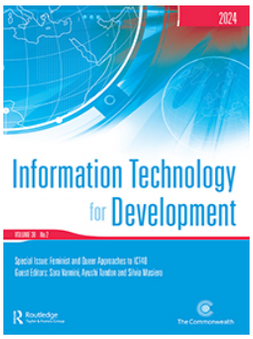

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Comprehending ICT for gender empowerment in an aging context: digitalization of marginalized female elderly in the Global South during COVID-19

Xin Pei[a], Zhen Troy Chen[b] and Lina Zhang[c]

[a]School of Culture and Communication, The University of Melbourne, Melbourne, Australia; [b]Department of Media, Culture and Creative Industries, City, University of London, London, UK; [c]University of Exeter Business School, Exeter, UK

ABSTRACT

Focusing on the low-income elderly women in the Global South, our study situates the discussion on ICT for gender empowerment in an aging context. We aim to explore the role of aging as a biological and socio-cultural factor affecting digital adoption and usage by women in the lower rungs of their societies in developing countries. Grounded in an intersectionality approach, this study maps the dynamic and complicated landscape of their digital practices that are negotiated at the intersection of gender, aging, socioeconomic status, and local digital management policies. Through in-depth interviewing and digital ethnography, we particularly give avoice to the low-income elderly women in China, illuminating their constraining, yet empowering digitalization process during COVID-19. The findings reveal a distinctive understanding of ICT for gender empowerment from aging women's perspective, shifting away from the personal advancement that typically dominates the agenda of their younger counterparts.

KEYWORDS

ICT; gender; empowerment; aging; COVID-19; China

1. Introduction

Among the extensive discussion on ICT (Information and Communication Technology) for gender empowerment in the Global South, few studies illuminated the age-based differentiations. While great attention has been drawn to ICT adoption and usage across a wide spectrum of marginalized women in developing societies (Elnaggar, 2008; Hafkin & Huyer, 2008; Pei & Chib, 2021), little is known about the digital struggles faced by the elderly women in the lower rungs of their situated socio-cultural contexts. However, this neglected research area deserves particular attention in the context of the accelerated aging and simultaneous digitalization of the Global South, which has seen an increasing number of elders become involved in digital processes (e.g. Ferreira et al., 2016; Firdhous & Karunaratne, 2012; Ma et al., 2021). In India, the middle-aged and elderly population will account for 66% of the increase in internet users by 2025 (Oi, 2021). A survey released at the 3rd China Population and Development Forum revealed that over half of the elderly population aged 65–69 use smartphones, and the percentage of elderly smartphone users aged 70–79 is 31.2% (Tian, 2023).

Notably, during the pandemic, relentless digital transformation engineered from the top and occurring across different industries has further enforced the integration of digital devices as mediators in

CONTACT Xin Pei PEIX0001@gmail.com The University of Melbourne, Parkville VIC 3052, Australia
Silvia Masiero, Sara Vannini, Ayushi Tandon and Kristin Braa are the accepting Associate Editors for this manuscript.

daily communication and diverse social activities (e.g. Almeida et al., 2020; Bhambere et al., 2021). This consequently engenders tremendous challenges for the marginalized elderly women in the Global South who have already faced restrictions in accessing ICTs and developing digital literacy (Pei & Zhang, 2022; Rashid, 2016; Yang & Du, 2021). Gender inequalities, persisting in their late life, are likely entangled with multi-faceted obstacles arising from the aging processes and other uneven social stratifications (e.g. Calvi, 2020; Yang & Du, 2021) to create unique marginalization encountered by this elderly female group when adopting and incorporating digital components in their daily life.

This might result in a different landscape of their digital practices compared to the relatively young female cohorts, with respect to both barriers and usage preferences. It thus has become urgent to extend the comprehension of ICT for gender empowerment in an aging Global South. Specifically, it is imperative to specify the contextualized constraints faced by the marginalized elderly women in their digital adaptation. Meanwhile, it is equally important to explore their negotiation of agency to empower themselves in ways that align with their perceptions of gender empowerment, which might deviate from the definition held by the younger ones. To fill this gap becomes the research goal of our study.

Our study gives a voice to the group of low-income elderly women with limited educational background and digital literacy in China. We aim to examine how they negotiate digital practices at the intersection of aging, gender, socio-economic status, and digital management policies during the pandemic. Through in-depth interviewing and digital ethnographic fieldwork on WeChat between 2020 and 2021, our study reveals a constraining, yet empowering digitalization process. On one hand, digitalization mediates the intersectional structural constraints into further reduced independence, emergent immobility, and misinformation circulation. Elderly women, on the other hand, actively negotiate their agency, albeit often in a restricted way, to navigate affordances of digital technologies, and to enact strategic responses to pursue a sense of self-empowerment from their own reflections. Notably, the unique digitalization processes of the marginalized elderly female population, although remaining largely invisible, have substantially become an inextricable component of the transforming digital landscape of developing countries during the pandemic.

2. Literature review

2.1. ICT for gender empowerment and aging

The past few decades have witnessed the exponential development of ICT for gender empowerment research. Such development is accompanied by a constantly more nuanced understanding of 'contextualized' or 'situated' agency of socially marginalized women in the Global South (e.g. Nguyen et al., 2017; Oreglia & Srinivasan, 2016). Studies have widely revealed that their digital usage and the subsequent gender impacts are highly contingent upon intersectional factors, encompassing the multi-faceted dimensions of marginalization that women face in their daily lives (e.g. Svensson & Wamala Larsson, 2016; Wallis, 2011). The extant literature has explicitly examined structural constraints such as deeply rooted patriarchal norms, socio-economic restrictions, and a variety of biases and discriminations associated with race, ethnicity, and other social and cultural identities.

However, aging as an emerging phenomenon in many developing countries has not yet raised attention from scholars in the field of ICT for gender empowerment, regardless of its increasingly critical role in adding another layer of disadvantage via further excluding elderly women's access to digital technologies and restricting their level of digital literacy. A few existing studies (e.g. Fortune & Chungong, 2013; Rashid, 2016) that addressed age often failed to provide a clear definition for the group of elderly female adults. For instance, Fortune and Chungong (2013) simply categorized women above thirty-five years old as a monolithic elder group in West Africa. Moreover, there was a lack of in-depth investigation of the underlying reasons for the elder group's marginalized digital practices beyond a descriptive summary stating that elderly women are more likely to be excluded from the information society (Rashid, 2016).

Notably, although not situated in the context of ICT adoption and usage, a stream of development research has indicated the more severe marginalized status of elderly women in developing countries. Different from studies in developed countries, which largely focus on the progressive cognitive declines and physical impairments as the prominent obstacles for elderly's digital practices (Kurniawan, 2008; Merriam et al., 2007), aged marginalization for women in the lower rungs of their situated societies in relatively underdeveloped areas tends to be more complex. Under many circumstances, aging is not the sole axis generating inequalities and constraints (Jacka, 2014; Jiao et al., 2021; Omar, 2003). Yang and Du (2021) indicated that gender inequalities in educational resources and employment opportunities, which persist throughout women's lifetimes in China, often result in reduced access to economic and social capitals in their later years. Calvi (2020) pointed out that the aging process of Indian women is always accompanied by a declined bargaining power and exacerbated poverty in their patriarchal households. Studies (Bakshi & Bhattacharyya, 2021; Wang et al., 2021) revealed that inadequate policy support from the government in the Global South for the elderly could be another factor restricting their welfare and social equalities, which can further marginalize the elderly women who might already lack support from their family members.

Informed by these studies, we aim to fill in the current gap of ICT for gender empowerment research by extending the examination in an aging and intersectional context. Specifically, our study plans to propose an analytical approach that considers aging as a contextually situated and dynamically negotiated process intertwined with a network of structural constraints. This will further enable researchers to unearth the unique marginalization experience by the low-income elderly women in their trajectories of digitalization whose agency is often subject to intersectional influence from aging, gender, their embedded social-cultural environment as well as the political-economic system. This approach is drawn on the theory of intersectionality.

2.2. Intersectionality

Introduced in the wave of Black Feminist Criticism (Crenshaw, 1989; hooks, 1981), intersectionality was adopted to illuminate how power structures of gender and race are interwoven to engender the complicated discrimination against African American women. In recent years, intersectionality has been increasingly applied as an important feminist approach in ICT for gender empowerment to examine how power relations work out at the intersection of gender, race/ethnicity, socio-economic status, and other uneven social divisions and inequalities, affecting digital adoption and usage of marginalized women. Situated in the migration context of Vietnamese foreign brides in Singapore, Nguyen and colleagues (2017) used the intersectionality approach to investigate how an interlocking system of oppressions arising from gender, constrained migratory status, ethnicity, and social class result in these migrant women's enactment of 'restricted agency' in mobile phone usage. This approach enables a more contextualized definition of the gendered impacts generated from ICT adoption and usage processes, which as indicated by Pei and Chib (2021), might not be equivalent to an immediate achievement of gender equalities.

Simultaneously, the intersectionality approach also allows more researchers in ICT4D (Information Communication Technology for Development) to uncover the possible disempowering effects of ICT usage. Digital practices embedded in multi-faceted gender and social inequalities could play a part in extending the control and restrictions of existing power structures (e.g. Svensson & Wamala Larsson, 2016; Wallis, 2011). Wallis (2011) portrayed the mobile-related surveillance in the workplace of Chinese rural-urban female migrant workers because of their inferior positionality in terms of gender, class, and migratory status. Svensson and Wamala Larsson (2016) observed that market women in Kampala who benefited economically from mobiles continued submitting this augmented income to their husbands, which consequently sustained patriarchal control.

Our study adopts intersectionality as the guiding framework. Additionally, it aims to extend this longstanding feminist approach by introducing aging as an increasingly critical element meshed into

the intersectional factors shaping ICT usage and its gender consequences in the Global South. As Alejandria-Gonzalez and colleagues (2018) noted, aging, rather than a chronological marker, has become a 'dynamic and systemic phenomenon'. It embodies not only the hybridity of physical conditions, but also the social constructiveness that is highly dependent upon the context and social structures where the elderly are embedded. Holman and Walker (2021) further indicated that 'intersectionality might be synthesised with a life course perspective to deliver novel insights into unequal ageing' (p. 1).

Recent studies situated in the Western context have drawn attention to the intersection of aging, gender, and various social divisions producing enormous diversity and complexity of marginalization experiences (Adams, 2016; Warner & Brown, 2011). Adams (2016) revealed the heterogeneity of LGBT elders' health experiences negotiated at the intersection of disparities of gender, migratory status, race/ethnicity, and financial security. Similarly, Warner and Brown (2011) unfolded how race/ethnicity and gender work together to define the age-trajectories of disability.

Built upon the strand of pioneering scholarship, our study aims to advance the intersectionality approach in the aging and simultaneously digitalized context of Global South. We place the emphasis on the unequal aging processes experienced by socio-economically marginalized elderly female adults and their struggles during the digitalization processes. Specifically, we aim to propose an analytical approach that allows first the examination of the intersectional constraints on elderly women's ICT adoption and usage and second, the investigation of their negotiation of agency and potential responses. To achieve this objective, our empirical examination is situated in China, an emerging aging society, amidst its rapid digitalization processes during the COVID-19 pandemic.

2.3. China, COVID-19, and low-income elderly women

Over the past decade, China has experienced a simultaneous rise in its aging population and the rapid ICT development. According to the United Nations Department of Economic and Social Affairs, individuals aged 65 and over constituted 12.6% of the population in China in 2020. On one hand, a prosperous digital industry arising from the rapid marketization and industrialization in the post-Mao era has contributed to an expansion of ICT adoption and usage among the elderly population (He et al., 2020). In 2020, the number of elderly mobile adopters reached 274 million in China (Xinhuanet, 2021). On the other hand, the digital literacy of the elders remains low and most of them are struggling with daily digital usage. Nearly 140 million elders in China do not have access to the Internet on their mobile devices (Xinhuanet, 2021), in addition to a high dropout rate of usage due to absent guidance (Zhao et al., 2020).

COVID-19 has further exacerbated this divide. During the pandemic, the Chinese government has constantly escalated the policy on digital management and reinforced digital surveillance and control (Hou et al., 2020), moving toward the goal of constructing 'digital China' (Office of the Central Cyberspace Affairs Commission, 2021). ICTs have been unprecedentedly entrenched into various aspects of people's daily routine, including their search for social and informational support, and the ability to order necessary groceries during lockdowns (Wu et al., 2020). ICTs also played a role in reconfiguring entry and exit procedures in public spaces and access to public transportation. Studies (Song et al., 2021; Wang et al., 2021) argued that the digital transition to virtual-only offerings under COVID-19 further reinforces the age-related digital divide, thus enhancing the social exclusion and isolation of the less tech-savvy elderly.

The situation is even more challenging for low-income elderly women (Yang & Du, 2021). Constituting more than half of the elderly population in China, the percentage of elderly women living in poverty is 12 percent higher than that of their male counterparts (CRCA, 2021). Studies have widely discussed the economic insecurities of Chinese elderly women as a consequence of uneven gendered social structures (Goldstein & Ku, 1993; Xiong, 1998). Moreover, Yang and colleagues (2018) argued that the array of socio-economic disadvantages often further result in social exclusion of Chinese marginalized elderly female group, which leads to a lack of agency and financial deprivation.

Yang and Du (2021) indicated that the complex interplay between gender and the cumulative disadvantages associated with aging tends to deprive elderly women of both economic and social capital needed to access digital technologies in China. However, with a primary focus on digital exclusion, this study fails to delve into the specific challenges that marginalized elderly women face during the process of using digital technologies. This has become an increasingly pressing issue, especially given the large number of elderly adults who have been forced to adapt to the digitalization in China during the pandemic, including those with disadvantaged socio-economic status (Whitelaw et al., 2020).

To fill this gap, our study illuminates the constraints and agency of low-income elderly women in China in their trajectories of incorporating themselves in a rapidly digitalized environment under the pandemic. Through an intersectionality approach, our study aims to capture the dynamics and complexity of their digitalization processes revolving around intersectional factors encompassing aging, gender, socio-economic status, as well as the digital management policies in China related to COVID-19. Therefore, we propose the following research question:

> **RQ**: How do the low-income elderly women in China negotiate digital practices at the intersection of aging, gender, socio-economic status, and digital management policies during the pandemic?

3. Methods and data

3.1. Respondents

We define the elderly population as individuals aged 60 and above in line with the definition provided by United Nations (ESCAP, 2022). Respondents for this research project include twenty-two elderly women between sixty-five and eighty-two years old, with an average annual income ranging between approximately thirty to forty thousand RMB. Twenty-one respondents hold either secondary or high school diplomas, and one did not finish her primary education. Before retirement, their occupations were predominantly in the working class, such as factory workers and primary school teachers in remote suburbs of third-tier cities in China. Five were living with their husbands, while the rest were widows, living either with their children or alone. Respondents were primarily from Jiangsu, Anhui, and Zhejiang provinces, which are among the regions at the forefront of embracing an aging society (Wan, 2021). All respondents were smartphone users, with usage spanning from under a year to five years. In addition, two children and two husbands also participated in this research to complement the understanding of respondents' smartphone adoption and usage from a different angle. Please refer to Table 1 demonstrating the age variations, geographical distribution and the duration of smartphone ownership of respondents.

3.2. Recruitment and data collection

Respondents were recruited through snowball sampling, based on the referral between respondents. Qualitative semi-structured interviews were conducted alongside digital ethnography to facilitate triangulated data collection and enable comparisons between 2020 and 2021. The in-depth interviews enabled elicitation of narratives of daily life experiences in respondents' own words, and more importantly, allowed us to comprehend each respondent holistically as an experiencing, meaning-making person (Josselson, 2013). Due to the lockdown and social distancing policies, interviews with twenty respondents were conducted online via WeChat video calls, and six were conducted in person. Despite distance, the visual cues allowed by video calls enabled the interlocutors to observe each other's facial expressions and surroundings, thereby successfully engaging each interviewee in an in-depth interview lasting between half an hour and one hour.

Notably, how the researchers present themselves and their interactions with respondents may affect the interview data collected (Wiederhold, 2015). The shared gender identity of the first author made respondents more receptive to sharing their gendered experiences of smartphone

Table 1. Demographic information of respondents.

No.	Age	Province	Smartphone ownership duration
1	81	Anhui	3–4 years
2	82	Anhui	4 years
3	82	Anhui	3–4 years
4	65	Jiangsu	5 years
5	83	Jiangsu	3 years
6	78	Anhui	3 or 4 years
7	75	Anhui	4 years
8	83	Anhui	2–3 years
9	82	Anhui	4 or 5 years
10	67	Anhui	5 years
11	77	Jiangsu	4 years
12	80	Jiangsu	2 years
13	83	Jiangsu	less than one year
14	69	Jiangsu	2 or 3 years
15	69	Jiangsu	5 years
16	69	Jiangsu	3–4 years or 4–5 years
17	68	Zhejiang	cannot identify (only remembered when to start using feature phone)
18	65	Zhejiang	around 4 years
19	68	Zhejiang	2 years
20	75	Zhejiang	cannot identify
21	72	Zhejiang	less than one year
22	68	Zhejiang	cannot identify

practices, and the age difference positioned the first author as the younger generation which further triggered the interest of respondents to share life stories as elders. The interview guide is attached in the appendix. However, the specific interview questions were tailored to the respondents' characteristics and context, and thus, were subject to change.

On-site observation of the digital engagement of respondents (Kozinets, 2019) was conducted in a WeChat group where six respondents were members. Titled 'Sunset Glow Friends' Group' (*wanxia qunyou* 晚霞群友), this group bonded elderly women retired from the same primary school. Upon obtaining consent to join this messaging group, we took notes of their daily interactions in the groups on a weekly basis and compared our notes regularly to share the reflections and advance the methods of observation.

A university-level institutional review board approved the protocol under which the interviews and observations were conducted anonymously. To address privacy concerns, most interviews were conducted individually between the first author and a single respondent. Two interviews were conducted with respondents under the company of one family member, but still in a private environment. Respondents were informed of their right to terminate the interview or observation if they felt uncomfortable, and they were also given the option to decline answering questions that touched upon sensitive or private topics.

3.3. Data analysis

The dataset constituted twenty-four transcribed recordings of interviews paired with notes taken during observation. We analysed the data through the constant comparative method (Boeije, 2002). According to Goetz and LeCompte (1981), constant comparison, as a critical method in qualitative research, allows the process of hypothesis generation and relationship discovery to commence with the analysis of initial observations. This process will subsequently undergo continuous refinement throughout the analysis phases, with outcomes continually informing the category coding process. This method enables us to develop a comprehensive understanding of the data, remain attuned to contextual nuances, and remain open to extending, modifying, or discarding categories. Consequently, the iterative nature of constant comparison facilitates the identification of new topological dimensions and relationships. Furthermore, researchers can progressively refine emerging categories as their analysis deepens (Dey, 1993).

Through constant comparison, authors immersed themselves into data reading and interpretations and made memos to document the key points and reflections stemming from the analysis processes. This was followed by several rounds of discussion to compare the notes and summarize the emerging themes until the themes became saturated and no new points emerged.

It is important to note that this analysis process was guided by our theory and research question. We first focused on the intersectional constraints affecting elderly women's ICT adoption and usage, and second, investigated their negotiation of agency and possible responses. Rather than viewing any element individually, we aimed to generalize and conceptualize how the respondents used mobile communication practices to negotiate the accelerated digitization when dealing with the interlocking system of aging, gender, socio-economic status, and digital management policies during the pandemic. This approach allowed us to gain a deeper understanding of the complex and dynamic relationships among these factors and their influence on digital practices, agency, and empowerment.

This led to the identification of the first general theme – 'reinforcement of digitalized social inequalities', entailing three subthemes as 'reduced independence' 'emergent immobility' and 'information inequalities'. Second, we generated a theme that reflects the display of agency in response to constraints encountered through digital usage. Consequently, the second theme emerged as 'contextualized negotiation of digitalized strategies', including sub-themes as 'simplified and necessitated digital usage', 'community involvement', and 'better fulfillment of gender roles'.

4. Findings

4.1. Reinforcement of digitalized social inequalities

Against the drastic digitalization processes under COVID-19, restricted digital access and literacy tend to further mediate intersectional structural constraints into digitalized social inequalities restricting independence, mobility, and information-seeking behaviors of the marginalized elderly women. To specify, the enhanced reliance upon instruction and supervision from families to cope with digitalized daily communication and social activities inevitably reduces independence. This is often followed by restricted mobility due to the requirement for digital identification with the biographical trace, personal information, and medical status for travelling during the pandemic. The additional constraint lies in the constant exposure to low-quality information and fake news because of the limited accessible digital platforms for information seeking.

4.1.1. Reduced independence

Most elderly women were placed as secondary digital adopters in their families restricted to obsolete ICTs from families. Twenty respondents adopted the outdated mobile models from their children, while only two respondents who owned brand-new phones received them as gifts from husbands or sons. Notably, in the context of this elderly female group, purchasing power was not the sole force impeding their adoption of new technologies. Biases and stereotypes ingrained in the social construction of aging and gender also played a part.

On the one hand, these biases and stereotypes tended to result in external constraints, such as the normalized neglect of elderly women's digital needs by their children. This is often accompanied by a devaluation of their ability to handle digital media and services. Both interviewed children referred to their mothers as 'old auntie' (*Lao Taitai*老太太) who 'doesn't need to know so many functions.'

On the other hand, the aged and simultaneously gendered stereotypes were likely to be internalized by elderly women. The elderly women tend to suffer from a deeply suppressed self-consciousness in Chinese society where neither age discrimination nor gender inequalities have been thoroughly addressed (Berna, 2013; Yao et al., 2018). Although respondents widely complained about their old mobile models that often 'died all of a sudden' (No.16, 69) or 'storage is so small'

(No.8, 83; No.20, 75), they seemed to have accepted such constraints. Some respondents (No.3, 82; No.5, 83) stated that they were 'too old to catch up with new technologies' or 'all I need is to make phone calls, so an old phone is sufficient.' Others mentioned the perceived gender difference, saying that 'for old grandmas, (we) do not need to know all these (different functions)' (No.2, 82), or 'men of our age are more capable of handling digital technology' (No.16, 69). In comparison, their husbands were more confident about exploring digital technologies for personal interests such as 'checking the stock market' (No.5 83), and 'booking online tickets and accommodations for trips' (No.14, 69).

Outdated technology, and restricted digital literacy, in conjunction with a devaluation of digital needs, often resulted in the reduced independence of elderly women. This situation became even worse in the face of accelerated digital management under COVID-19. For many respondents, the rapidly digitalized social interactions across various aspects of daily life unprecedentedly reinforced their reliance upon children and male spouses whenever they needed to cope with online services. Respondents (No.1, 81; No.7, 75; No.12, 80; No.16, 69; No.17, 68) reported that they had to always 'ask kids whenever they have time.' As 'almost everything has gone online', they needed to use mobiles for 'checking the pension through the online banking system', 'making online payments and transactions for utilities', 'booking an online appointment for hospitals', 'seeking information related to COVID-19 test and vaccination', 'showing the QR health code to enter the shopping mall (public access)', and so forth.

It is worth noting that while elderly women often relied on their families for support, this can be contradicted by the fact that they were placed in a marginalized position in their own households. Echoing findings by prior studies (Calvi, 2020; Yang & Du, 2021), long-standing gender inequalities combined with reduced economic and manual labour contribution to families likely restricted the bargaining power of elderly women compared to their male counterparts. Respondents, especially those living in poverty and heavily relying on financial and emotional support from their children, complained that 'children never had time for teaching only simple operations … always busy and responded to me with impatience' (No.16, 69). Therefore, elderly women had to wait for help or just cautiously 'reserved the setting as whatever it has been done by children' in case of 'deleting any important messages by accident' or 'could not switch on the app used last time' (No.1, 81).

4.1.2. Emergent immobility

The reduced independence subsequently engendered a new form of immobility under the pandemic when travelling required QR health code identification. This code was associated with the past travel history and COVID test results. During the pandemic, the Chinese government strictly implemented the rules across the nation of 'unifying the standard for QR health code system, the way of code presentation, and the data' (State Administration for Market Regulation, 2020). Consequently, public transport and entrance into any public place such as shopping malls, hospitals, and banks could only be permitted when the QR health code showed green which represented no or low risk of travelling. Yellow and red colors, as well as the absence of a QR code, could lead to rejection to the entrance or an immediate quarantine in designated premises.

Even possessing the green code, many elderly women were faced with the technical issue of finding and showing the code that was normally built in the mini programme of WeChat or Alipay. The abovementioned reliance upon children's help for dealing with digitized services, in this case, tended to be converted into physical immobility. Respondents reported that they 'could not find the page opened by children at home' (No. 1, 81; No.16, 69). Moreover, the deteriorated memory paired with physical declines because of aging contributed to the complaints of either 'could not remember how to find the code at all (on the spot)' (No.16, 69) or 'getting old, eyes are destroyed, so (it is) not so easy (to recognize the words on small screens)' (No.5, 83), where they had to constantly apologize in front of impatient guards or officials.

Socio-economic restrictions became an additional dimension of marginalization that restricted the digital usage of this low-income elderly group. The concerns of extra expenditure prevented the subscription to any cellular plan (QR). While at home respondents could rely upon Wi-Fi set

up by children, they barely had any accessible Internet in public spaces. As one respondent recalled (No.3, 82), 'I did not (use cellular data). No need for that. When I am outside, I do not use WeChat. Therefore, I only need to spend 8 RMB (monthly) for the basic mobile plan'. Many respondents also expressed suspicion regarding the potential financial scam associated with scanning the QR code, stating that 'I did not want to scan the QR code outside, you never know, maybe my money will be stolen.' (No.2, 82)

All the factors worked together to create a new experience of immobility mainly built upon social inequalities and digital inadequacy rather than physical impairment. It is worth noting that this digitally mediated immobility not only caused inconvenience for elderly women, but also resulted in feelings of shame and stress when they were stopped at the entrance to public places. As one respondent described (No.16, 69),

> I felt so embarrassed. I could do nothing but waiting at the gate of the shopping mall that I used to go, coz I did not know how to get the code. I begged the security guard for an exemption. But he said, no code, no entry, very firmly.

4.1.3. Information inequalities

Another digitalized inequality is related to information acquisition. The intersectional constraints largely restricted the agency of elderly women to access various channels for seeking information and to navigate digital platforms to assess the quality of the information they found or were targeted towards. As a result, they were often confined to constant exposure to low-quality information.

To specify, most respondents merely used the basic functions of smartphones such as telephony and WeChat to maintain social connections. They rarely took the initiative to seek information but rather acted as passive information receivers from friends and families. In addition, due to limited education and media literacy, many elderly women preferred to receive information through short videos re-posted on platforms such as *Tiktok* or news apps like 'Today's Headlines' (*Jinri Toutiao*. 今日头条) over text-based information. However, many of these videos prioritize entertainment over the news value and fact-checking. Numerous short video news clips were found to be false and were removed immediately after re-posting, resulting in the message shown as 'no longer existing' when clicked on later.

Interestingly, many respondents (No.5, 83; No.18, 65; No.19, 68; No. 20, 75; No.22, 68) expressed their caution about fake news, stating that 'we will not re-post any random news'. They also sometimes received warnings from children that 'some news is made to trick you, and you should not believe.' (不传谣 不信谣). But the chaotic information environment in the context of COVID-19 infodemic reinforced their vulnerability to fake news. Ironically, the rigid digital management, precisely, the strengthened information censorship by the Chinese government under COVID-19 encouraged misinformation sharing among the elders. The information blockade which involved information surveillance and control in many cases impelled the elderly to share unreliable information in an attempt to at least gain some (even distorted) understanding of the pandemic.

It is worth noting that the perceived gender roles of elderly women must be considered in relation to their desires to update their families with COVID-19 information, even if it was fake, which they saw as 'a way of expressing care and love' (No.9, 82). One respondent (No.2, 82) shared her experience of sending misinformation to her grandson who was in the United States when COVID-19 just started.

> I was not sure which type of news (would be useful), just sent whatever relevant (to my grandson), because around that time, the kid was there (in the United States), I was particularly concerned about the news reporting pandemic in the United States … My grandson told me nothing to worry … the news you sent was all exaggerated.

4.2. Contextualized negotiation of digitalized strategies

In the face of multi-faceted digitalized marginalization, the socio-economically constrained elderly women, on another note, engaged themselves in the exploration alongside the trajectory of evolving digitalization, albeit with limited agency due to contextual restrictions. We observed how elderly women dynamically enacted strategies, mediated by ICTs, to cope with various constraints, which allowed them to obtain a sense of autonomy in managing their emotional, social, and informational needs – all of which were distinctively necessary for this aging group. Notably, the goal of such empowerment was not necessarily focused on structural subversion for individual liberation or personal advancement, but rather on adapting to their situated structures – no matter in terms of aging, socio-economic status, gender, or local digital management scheme.

4.2.1. Simplified and necessitated digital usage

One noteworthy strategy is to simplify complex digital operations to the most essential and necessary functions. Elderly women explored their unique ways to navigate the limited number of accessible digital platforms and functions. This allowed them to negotiate solutions to satisfy their emotional and social needs to some degree and manage digitalized services during the pandemic. Notably, although such exploration was inevitably embedded in an interlocking system of multiple inequalities, these elderly women still made gradual progress and achieved trivial yet substantial improvements. While these digital practices might not entirely eliminate marginalization, they did provide a sense of autonomy and enabled the marginalized elderly women to make some progressive changes within the scope of their abilities.

One example is reflected in their response to enhanced digital management under COVID-19, especially the implementation of QR health codes. To overcome the technical challenges and memory limitations associated with finding and scanning QR codes, some respondents (No.1, 81; No.7, 75; No.16, 69) turned to 'preparing a screenshot of the QR code at home'. By including the date on the screenshot to demonstrate the updated status of the day, they were able to simply 'show this screenshot to the bus driver to pop on'. This approach not only resolved the technical issues but also helped those with limited budgets for cellular plan subscriptions.

Some strategies addressed emotional and social needs. In particular, we observed that elderly individuals in this group had a preference for visual communication facilitated by smart devices. Due to their restricted educational background and literacy as well as the declined eyesight, most respondents found it easier to watch short videos rather than written information. Although these short videos were normally sourced from TikTok or unreliable news outlets and often contained fake news and low-quality information, they served as vital sources for the elderly women to stay connected with the world outside their immediate surroundings, with which they had limited contact after retirement. These short videos also provided them with topics to chat about with their families and friends, and we could see their joy when sharing even seemingly ungrounded news during the interviews. For instance, one respondent enthusiastically talked about the video report about the lockdown lift in Xinjiang (No.11, 77), saying, 'Oh My God, (I saw) so many people running on the street. It was crazy.'

4.2.2. Community involvement

In addition to addressing individual needs, the connectivity enabled by ICTs facilitated the construction and development of a community among the elderly women, providing them with social and informational support. Diverse media platforms enabled a range of communication modes, allowing elderly women to stay in touch and reduce their loneliness. This resulted in an enhanced sense of community involvement, which was critical for elderly women whose needs and voices were often sidelined and overlooked by their family members and society at large.

To specify, many respondents reported the usage of WeChat messaging groups to maintain different social networks and relationships. For instance, the previously mentioned 'Sunset Glow

Friends' Group' included elderly women who used to work in the same place. The name, given by one of the key group members, represented an ideal life that was rarely expressed by marginalized elderly women in their daily lives – shining till the end of life.

This group extended a digital space gluing the elderly women together to share interesting news, casual chats, and technical advice. In the context of COVID-19 where offline banking was largely replaced with the online system, we observed they mutually supported one another to learn how to use such digital services. The more tech-savvy elderly women would first inform everyone in the group that 'salary has been released' and provide specific instructions on how to verify their online identity to receive payment. They always asked group members to 'send the screenshot (proving the accomplishment of online identity verification) to me' to ensure everyone was on the right track in real time.

In addition, elderly women also made use of this group space to share their complaints barely expressed in public, such as this one:

> So worried about not being able to collect the payment, only having two thousand or less per month, having to make an extra payment for smartphones, and moreover, putting on presbyopia glasses and asking for help, nodding, shaking, and blinking (for facial recognition) to prove that you are not dead yet.

The use of WeChat sports also provided an alternative way for elderly women to be informed about one another's health status. WeChat sports is a built-in mini-programme within WeChat that counts, records, and ranks (if opted-in) the number of steps taken by users daily. Elderly women innovatively made use of WeChat sports by tracking the number of steps of their elderly peers, thus gaining insights into their overall health conditions. One respondent stated (No.1, 81),

> If the steps (of my friends) become less (than usual) for more than three days, I need to ask them if anything goes wrong. I would wonder why they do not take a walk regularly these days, what's up, for what reasons.

In the meanwhile, respondents mentioned the heightened motivation to exercise and compete with their friends after using WeChat sports especially during the pandemic.

> During the lock-down, we walked at home, walked in my bedroom … I am so happy, so motivated to walk more. I hope I can walk a bit more and get more exercise. Sometimes I walk so much, even up to ten thousand steps (per day). (No.1, 81)

4.2.3. Better fulfillment of gender roles

ICT usage also enables a better fulfilment of traditionally defined gender roles. This finding resonates with prior studies that have shown how ICTs in a society with deeply embedded patriarchal systems could duplicate or extend the practices of traditional gender norms (e.g. Chib et al., 2014; Munyua, 2009). However, unlike prior studies that have normally categorized such ICT-mediated gender behaviors as disempowering, in the case of the elderly women, they in fact achieved a sense of empowerment through using digital affordances to play a better role as mothers and grandmothers. For many elderly women, the desire to care for family members acted as a primary motivation to adopt new digital technologies.

WeChat payment provides one such example. As mentioned above, due to financial concerns and restricted digital literacy, elderly women usually felt reluctant to initiate WeChat payment. However, many of them expressed an interest of using this function just for the purpose of sending remittances to their children and grandchildren. This is due to a mini programme called 'Red Pocket' (*Hongbao* 红包) integrated with WeChat payment through which users can transfer up to two hundred RMB in a virtual pocket. This programme allows a virtual extension of the traditional ritual of gifting pocket money to the younger generation during important festivals, such as the Spring Festival. Due to pandemic lockdown policies, many elderly women were not able to meet children and grandchildren in person to hand over the red pocket. Therefore, they were enthusiastically engaged in sending virtual red pockets on WeChat to fulfil their duties as 'a good

grandmother'. Despite restricted financial status, they still exhibited generosity, stating that they were 'so happy to do something for our kids, so much fun' (No. 12, 80).

In the same vein, the role of caregivers in a family also motivated some elderly women to explore alternative channels to seek information on the Internet. Although they did feel the necessity to adopt new functions due to the abovementioned intersectional factors, some elderly women were willing to overcome the digital obstacles to look for useful information for their families. Some respondents (No.7, 75; No.14, 69; No.17, 68) took the initiative to 'subscribe to public accounts on social media' or 'collect information on Baidu' to 'have a second opinion from the Internet'. One respondent (No.7, 75) shared a story of a conflict with her daughter regarding the vaccination for her grandson, which motivated her to search for relevant information online by herself.

> I searched on Baidu . . . not easy. I needed to write down every single step in my notebook (about how to use the search engine). But the information was crucial for my grandson's health. Then it was a great pleasure to do this.

5. Discussion

Our study extends the feminist approach of intersectionality to examine ICT for gender empowerment in an aging context of the Global South. The investigation is contextualized within the rapidly advanced digitalization that has been particularly pronounced during the pandemic, affecting both individual usage and systemic management by governmental platforms. This shift has led to an increased engagement of marginalized elderly women with digital technology. For these aging and gendered subjects, many were forced into the drastic digital transition across various facets of their daily lives ranging from social interactions to physical mobility. Our findings are intricately entwined with the context of the ongoing pandemic, which provides the essential background for our intersectional analysis of the digital practices of marginalized elderly women.

The findings reveal the dynamic interactions between aging, gender and other disparate social structures, giving rise to distinctive digital challenges and negotiations that elderly women are encountering. First, such intersections engender a complex network of physical, cognitive, emotional, economic, and gender constraints remarkably impeding their digitalization processes. The multi-faceted constraints often act in concert with more stringent digital management policies implemented during the pandemic. This has further transformed restricted digital access and literacy into an array of digitalized structural inequalities that are manifested in reduced independence, technologically-mediated physical immobility, and information restrictions.

Rather than viewing the marginalized elderly women as powerless victims, our study foregrounds their digitalized responses to cope with constraints, albeit often being restricted in nature. The findings reveal the integration of digital components into the structural intersections that produces nascent digital and social resources for agency negotiation. This is reflected in the enactment of strategies reserved for simplified and necessitated digital usage, which allows the elderly women to manage daily life routines during the pandemic, to maintain social connectivity and the sense of community, as well as to better fulfil their traditional gender roles.

Notably, our study provides a novel perspective on restricted agency in the field of ICT for gender empowerment. Previous research has predominantly framed agency among younger marginalized women in the Global South as the pursuit of personal desires and social autonomy, which often tends to lead towards an emerging self-consciousness (Chib & Chen, 2011; Nguyen et al., 2017). However, our findings suggest that for the elderly female group, the internalized biases and stereotypes associated with gender and age, the diminished socio-economic status and bargaining power in the households, as well as substantial cognitive and physical declines, are likely to further restrict their abilities in ICT usage compared to their younger cohorts.

This echoes the theory of cumulative disadvantages and inequalities throughout the life course, as proposed by Dannefer (1987) and Ferraro and Shippee (2009). Such disadvantages and

inequalities emerge at the intersection of aging and other factors operating in tandem to facilitate the accumulation of constraints in later life. This evokes a critical yet largely overlooked question – whether the digitally mediated empowerment demands a different conceptualization in the aging context of the Global South. For the elderly women, the sense of empowerment tends to stem from developing digital strategies for a better alignment with social norms and gender expectations, i.e. being a responsible mother and grandmother, a care provider, an obedient citizen.

6. Conclusion

Upon the ubiquitous encounters between aging and digitalization (e.g. Bakshi & Bhattacharyya, 2021; Pei & Fu, 2022), our study yields insights into the ongoing struggles and transformations negotiated in the flux of daily social activities of low-income elderly women in the Global South. While these dynamics often remain under the radar, they are progressively becoming an integral part of the digital fabric in developing countries, a trend that has been accentuated by the pandemic. A significant contribution of our study is to illuminate this subtle yet profound shift, deepening the comprehension of the contextualized challenges faced by the marginalized female elderly group and the construction of their unique digital culture. This enables us to address a critical gap left by previous studies that treat elderly populations homogeneously without drawing attention to their gender disparities (e.g. Bakshi & Bhattacharyya, 2021; Cibangu, 2020; He et al., 2020) and research in ICT for gender empowerment that often neglects nuances related to aging (e.g. Hafkin & Huyer, 2008; Hilbert, 2011).

Our study proposes a typology that can be easily extended beyond the context of China and utilized as a guiding framework to unpack the digitalization processes of marginalized elderly women in other contexts of the Global South. This typology offers an array of dimensions to comprehend the constraints as well as the potential for agentic actions. Grounded in empirical evidence demonstrated in the findings, the typology indicates that constraints can be measured through reduced independence, immobility, as well as the quality of accessible online information, while the agency can be interpreted through the ability to engage with essential online services, digitally-mediated social connectivity, as well as the management of social and emotional needs through digital usage.

Our study also contributes to integrating aging as a critical axis in the intersectionality, therefore broadening the scope of this approach to more effectively capture the gendered social constraints imposed on digital practices in an aging context. In particular, we theorize aging as a biological process, and simultaneously, a social construct deeply embedded in contextualized political-economic structures and cultural systems (Alejandria-Gonzalez et al., 2018; Holman & Walker, 2021). We examine how aging significantly alters and shapes the intersectional structures, affecting digital adoption and usage via introducing new constraints such as cognitive and physical declines as well as biases and stereotypes associated with age.

This allows for a more nuanced conceptualization of digitally-mediated gender empowerment in the aging context of the Global South. Such empowerment not only transcends the Western feminist notion of gender equality (e.g. Butler, 2004) but also deviates from the goal of deploying digital devices to pursue personal desires and embrace self-consciousness which is often observed among the relatively young marginalized female groups (e.g. Pei & Chib, 2021). Instead, the shifted life priorities, deeply internalized social expectations and gender norms throughout their lifetime, in conjunction with a further reduced agency, are likely to shape the focus of the elderly women that is more about securing adaptation to the digitalized social environment and using digital devices to accommodate themselves with social orders to avoid further exclusion.

Our study also demonstrates certain limitations. We primarily focus on the intersection of aging, gender, socio-economic status, and digital management policies during the pandemic. While these factors are crucial, they might not fully encompass the various social stratifications that inform the

diverse digital struggles of elderly women in different marginalized contexts. For example, future research can consider additional factors such as the rural-urban divide and racial/ethnic disparities, which can further differentiate the digital experiences and agency of the low-income elderly women in the Global South.

Our qualitative methodology has afforded rich, detailed insights into our respondents' experiences, yet future studies could benefit from a more expansive sample size to improve representativeness. Additionally, incorporating quantitative techniques could yield a more comprehensive view of the digital experiences across diverse aging populations in the Global South.

Further investigations might also benefit from a more granular classification of age categories. While our study adheres to the United Nations' definition of the aging population, focusing on elderly women above sixty years old, we recognize that such a broad categorization may overlook subtle yet important variations in technology engagement between younger seniors and their more senior counterparts. Additionally, forthcoming research could intensively explore the digital engagement of individuals who just started adopting mobile phones during the COVID-19 era. This might enable the examination of a more significant digital gap within the elderly group.

Lastly, we propose that longitudinal studies could be instrumental in tracking the dynamic process of digital adoption among the elderly. The longitudinal approach can reveal the continuous adjustments and agency negotiations, providing valuable guidance for researchers and policy decision-makers designing policies and interventions that support the ongoing learning and adaptation processes of the elderly.

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No potential conflict of interest was reported by the author(s).

Notes on contributors

Xin Pei (Ph.D. from Nanyang Technological University) is a lecturer at School of Culture and Communication, The University of Melbourne. Her research focus lies in examining the social consequences of adopting information and communication technologies (ICTs) in the context of marginalization. Her research adopts an interdisciplinary approach to investigate the (dis)empowerment brought about by the adoption and usage of ICTs in different contexts encompassing gender, aging, racism, and so forth. Her research works have appeared in leading journals such as New Media & Society, Journal of Ethnic and Migration Studies, Information, Communication & Society, Continuum: Journal of Media & Cultural Studies.

Zhen Troy Chen, PhD, FHEA, is a Senior Lecturer in Media, Department of Media, Culture and Creative Industries at City, University of London. His research interests are in digital media and cybernetics, cultural and gender studies, cultural and creative industries, China and Asia studies. He is the author of *China's Music Industry Unplugged* and co-editor of *Identity, Space, and Everyday Life in Contemporary Northeast China*. He has widely published in *Journal of Consumer Culture*, *International Journal of Cultural Policy*, *Ethics and Information Technology*, *Social Semiotics*, *Asian Journal of Women's Studies*, *Asian Studies Review*, *Feminist Review*, *Journal of Chinese Sociology*, *Global Media and China*, *IEEE Transactions on Professional Communication*.

Lina Zhang is a lecturer in Operations Management at the University of Exeter Business School. Her research interests focus on retail operations in the digital era, particularly concerning the omni-channel retail operations and operations management with social technologies. Her research has been published in the European Journal of Operational Research, International Journal of Production Economics and Transportation Research Part E: Logistics and Transportation Review.

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Appendix

Semi-structured interview guide

Demographic information

1. What is your age?
2. Do you have a smartphone?
3. When did you start using smartphone?
4. May I know your annual income?
5. Are you staying alone?

General smartphone usage

1. Did you buy your smartphone by yourself?
2. What are some of the most common ways that you typically use the smartphone for, such as communication, entertainment, or other purposes?
3. Who do you contact the most frequently using your mobile phone?
4. What are your most frequently used functions?
5. How did you learn how to use these functions?
6. Besides the functions mentioned earlier, are there any other smartphone functions or features that you have not explored or used before? If so, why?
7. What was the last activity you used your smartphone for?
8. Could I take a look at your phone?

Smartphone usage during pandemic (constraints and agency)

1. Did the COVID-19 pandemic have an impact on how you use your smartphone? If so, in what ways?
2. Can you please give more specific examples?
3. Can you specify the challenges (e.g. age, financial status, digital literacy, short of support, etc)?
4. How did you respond to the challenges?
5. Whether you can get any support and help, e.g. from your family relatives, friends, and others?