   DISCUSSION

In order to gain an insight into how older Chinese immigrants use social media for digital storytelling, several key findings were compared to other similar contemporary studies. Four themes are discussed in this section, based on different dimensions of digital storytelling, including the potential for digital storytelling to enhance social connection, digital storytelling as social interaction, digital storytelling modalities, and the comparison of two main digital storytelling social media platforms. This discussion enriches knowledge of how older Chinese immigrants use social media and their useability and user experiences.

4.1   The possibility for digital storytelling to enhance social connection

The survey responses revealed a possibility for digital storytelling for older Chinese immigrants to enhance their social connection and build their networks from the wider local community. The results demonstrated that the majority of survey respondents were identified as having characteristics of not feeling lonely, but felt a lack of social connection, had good digital literacy, and high social motivation. From the results of relative loneliness (UCLA 3 items), participants did not perceive themselves as lonely, which is similar to other studies with older Chinese adults [22]. However, in contrast with a study from Malaysia [34], the level of social connection (DSSI) remained low. These findings contradict previous studies where low level of social connection caused loneliness among older adults [35, 36]. In addition, the results of POMSS align with data from Stone et al. [37], as the "Social" dimension was emphasised as the major purpose of digital storytelling in this study. When further analysing the "Social" dimension, this study found participants had good connections with their friends and family, but not with others in the community. Moreover, more than half of survey participants responded that they lived with their children, similar to a study that found that Chinese older adults who did not live with their children were more likely to feel lonely [38]. Thus, a possible reason for participants not identifying themselves as lonely, but having a low level of social connection was because they had strong connection with their family and friends, but not with the local community. Moreover, the weak connection with the local community limited older Chinese immigrants' communication and caused isolation and a high level of dependence on their children when they needed to communicate with English speakers or go out [14]. Therefore, digital storytelling solutions can be employed to assist these older Chinese adults in building up their connections with the local community and further enhance their independence of social connection in their life in Australia.

Even though the level of social connection remained low, the results still showed that participants had high intent to maintain their social network, indicating a desire to maintain good social connections. This is similar to Matz-Costa et al., who found many older adults continued to work for social purposes, as they felt energetic and relaxed when they connected with others [39]. Thus, it is essential to develop approaches to assist older Chinese immigrants to integrate into their local communities in Australia. Because the results of MDPQ 16 items in this survey supported that the survey respondents in this population had good digital literacy compared to other ethnic populations [31], these skills could be utilised to resolve the issue of low social connection. Based on their high purposes for social connection and good digital literacy results, it seems that digital storytelling could be a possible solution to enhancing their social connections and interactions with wider local communities.

4.2   Digital storytelling as social interaction

The relationship between digital storytelling likelihood and other variables that related to loneliness, social support, digital literacy, purposes, and types of digital storytelling and social media platforms were assessed in this research. The study found that the social dimension had a strong relation with digital storytelling likelihood, which was found in social support scales and purposes of digital storytelling scales. Similarly, Kory-Westlund and Breazeal's research found that online story

sharing could be used to express an individual's emotions, to enhance their social communication, and both storytellers and viewers could feel enjoyment and connection by using digital storytelling [40]. Moreover, a key result in this study showed that "social interaction" could predict digital storytelling likelihood in the hierarchical multiple regression results. This is similar to Alexandrakis et al., who found that storytelling can help older adults improve social interaction and engagement by sharing their stories in their community, as it could further reduce their feeling of loneliness [41]. T-test results in this study suggested that WeChat users had better social interaction, and a stronger purpose for using digital storytelling in social dimensions. No previous research has examined how older Chinese immigrants use WeChat; however, this finding supports the findings from a study of an older Chinese population [42], where older adults who used WeChat had a positive attitude to establishing their online social networks, relationships with others, and improving their social engagement. In the current study, Facebook users had better digital literacy and a stronger directive purpose (e.g. sharing information; influence, motivate and help others) for digital storytelling. This finding supports research from Chan that older Chinese use Facebook to maintain their social connectedness, and during this process, they have strong enthusiasm to learn new technologies in order to communicate with their family and friends [43]. Caci et al. also stated that Facebook was the new technological media that could assist extraverted individuals by helping them understand others and maintain a sense of self-continuity [44]. The possible reasons for the differences between WeChat and Facebook users could be that WeChat was primarily used for text messages, images, and videos for communication purposes among older Chinese immigrants in this study. These findings are similar to Guo, who found that WeChat was used for alternative communication to extend their social network online [45]. However, Facebook includes many interactive functions and multimedia storytelling methods which enable users to broadcast stories; thus, it is reasonable that Facebook users in the current study had higher levels of digital literacy and directive purpose. Similarly, Hou found that Facebook provided a platform with multimedia expression methods for users performing togetherness by sharing their experiences, which facilitated the formation of virtual communities [46]. These findings show that digital storytelling has a strong relationship with social purposes and social interactions among older Chinese immigrants.

Additionally, the POMSS results suggest that "keeping in touch with friends and family" was main reason for digital storytelling in older Chinese immigrants. This correlates with another item, "maintain social network". Moreover, all dimensions in the purpose of digital storytelling scale showed strong correlations with "social interaction" and the sub-item "understand by family and friends" in the social support scale, demonstrating that social dimension, especially the connection with their family and friends, was the main purpose for digital storytelling for most participants.

The evidence from literature also supports that digital storytelling could enhance social interaction between older adults and their family and friends in six ways, including increased socialisation, bridging geographical distance, motivation to share stories, creation of shared experiences, increased self-esteem and life satisfaction [47]. Moreover, family connections between older adults and their offspring are maintained through sharing stories online, such as posting family photographs, which has been shown to reduce older adults' social isolation [48]. Overall, the research listed above echoes our findings that digital storytelling may contribute to improving storytellers' social interaction, as well as their connections with family and friends.

4.3 Digital storytelling modalities

The responses to types of digital storytelling suggested that photography stories were the most frequently used in digital storytelling. A study of photography storytelling by Wu et al. claimed digital photo sharing was an easy operational online storytelling approach widely used by mobile phone users, as this approach allowed users to share their stories anywhere, anytime [49]. Moreover, previous literature found that sharing digital photos can help older adults leave an intangible

legacy for their offspring, which has led to many older adults sharing their photos to connect with their family members [12].

In contrast, participants in this study responded that many had never used video and audio storytelling before, 30.2% and 23.0% respectively, which contrasts to the finding of some studies. For example, a study from Saposnik demonstrated that video and audio stories had larger user populations than other traditional storytelling methods [50]. The correlation results also suggest that audio and video storytelling correlated with digital storytelling likelihood. In addition, t-test results illustrated that both users and non-users of WeChat and Facebook showed a large effect size for video storytelling. Moreover, both video storytelling and audio storytelling had large effect sizes between WeChat users and non-users. This has also been found in previous research, which showed that sharing individuals' videos on video-based social media can enhance people's social support and online community engagement [51]. However, speech or audio-based storytelling is the most natural and preferable storytelling mode by older storytellers [47].

Virtual reality (VR) and interactive stories are two novel digital storytelling types adopting VR technologies (e.g. VR glasses or 360-degree immersive films) and interactive technologies (e.g. chatbots, serious games). From the results, VR storytelling, which has higher technical hurdles, had a small user group in this study, a finding that correlates with a previous study that found usability influenced users' motivation for using products [52]. Technical barriers may explain why VR storytelling was only used by a small group of people [52]. Similar findings related to technical proficiency were also shown in the digital literature scales and purpose of digital storytelling scales. The results show the correlation between the participants who preferred VR storytelling having higher levels of competence with "data and file storage", "trouble shooting and software management" and "therapeutic" and lower correlations with "social". In contrast, participants who preferred audio, photography, and video storytelling may have been more focused on "social" and "self" dimensions. However, older adults could be taught the higher technical skills required for storytelling to enhance their ability and confidence for using these technologies. This correlation supports that participants preferring VR storytelling may have had higher software operation ability. Appel et al. found that when VR with 360-degree film storytelling was used for community technology training, it received positive feedback from older adults. Their results showed that technology training workshops can help older adults develop self-confidence, positive attitudes, and enhance social interactions [53].

4.4   The comparison of two main digital storytelling platforms

The hierarchical multiple regression results found that Facebook usage negatively predicted digital storytelling likelihood. This aligned with the commonly held view of WeChat as the most popular social media platform for digital storytelling likelihood in Chinese communities [54]. However, WeChat also correlated negatively with digital storytelling likelihood, revealing that although WeChat had a large user population, many functions of WeChat could not be used appropriately outside of China; thus, older Chinese immigrants who used WeChat may not have had a good user experience in the Australia context. This result suggests that further research is required to understand older users' challenges with using the two major digital storytelling platforms and how modules might be redeveloped to better support digital storytelling for older adults. Researchers have found that user engagement can be improved through open resource interaction add-ons and multiple types of digital storytelling modules in Facebook [55, 56]. Thus, there is a possibility of improving digital storytelling functions in the future design of social media platforms if they include rich resources, such as digital storytelling add-ons, social functions and enjoyable modules specifically designed for the older Chinese population. This may allow older Chinese immigrants to build their local online social network through digital storytelling.

The comparison between users of WeChat and non-users suggested that age, place of birth, highest education attainment, social interaction, and purpose and types of digital storytelling could effect intent to use WeChat among older

Chinese immigrations. T-test results revealed that WeChat usage was closely associated with social interaction, purpose of digital storytelling, text, audio, photography and video storytelling. WeChat was widely been perceived as being able to enhance sociability [57]. In addition, social interaction features could improve older adults' engagement while using WeChat [58, 59]. The Cohen's d results revealed that audio storytelling had a large effect. This finding is supported by Aslam et al., in that audio messages, which are the key feature of WeChat have been found to be more efficient than text messages and phone calls [60].

The results demonstrate that Facebook usage was significantly associated with age, frequency of visiting their hometown, whether English was spoken at home, oral English proficiency, digital literacy factors, purpose and types of digital storytelling. The possible reason for Facebook users being significantly associated with English usage is that many older Chinese immigrants use mixed language versions of Facebook content, including English, Simplified Chinese, and Traditional Chinese. This is similar to Wei et al., who found that Chinese Facebook users use two writing languages, English and Chinese; and three oral languages, including English, Mandarin and Cantonese [61]. While T-test results illustrated that Facebook usage was significantly correlated with all variables of digital literacy, directive in purpose of digital storytelling, photography, video and VR. Facebook users had better digital literacy performance than non-users, and the Cohen's d results demonstrated that five dimensions in digital literacy had a large effect size, namely communication, calendar, entertainment, privacy, and trouble shooting and software management. Some possible reasons for these large effects are that Facebook has events and a calendar management function, and privacy settings can be customised. These findings correspond with a prior study that showed that customisation and personalisation of an application can improve users' engagement and user experience [62]. Surprisingly, VR digital storytelling had a medium effect size in this study, with the reasonable explanation being that Facebook has VR addon modules, and older Chinese immigrants who use Facebook may be interested in this function.

Overall, the results provide several points of novel knowledge. As the core variable in this study, digital storytelling had a strong relation with the social dimension, and online social interaction was the main purpose for digital storytelling. Similarly, "maintaining social network" was another factor supported in this survey. These findings show that older Chinese immigrants primarily use digital storytelling for social purposes. Photography had the highest frequently of use as a digital storytelling method found in this survey, compared to the other five types of digital storytelling which were also discussed. Finally, the social media platforms were discussed, with usability variables of Facebook and WeChat compared using different statistics analyses.

5   LIMITATIONS

There are some limitations to this study that must be acknowledged. First, most participants were recruited from the greater Brisbane area due to both a preference for paper-based surveys from the target population and budgetary limitations that prevented widescale paper-based collection in other parts of Australia; thus, there may be some differences between other Australia cities and rural areas. Recruiting participants from a wider range of areas should be considered in future studies.

Second, the implementation of online survey reflected that some participants were concerned about cyber security; thus, participants may have chosen not to participate if asked to share their own perspectives using an online survey. In this study, 51 participants unsuccessfully completed their online survey leaving the survey after clicking the link and answering a few questions. Many participants were married to other Chinese speakers and were actively involved in Chinese groups such as churches. These participants may have had different language and cultural identities to those married to speakers of other languages who were not involved in Chinese communities. To provide an integrated understanding of Chinese immigrants, participants living outside of Chinese communities should be considered in future studies.

Third, data collection took place just after the COVID-19 restrictions were lifted, which may have affected participants' decisions if they were still suffering from issues related to the pandemic. Moreover, during the pandemic many older Chinese immigrants feared going out and communicating with others. This may have meant that the participants found in public spaces were more sociable than those who remained at home. Future studies should include methods to reach less sociable participants.

6   IMPLICATIONS

The results of this study have some important implications for relevant methods and practices for designing digital storytelling apps for older Chinese immigrants. Three major implications were found, including digital storytelling improving social interaction, modalities for the future design, and adjusting designs for different social media platforms users.

First, this study revealed that online social interaction, keeping in touch with friends and family, and maintaining social networks were the main purposes for digital storytelling; however, compared to previous studies, social connection remained low; thus, future design of digital storytelling should consider designing functions such as group chat, broadcast, or family and friends communication tools, such as novel digital storytelling add-ons in social media platforms to enhance users' social interaction and connection.

Second, the results show that photography storytelling was most used for digital storytelling. Both photography and video storytelling were chosen by WeChat and Facebook users. In this study, WeChat users were more interested in using audio storytelling, while Facebook users were more interested in using VR storytelling. Therefore, future design needs to consider adopting innovative technologies in photography, video, audio, and VR storytelling functions to provide users with their preferred digital storytelling tools.

Finally, users from different social media platforms had different user characteristics. For example, WeChat users and non-users had significant differences in place of birth and the purpose for digital storytelling; however, the Facebook users and non-users had significant differences in English proficiency and digital literacy. Thus, future design should consider how to adjust apps for users from different backgrounds, such as those who use both Chinese and English versions, and app functions that necessitate minimal technical acumen. These three major implications of this study could inform the design guidelines for the future digital storytelling apps to provide better user experiences for older Chinese immigrants in Australia.

7   CONCLUSION

A survey was conducted to provide an understanding of how older Chinese immigrants in Australia use social media for digital storytelling. Several factors were measured, including relative loneliness, social support, digital literacy, purposes of digital storytelling, and user experience of digital storytelling. The findings of this study provide insights into the research questions, which also formed four themes in the discussion section, thereby providing a deeper understanding of this topic to inform future studies.

In addition, this research validates and confirms several user experiences of digital storytelling among older Chinese immigrants in Australia and provides novel information about relationships between demographic factors and usability variables. Thus, this study further informs the design and development of digital storytelling apps targeting older Chinese immigrants in Australia to enhance their social engagement.

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REFERENCES

[1] David Ip, Chi Wai Lui and Wing Hong Chui. 2007. Veiled entrapment: a study of social isolation of older Chinese migrants in Brisbane, Queensland. *Ageing and Society*, *27*(5), 719–738. https://doi.org/10.1017/s0144686x07006083

[2] Xiaoping Lin, Christina Bryant, Jennifer Boldero and Briony Dow. 2016. Psychological well-being of older Chinese immigrants living in Australia: a comparison with older Caucasians. *International Psychogeriatrics*, *28*(10), 1671–1679. https://doi.org/10.1017/s1041610216001010

[3] Kai Feng. *The Status Quo and Predicament of the Chinese Aged in Australia.* ABC News. Retrieved February 24, 2019. https://www.abc.net.au/chinese/2019–02–24/aged-care-for-chinese-australia-situation-and-difficulty/10828912

[4] Kate Hamilton-West, Alisoun Milne and Sarah Hotham. 2020. New horizons in supporting older people's health and wellbeing: is social prescribing a way forward?. *Age and Ageing*, *49*(3), 319–326. https://doi.org/10.1093/ageing/afaa016

[5] Amanda Hunsaker, Eszter Hargittai and Anne Marie Piper. 2020. Online Social Connectedness and Anxiety Among Older Adults. *International Journal of Communication, 14, 697–725. https://ijoc.org/index.php/ijoc/article/view/11841*

[6] Kreshnik Vukatana, Gjergji Mulla, Ran Liu and Xhulio Mitre. 2022. Analyzing user opinions on content and social media apps to online marketing: Evidence from Albania. *Journal of Eastern European and Central Asian Research (JEECAR)*, *9*(6), 1072–1082. https://doi.org/10.15549/jeecar.v9i6.965

[7] Ashlee Cunsolo Willox, Sherilee L Harper, Victoria L Edge, 'My Word': Storytelling and Digital Media Lab, Changing Climate, Changing Health, Changing Stories project, and Rigolet Inuit Community Government. 2013. Storytelling in a digital age: Digital storytelling as an emerging narrative method for preserving and promoting indigenous oral wisdom. *Qualitative Research, 13*(2), 127–147. https://doi.org/10.1177/1468794112446105

[8] Yuxing Qian, Zhenni Ni, Han Zheng, Zhenghao Liu and Feicheng Ma. 2023. Factors influencing users' post replying behavior in a senior online community: An empirical investigation. *Telematics and Informatics,* 77(C), https://doi.org/10.1016/j.tele.2022.101926

[9] Chunhui Xie, Jagannadha Sri Harsha Putrevu and Chelsea Linder. 2017. Family, Friends, and Cultural Connectedness: A Comparison Between WeChat and Facebook User Motivation, Experience and NPS Among Chinese People Living Overseas. In: Rau, PL. (eds) Cross-Cultural Design. CCD 2017. Lecture Notes in Computer Science, vol 10281. Springer, Cham. https://doi.org/10.1007/978–3–319–57931–3_30

[10] Lee, Chaiwoo and Joseph F. Coughlin. 2015. PERSPECTIVE: Older Adults' Adoption of Technology: An Integrated Approach to Identifying Determinants and Barriers. *Journal of Product Innovation Management, 32(5)*, 747-759. https://doi.org/10.1111/jpim.12176

[11] Amaral, Inês and Daniel, Fernanda. 2018. *The Use of Social Media Among Senior Citizens in Portugal: Active Ageing Through an Intergeneration Approach.* In Human Aspects of IT for the Aged Population. Acceptance, Communication and Participation: 4th International Conference, ITAP 2018, Held as Part of HCI International, July 15–20, 2018, Las Vegas, USA. 10926. 422–434. https://doi.org/10.1007/978–3–319–92034–4_32

[12] Cun Li, Jun Hu, Bart Hengeveld, and Caroline Hummels. 2019. *Slots-Memento: Facilitating Intergenerational Memento Storytelling and Preservation for the Elderly.* In Proceedings of the Thirteenth International Conference on Tangible, Embedded, and Embodied Interaction (TEI '19). Association for Computing Machinery, New York, NY, USA, 359–366. https://doi.org/10.1145/3294109.3300979

[13] Seok Kang. 2013. The elderly population and community engagement in the Republic of Korea: The role of community storytelling network. *Asian Journal of Communication*, *23*(3), 302–321. https://doi.org/10.1080/01292986.2012.725176

[14] Siyao Gao, Karine Dupre, and Caryl Bosman. 2022. Parenting Immigrants: Understanding How Family Relationships Impact the Wellbeing of Older Chinese Immigrants Living on the Gold Coast, Australia. *Journal of Family Issues*, 44(12), 3176–3198. https://doi.org/10.1177/0192513X221126750

[15] Guo, Man, Yi Wang, Jinyu Liu, and XinQi Dong. 2023. Ethnic enclaves, social capital, and psychological well-being of immigrants: the case of Chinese older immigrants in Chicago. *Aging & Mental Health*, *27*(6), 1077–1085. https://doi.org/10.1080/13607863.2022.2084506

[16] Russell Dan, Peplau Letitia A. and Cutrona Carolyn E. 1980. The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology, 39*(3), 472–480. https://doi.org/10.1037/0022–3514.39.3.472

[17] Mary Elizabeth Hughes, Linda J. Waite, Louise C. Hawkley, and John T. Cacioppo. 2004. A Short Scale for Measuring Loneliness in Large Surveys: Results From Two Population-Based Studies. *Research on aging*, *26*(6), 655–672. https://doi.org/10.1177/0164027504268574

[18] Barbara Barbosa Neves, Rachel Franz, Rebecca Judges, Christian Beermann, and Ron Baecker. 2017. Can Digital Technology Enhance Social Connectedness Among Older Adults? A Feasibility Study. *Journal of Applied Gerontology*. https://doi.org/10.1177/0733464817741369

[19] Nelson A. Roque and Walter R. Boot. 2018. A New Tool for Assessing Mobile Device Proficiency in Older Adults: The Mobile Device Proficiency Questionnaire. *Journal of applied gerontology: the official journal of the Southern Gerontological Society*, *37*(2), 131–156. https://doi.org/10.1177/0733464816642582

[20] Qi Wang. 2020. Creation of the Purposes of Online Memory Sharing Scale. *International Journal of Applied Psychology*, *10*(3), 65–70. https://doi.org/10.5923/j.ijap.20201003.01

[21] Andrew Steptoe, Aparna Shankar, Panayotes Demakakos, and Jane Wardle. 2013. Social isolation, loneliness, and all-cause mortality in older men and women. *Proceedings of the National Academy of Sciences*, *110*(15), 5797–5801. https://doi.org/10.1073/pnas.1219686110

[22] Tianyin Liu, Shiyu Lu, Dara K Y Leung, Lesley C Y Sze, Wai Wai Kwok, Jennifer Y M Tang, Hao Luo, Terry Y S Lum and Gloria H Y Wong. 2020. Adapting the UCLA 3-item loneliness scale for community-based depressive symptoms screening interview among older Chinese: a cross-sectional study. *BMJ Open*, *10*(12), e041921. https://doi.org/10.1136/bmjopen-2020–041921

[23] Addone Agnese, De Donato Renato, Palmieri Giuseppina, Pellegrino Maria Angela, Petta Andrea, Scarano Vittorio, and Serra Luigi. 2021. Novelette,

a Usable Visual Storytelling Digital Learning Environment. *IEEE Access*, vol. 9, pp. 168850-168868, https://doi.org/10.1109/ACCESS.2021.313707

[24] Australian Bureau of Statistics. 2024. *Australia's Population by Country of Birth: Statistics on Australia's estimated resident population by country of birth.* Australian Bureau of Statistics. Retrieved April 2024, https://www.abs.gov.au/statistics/people/population/australias-population-country-birth/latest-release#:~:text = As%20at%2030%20June%202023,8.2%20million%20people%20born%20overseas.

[25] Guan, Qing. 2019. Measuring the spatial integration of the China-born population in Australia, 1981–2016. *Journal of Population Research,* 36, 319–346. https://doi-org.libraryproxy.griffith.edu.au/10.1007/s12546-019-09234-9

[26] Pedersen Mogens Jin, & Nielsen Christian Vidaek. 2016. Improving Survey Response Rates in Online Panels: Effects of Low-Cost Incentives and Cost-Free Text Appeal Interventions. Social Science Computer Review, 34(2), 229-243. https://doi-org.libraryproxy.griffith.edu.au/10.1177/0894439314563916

[27] Eugene Allevato and Moayad A. Marrar. 2019. A Project-based Approach to Examine University Teachers Attitudes towards Visually Impaired Students. *Scholarly Journal of Psychology and Behavioral Sciences*, *2*(3). https://doi.org/10.32474/sjpbs.2019.02.000137

[28] George Darren and Mallery Paul. 2003. Using SPSS for Windows Step by Step: A Simple Guide and Reference (4th ed.). London: Pearson Education.

[29] Harold G. Koenig, Ron E. Westlund, Linda K. George, Dana C. Hughes, Dan G. Blazer and Celia Hybels. 1993. Abbreviating the Duke Social Support Index for use in chronically ill elderly individuals. *Psychosomatics*, *34*(1), 61–69. https://doi.org/10.1016/S0033–3182(93)71928–3

[30] Esben Strodl, Justin Kenardy and Con Aroney. 2003. Perceived stress as a predictor of the self-reported new diagnosis of symptomatic CHD in older women. *International journal of behavioral medicine*, *10*(3), 205–220. https://doi.org/10.1207/s15327558ijbm1003_02

[31] Carmen Moret-Tatay, María José Beneyto-Arrojo, Eugenia Gutierrez, Walter R Boot and Neil Charness. 2019. A Spanish Adaptation of the Computer and Mobile Device Proficiency Questionnaires (CPQ and MDPQ) for Older Adults. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.01165

[32] Jacob Cohen. 1988. Statistical Power Analysis for the Behavioral Sciences (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

[33] Jacob Cohen. 1992. A power primer. *Psychological bulletin*, *112*(1), 155–159. https://doi.org/10.1037//0033-2909.112.1.155

[34] Mohd AF Mahmud, Mohd Hazrin, Eida N Muhammad, Muhammad F Mohd Hisyam, S. Maria Awaludin, Mohammad A Abdul Razak, Nur A Mahmud, Nor A Mohamad, Noran N Mohd Hairi and Choo Wan Yuen. 2020. Social support among older adults in Malaysia. *Geriatrics & Gerontology International*, *20*(S2), 63–67. https://doi.org/10.1111/ggi.14033

[35] Eliane M Boucher, Emily C McNaughton, Nicole Harake, Julia L Stafford and Acacia C Parks. 2021. The Impact of a Digital Intervention (Happify) on Loneliness During COVID-19: Qualitative Focus Group. *JMIR mental health*, *8*(2), e26617. https://doi.org/10.2196/26617

[36] Heather R Fuller and Andrea Huseth-Zosel. 2022. Older Adults' Loneliness in Early COVID-19 Social Distancing: Implications of Rurality. *The journals of gerontology. Series B, Psychological sciences and social sciences*, *77*(7), e100–e105. https://doi.org/10.1093/geronb/gbab053

[37] Charles B Stone, Li Guan, Gabriella LaBarbera, Melissa Ceren, Brandon Garcia, Kelly Huie, Carissa Stump and Qi Wang. 2022. Why do people share memories online? An examination of the motives and characteristics of social media users. *Memory*, *30*(4), 450–464. https://doi.org/10.1080/09658211.2022.2040534

[38] Kai Wei, Junjie Yang, Bixi Yang, Lijuan Jiang, Jiangling Jiang, Xinyi Cao and Chunbo Li. 2022. Living Preference Modifies the Associations of Living Arrangements With Loneliness Among Community-Dwelling Older Adults. *Frontiers in public health*, *9*, 794141. https://doi.org/10.3389/fpubh.2021.794141

[39] Christina Matz-Costa, Stephanie Cosner Berzin, Marcie Pitt-Catsouphes and Cal J Halvorsen. 2019. Perceptions of the Meaningfulness of Work Among Older Social Purpose Workers: An Ecological Momentary Assessment Study. *Journal of applied gerontology: the official journal of the Southern Gerontological Society*, *38*(8), 1121–1146. https://doi.org/10.1177/0733464817727109

[40] Jacqueline M. Kory-Westlund and Cynthia Breazeal. 2019. Exploring the Effects of a Social Robot's Speech Entrainment and Backstory on Young Children's Emotion, Rapport, Relationship, and Learning. *Frontiers in Robotics and AI*, *6*. https://doi.org/10.3389/frobt.2019.00054

[41] Diogenis Alexandrakis, Konstantinos Chorianopoulos, and Nikolaos Tselios. 2019. Insights on Older Adults' Attitudes and Behavior Through the Participatory Design of an Online Storytelling Platform. In Human-Computer Interaction – INTERACT 2019: 17th IFIP TC 13 International Conference, Paphos, Cyprus, September 2–6, 2019, Proceedings, Part I. Springer-Verlag, Berlin, Heidelberg, 465–474. https://doi.org/10.1007/978–3-030–29381–9_29

[42] Zhongping Zeng, Liu Liu, Ye Han and Zhaoyin Liu. 2016. Understanding Mobile SNS Usage for Aging People in China: A Perspective from Motivations, Trust and Attitude. In: Zhou, J., Salvendy, G. (eds) Human Aspects of IT for the Aged Population. Healthy and Active Aging. ITAP 2016. Lecture Notes in Computer Science, vol 9755. Springer, Cham. https://doi.org/10.1007/978–3-319–39949–2_25

[43] Michael Chan. 2018. Mobile-mediated multimodal communications, relationship quality and subjective well-being: An analysis of smartphone use from a life course perspective. *Computers in Human Behavior, 87,* 254–262. https://doi.org/10.1016/j.chb.2018.05.027

[44] Barbara Caci, Maurizio Cardaci, and Silvana Miceli. 2019. Autobiographical Memory, Personality, and Facebook Mementos. *Europe's journal of psychology*, *15*(3), 614–636. https://doi.org/10.5964/ejop.v15i3.1713

[45] Lei Guo. 2017. WeChat as a Semipublic Alternative Sphere: Exploring the Use of WeChat Among Chinese Older Adults. *International Journal of Communication.* 11. 408–428. https://ijoc.org/index.php/ijoc/article/view/5537

[46] Jenny Zhengye Hou. 2023. "Sharing Is Caring": Participatory Storytelling and Community Building on Social Media Amidst the COVID-19 Pandemic. *American Behavioral Scientist*. https://doi.org/10.1177/00027642231164040

[47] Benett Axtell and Cosmin Munteanu. 2016. Speech-Enabled Intelligent Mobile Interfaces to Support Older Adults' Storytelling Around Digital Family Pictures. In *Communications in Computer and Information Science* (pp. 401–406). Communications in Computer and Information Science. https://doi.org/10.1007/978–3-319–40548–3_67

[48] Benett Axtell and Cosmin Munteanu. 2019. PhotoFlow in Action: Picture-Mediated Reminiscence Supporting Family Socio-Connectivity. In Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems (CHI EA '19). Association for Computing Machinery, New York, NY, USA, Paper INT050, 1–4. https://doi.org/10.1145/3290607.3313272

[49] Yue Wu, Xu Shen, Tao Mei, Xinmei Tian, Nenghai Yu and Yong Rui. 2016. Monet: A System for Reliving Your Memories by Theme-Based Photo Storytelling, in *IEEE Transactions on Multimedia*, *18*(11), 2206–2216. https://doi.org/10.1109/TMM.2016.2614185

[50] Gustavo Saposnik. 2023. Understanding social media: how its popularity could be used to advance medical education in stroke care?. *Journal of Neurology*, *270*(8), 4096–4102. https://doi.org/10.1007/s00415–023–11743-w

[51] Bogeum Choi, Heejun Kim and Jina Huh-Yoo. (2021). Seeking Mental Health Support Among College Students in Video-Based Social Media: Content and Statistical Analysis of YouTube Videos. *JMIR Formative Research*, *5*(11), e31944. https://doi.org/10.2196/31944

[52] Esmadi A. A. Seman, Idyawati Hussein and Murni Mahmud. 2010. Why Thinking Aloud Matters for Usability Evaluation? *2010 Second International Conference on Computer Engineering and Applications, 1*, 462–466. https://doi.org/10.1109/ICCEA.2010.95

[53] Lora Appel, Samantha Lewis, Erika Kisonas and Jennifer Recknagel. 2022. VRCHIVE: experiences conducting an online workshop teaching intergenerational participants to create virtual reality films about their lives during the COVID pandemic. *Educational Gerontology*, *48*(7), 305–330. https://doi.org/10.1080/03601277.2022.2039848

[54] Lili Shang, Junjie Zhou and Meiyun Zuo. 2020. Understanding older adults' intention to share health information on social media: the role of health belief and information processing. *Internet Research*, *31*(1), 100–122. https://doi.org/10.1108/intr-12–2019–0512

[55] Tal Laor. 2019. "Hello, is There Anybody Who Reads Me?" Radio Programs and Popular Facebook Posts. *International Journal of Interactive Multimedia and Artificial Intelligence*, *5*(7), 80. https://doi.org/10.9781/ijimai.2019.10.003

[56] Soohyung Joo, Kun Lu and Taehun Lee. 2020. Analysis of content topics, user engagement and library factors in public library social media based on text mining. *Online Information Review*, *44*(1), 258–277. https://doi.org/10.1108/oir-11–2018–0345

[57] Yao Lu, Wei Qi, and Juan Qin. 2018. *The Research on Wechat Advertising Effectiveness Based on SOR Model.* In Proceedings of the 2nd International Conference on Computer Science and Application Engineering (CSAE '18). Association for Computing Machinery, New York, NY, USA, Article 42, 1–7. https://doi.org/10.1145/3207677.3278042

[58] Xingting Zhang, Dong Wen, Jun Liang and Jianbo Lei. 2017. How the public uses social media wechat to obtain health information in china: a survey study. *BMC Medical Informatics and Decision Making*, *17*(S2). https://doi.org/10.1186/s12911–017–0470–0

[59] Siu Pan Li, Hoi Cheng Ip, and Jia Cheng Huang. 2019. *The Use of WeChat Official Accounts in Macau: From the Customers' Perspectives.* In Proceedings of the 3rd International Conference on E-commerce, E-Business and E-Government (ICEEG '19). Association for Computing Machinery, New York, NY, USA, 49–52. https://doi.org/10.1145/3340017.3340023

[60] Naila Aslam, Kewen Xia, Furqan Rustam, Afifa Hameed and Imran Ashraf. 2022. Using Aspect-Level Sentiments for Calling App Recommendation with Hybrid Deep-Learning Models. *Applied Sciences*, *12*(17), 8522. https://doi.org/10.3390/app12178522

[61] Li Wei, Alfred Tsang, Nick Wong and Pedro Lok. 2020. *Kongish Daily*: researching translanguaging creativity and subversiveness. *International Journal of Multilingualism*, *17*(3), 309–335. https://doi.org/10.1080/14790718.2020.1766465

[62] Chetan Verma and Sujit Dey. 2013. "Fully Automated Learning for Application-Specific Web Video Classification," *2013 IEEE/WIC/ACM International Joint Conferences on Web Intelligence (WI) and Intelligent Agent Technologies (IAT), Atlanta, GA, USA*, 307–314. https://doi.org/10.1109/WI-IAT.2013.44

A APPENDICES

A.1 Tables

Table 2: Descriptive statistics of four scales and sub-scales (N = 139)

Characteristics	N	Min	Max	Mean	SD	Cronbach's α	Score interpretation
Loneliness (UCLA Loneliness Scale 3-items)						0.70	A higher mean score indicates higher loneliness
Total	133	3	9	4.08	1.26		
Social support (Duke Social Support Index (DSSI) 11-items)						0.71	A higher mean score indicates better social support
Total	135	12	33	26.44	4.07		
Digital literacy (Mobile Device Proficiency Questionnaire (MDPQ) 16-items)				All (*Age 65 and over)		0.95	A higher mean score indicates higher mobile device proficiency
Mobile device basics	136	1	5	**3.97 (3.68)**	**1.26 (1.31)**		

Communication	137	1	5	3.61 (3.34)	1.50 (1.52)		
Data and file storage	137	1	5	2.95 (2.68)	1.58 (1.45)		
Internet	138	1	5	**3.88 (3.68)**	**1.37 (1.42)**		
Calendar	139	1	5	3.05 (2.83)	1.62 (1.59)		
Entertainment	138	1	5	3.51 (3.29)	1.33 (1.33)		
Privacy	136	1	5	3.45 (3.18)	1.47 (1.49)		
Trouble shooting and software management	137	1	5	2.95 (2.72)	1.51 (1.47)		
Total	134	8	40	27.49 (25.42)	9.29 (9.20)		
Purposes of DST (Purposes of Online Memory Sharing Scale (POMSS))						0.96	A higher mean score indicates
Self	133	1	5	2.62	1.08		higher purposes of DST
Social	133	1	5	**3.11**	**1.15**		
Therapeutic	133	1	5	2.59	1.07		
Directive	136	1	5	2.77	1.05		
Total	132	1	5	2.78	1.01		

Age (y, mean ±SD, Min, Max): (69.86 ± 9.27, 55, 91)

Table 3: Digital literacy scale - Mobile Device Proficiency Questionnaire (MDPQ-16) (Mobile device basics and Internet, N = 139)

Characteristics		Frequency	
		N	%
Mobile device basics			
Navigate on screen menus using the touchscreen	Never tried	18	12.9
	Not at all	6	4.3
	Not very easily	12	8.6
	Somewhat easily	37	26.6
	Very easily	**65**	**46.8**
	Missing Values	1	0.7
Use the onscreen keyboard to	Never tried	14	10.1

type	Not at all	5	3.6
	Not very easily	13	9.4
	Somewhat easily	37	26.6
	Very easily	**67**	**48.2**
	Missing Values	3	2.3
Internet			
Find information about my hobbies and interests on the Internet	Never tried	20	14.4
	Not at all	6	4.3
	Not very easily	10	7.2
	Somewhat easily	39	28.1
	Very easily	**63**	**45.3**
	Missing Values	1	0.7
Find health information on the Internet	Never tried	20	14.4
	Not at all	6	4.3
	Not very easily	10	7.2
	Somewhat easily	35	25.2
	Very easily	**67**	**48.2**
	Missing Values	1	0.7

Age (y, mean ±SD, Min, Max): (69.86 ± 9.27, 55, 91)

Table 4: Purposes of Online Memory Sharing Scale (POMSS) – Social dimension (N = 139)

Characteristics		Frequency	
		N	%
To stay in touch with my friends and family	Not at all	18	12.9
	Rarely	10	7.2
	Sometimes	29	20.9
	Very often	31	22.3
	Exactly my reasons	**48**	**34.5**
	Missing values	3	2.2
To entertain people	Not at all	19	13.7
	Rarely	20	14.4
	Sometimes	**35**	**25.2**
	Very often	29	20.9

		N	%
	Exactly my reasons	34	24.5
	Missing values	2	1.4
	Not at all	**36**	**25.9**
	Rarely	25	18.0
	Sometimes	31	22.3
To network or to meet new people	Very often	22	15.8
	Exactly my reasons	21	15.1
	Missing values	4	2.9
	Not at all	30	21.6
	Rarely	26	18.7
	Sometimes	**33**	**23.7**
To communicate with many people at once, rather than telling them one at a time	Very often	18	12.9
	Exactly my reasons	28	20.1
	Missing values	4	2.9
	Not at all	28	20.1
	Rarely	26	18.7
	Sometimes	**36**	**25.9**
To feel close to others	Very often	19	13.7
	Exactly my reasons	27	19.4
	Missing values	3	2.2
	Not at all	22	15.8
	Rarely	22	15.8
	Sometimes	**35**	**25.2**
To maintain my social network	Very often	28	20.1
	Exactly my reasons	29	20.9
	Missing values	3	2.2

Age (y, mean ±SD, Min, Max): (69.86 ± 9.27, 55, 91)

Table 5: Digital storytelling User Experience (UX) (N = 139)

Characteristics		Frequency	
		N	%
PREFERENCES:			
DST likelihood	Highly unlike	15	10.8

	Unlike	13	9.4
	Neutral	**58**	**41.7**
	Like	34	24.5
	Highly like	17	12.2
	Missing values	2	1.4
	Less than 1 hour	**69**	**49.6**
	1–2 hours	44	31.7
Hrs of use DST	3–5 hours	18	12.9
	More than 5 hours	4	2.9
	Missing values	4	2.9

USAGE PATTERNS:

	Never	26	18.7
	Rarely	20	14.4
	Sometimes	**40**	**28.8**
Text narrative	Very often	29	20.9
	Always	20	14.4
	Missing values	4	2.9
	Never	32	23.0
	Rarely	22	15.8
	Sometimes	**44**	**31.7**
Audio	Very often	26	18.7
	Always	11	7.9
	Missing values	4	2.9
	Never	26	18.7
	Rarely	9	6.5
	Sometimes	40	28.8
Photography	Very often	**42**	**30.2**
	Always	19	13.7
	Missing values	3	2.2
	Never	**42**	**30.2**
	Rarely	26	18.7
	Sometimes	31	22.3
Video	Very often	21	15.1
	Always	13	9.4
	Missing values	6	4.3

	Never	**59**	**42.4**
	Rarely	23	16.5
Interactive stories	Sometimes	32	23.0
	Very often	16	11.5
	Always	5	3.6
	Missing values	4	2.9
	Never	**98**	**70.5**
	Rarely	17	12.2
	Sometimes	13	9.4
Virtual Reality (VR)	Very often	3	2.2
	Always	3	2.2
	Missing values	5	3.6

Age (y, mean ±SD, Min, Max): (69.86 ± 9.27, 55, 91)

Table 6: Social media in use (N = 139) (note: this is a multiple-choice question item)

Characteristics	Frequency	
	N	%
WeChat	**101**	**72.7%**
Facebook	45	32.4%
WhatsApp	17	12.2%
Line	9	6.5%
QQ	8	5.8%
TikTok	5	3.6%
Twitter	4	2.9%
Instagram	2	1.4%

Age (y, mean ±SD, Min, Max): (69.86 ± 9.27, 55, 91); N = 139

Table 7: Tables of correlation (N = 139)

Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

	1 = Total	2 = Social interaction	3 = Satisfaction with social support	4 = Total	5 = Likelihood	6 = Self	7 = Social
UCLA Loneliness Scale 3-items							
1 = Total	1						
Duke Social Support Index (DSSI) 11-items							
2 = Social interaction	-0.253**	1					
3 = Satisfaction with social support	-0.340**	0.419**	1				
4 = Total	-0.367**	0.782**	0.893**	1			
Digital storytelling likelihood							
5 = Likelihood	-0.022	0.241**	0.142	0.208*	1		
Purposes of Online Memory Sharing Scale (POMSS)							
6 = Self	-0.025	0.462**	0.275**	0.409**	0.418**	1	
7 = Social	-0.095	0.444**	0.379**	0.477**	0.489**	0.792**	1

Types of digital storytelling

8 = Therapeutic	9 = Directive	10 = Total	11 = narrative	Text12 = Audio	13 = Photography	14 = Video	15 = Interactive stories
							1
						1	0.552**
					1	0.706**	**0.468****
				1	0.637**	0.588**	0.583**
			1	0.581**	0.734**	0.580**	0.494**
		1	**0.393****	**0.517****	**0.472****	**0.524****	**0.411****
	1	0.933**	0.390**	0.467**	0.419**	0.476**	0.376**
1	0.828**	0.936**	0.298**	0.496**	0.381**	0.463**	0.419**
0.808**	0.861**	0.933**	0.418**	0.516**	**0.494****	0.484**	0.346**
0.852**	0.788**	0.921**	0.356**	0.442**	**0.461****	0.532**	0.386**
0.368**	0.434**	**0.459****	0.468**	0.436**	0.493**	0.417**	0.310**
0.377**	0.416**	**0.453****	0.370**	0.359**	**0.363****	0.305**	0.291**
0.243**	0.331**	**0.328****	0.282**	0.275**	0.276**	0.193*	0.198*
0.434**	0.399**	**0.468****	0.342**	0.339**	**0.352****	0.339**	0.318**
-0.057	-0.134	-0.086	-0.204*	-0.177*	-0.153	-0.210*	-0.114

Mobile Device Proficiency Questionnaire (MDPQ) 16-items

	16 = Virtual Reality (VR)	17 = Mobile device basics	18 = Communication	19 = Data and file storage	20 = Internet	21 = Calendar
	1					
	0.550**	1				
	0.411**	0.175*	1			
	0.261**	0.226**	0.659**	1		
	0.347**	0.278**	0.267**	0.637**	1	
	0.265**	**0.365****	0.171*	0.493**	0.695**	1
	0.292**	0.253**	0.164	0.408**	0.655**	0.537**
	0.269**	**0.442****	0.168	0.242**	0.531**	0.533**
	0.356**	0.171	0.194*	0.169	0.204*	0.482**
	0.154	0.158	0.201*	0.085	0.307**	0.446**
	0.316**	0.124	0.221**	0.221*	0.275**	0.318**
	0.158	0.161	0.264**	0.136	0.338**	0.288**
	0.162	0.220*	0.092	0.199*	**0.397****	0.308**
	0.081	0.240**	0.199*	0.158	0.330**	0.281**
	0.211*	0.258**	0.027	0.040	0.283**	**0.370****
	-0.116	0.146	0.165	0.134	0.275**	0.315**
		0.347**	0.116	-0.049	0.269**	0.274**
		-0.232**	0.202*	0.135	0.275*	0.324**
			-0.170	0.107	0.187*	0.259**
				0.158	0.208*	0.212*
				-0.217*	0.194*	0.240**
					0.198*	0.133
					-0.193*	0.192*
						0.115
						0.262**
						-0.267**

	22 = Entertainment	23 = Privacy	24 = Trouble shooting and software management	25 = Total
				1
			1	0.805**
		1	0.689**	0.858**
	1	0.755**	0.739**	0.850**
	0.638**	0.607**	0.652**	0.770**
	0.612**	0.681**	0.577**	0.805**
	0.508**	0.533**	0.519**	0.752**
	0.587**	0.600*	0.489**	0.810**
	0.647**	0.629**	0.477**	0.771**
	0.287**	0.277**	0.385**	**0.375***
	0.310**	0.282**	0.274**	**0.321***
	0.358**	0.287**	0.268**	**0.339***
	0.395*	**0.403***	**0.311***	**0.396***
	0.350**	0.275**	0.320**	**0.313***
	0.352**	0.331**	0.215*	**0.389***
	0.245**	0.200*	0.172*	0.265**
	0.257**	0.213*	0.209*	0.293**
	0.247**	0.246**	0.195*	0.279**
	0.187*	0.136	0.122	0.198*
	0.240**	0.174*	0.135	0.245**
	0.154	0.149	0.119	0.159
	0.235**	0.153	0.079	0.230**
	0.148	0.049	0.022	0.137
	0.314**	0.253**	0.161	0.300**
	-0.279**	-0.157	-0.174*	-0.265**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).