Master's Thesis

"We Don't Need These Fancy Things": Exploring the Perceptions of Marginalized Older Adults Towards a Community-Based Digital Intervention in Singapore

Si Yinn Lu

Certificate: Social Determinants of Health

Thesis Type: Research Report

Thesis Sponsor: Professor Kim Hopper, PhD

Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University, In partial fulfilment of MPH degree requirements, for graduation May 2021

Human Subjects Protection Statement

This research is part of a multicenter study, where Singapore General Hospital, Singapore, and Columbia University, New York, are the study sites. This evaluation reports on data collected by a researcher at Columbia University and the study team at Singapore General Hospital. All data was collected outside of Columbia University. The study was reviewed by the Institutional Review Boards of both study sites. Approval was granted from the SingHealth Centralized Institutional Review Board, Singapore (Ref No.: 2020/2722, Low Lian Leng, Principal Investigator) on August 30, 2020, and the Columbia Institutional Review Board (Ref No.: AAAT5212, Marita Murrman, Principal Investigator) on January 22, 2021.

Table of Contents

"When habitus encounters a social world of which it is the product, it is like a 'fish in water': it does not feel the weight of the water, and it takes the world about itself for granted."

(Bourdieu & Wacquant, 1992, p. 127]

Abstract

The Seniors Go Digital program was launched in 2020 as part of the Singapore government's plan to increase digital uptake among older adults. It sought to ensure they remain socially engaged, informed and are not left behind in the nationwide push for digitization. Project Wire Up is a community-based digital intervention that provides subsidized smartphones and one-to-one coaching on digital skills to older adults residing in public rental neighborhoods in Singapore. This exploratory study uses phenomenological and ethnographic approaches to examine older adults' perceptions towards Project Wire Up, particularly how their attitudes and behaviors towards learning smartphones are shaped by experiences of aging, social and material precarities. Semi-structured in-depth interviews were conducted with 9 participants who had completed the intervention. Although older learners expressed varying levels and types of motivation to learn, most expressed ambivalence about the perceived utility and relevance of the smartphone to their present needs, routines and priorities. In terms of barriers to learning, participants articulated two key challenges. These were: (i) anxieties about age-related cognitive and physical limitations; and (ii) self-consciousness about their socio-economic positioning, illiteracy, language barriers, and lack of cultural capital relative to other older adults. The internalization of class-related stigma and ageist stereotypes of being 'less worthy' learners further reduce self-efficacy and interest in learning. To increase the appeal and transformative potential of smartphones for older adults, implementers must develop ways for digital tools to be meaningful to the daily lives of older adults, such as through creating opportunities for sociality and relationship-building. Learning spaces should normalize ambivalence and learning challenges, while helping older adults to confront their own ageist stereotypes. These strategies must be complemented by broader structural efforts to expand definitions of successful aging that do not alienate or stigmatize those who may be unwilling or hesitant about partaking in the 'digital movement'.

Keywords: Elderly; Older Adults; Community; Smartphones; Digital; Technology; ICT; Precarity

Acknowledgements

I am indebted to the individuals who have welcomed me into their homes, and shared with me their life stories, of their becoming and overcoming, struggles, sources of strength and joy; these shared intimate spaces and presence have been deeply affecting and cherished.

I would like to thank Professor Kim Hopper, for his wise counsel and affirmation, and for facilitating spaces, through his classes, to engage more actively, to think more deeply, to take good notes, to question our assumptions, to be unafraid of failing, and to build our very own "handbook" for a lifelong pursuit of this work. I am also grateful to be learning alongside like-minded and passionate classmates in the SMS department, whose voices have inspired me to hone my own.

My deepest gratitude to Dr. Ad Maulod, my forever mentor, whose brilliance, perceptive guidance, and friendship have transformed me. Thank you for inducting me into the world of qualitative research and its immense possibilities, since the days we spent in the homes of older adults at Chin Swee. Bearing witness to your mastery of this craft has inspired me to walk this path. Thank you for believing in me.

My heartfelt appreciation to A/Prof Low Lian Leng for his support of my thesis and work, and for paving the way for research on social determinants of health in Singapore's healthcare setting. This work was partially financially supported by the SingHealth Duke-NUS Family Medicine Academic Clinical Programme (FM ACP) Seed Grant.

Finally, I would like to thank my family and friends for their unending support, for creating a home and refuge that enabled me to further my passion. Your love carried me through this journey.

1. Introduction

Globally, older adults received close scrutiny during the COVID-19 pandemic – in addition to confronting greater risks of COVID-related hospitalization or death (CDC, 2020), prolonged periods of lockdown and social distancing measures have exacerbated feelings of loneliness, social isolation, anxiety, grief and fear amongst older adults. Recent research suggests that this stems from an increased susceptibility to experiencing reduced social interaction and engagement, limited access to basic necessities and support, ageism, mistreatment, reduced mobility and misinformation (Harden et al., 2020; Banerjee, 2020; Wang et al., 2018; Sepúlveda-Loyola, 2020; Armitage & Nellum, 2020). Loneliness also amplifies the burden of physical and mental health, as it is associated with increased risks of morbidity, functional and cognitive decline, and all-cause mortality (Coyle & Dugan, 2012; Luo et al., 2011; Perissinotto, et al., 2012).

In Singapore, heightened safety measures were implemented from April to June 2020 in a bid to curb widespread COVID-19 transmission and skyrocketing cases in the community. During this period, non-essential services were shuttered and movement in public spaces was significantly curtailed, with harsh penalties meted out for those who flouted these regulations. In particular, multiple incidences of older adults contravening safe distancing rules circulated in the media, drawing critiques that this age-group was being "ignorant", "socially irresponsible" and "stubborn" (SMU, 2020). Others countered that attention should be paid to the underlying reasons for this occurrence rather than "scapegoat" vulnerable groups for compromising community safety (Wong, 2020). Some reasoned that older adults disproportionately struggle to adhere to self-isolation requirements because they are less able to obtain information about the constantly changing social distancing rules (SMU, 2020). For older adults who lived alone, social connectedness was also primarily maintained through interactions outside their household, in public spaces like markets, coffeeshops and community centers that had become heavily monitored during the lockdown (Asokan, 2020; Basu, 2020).

As a majority of the populace turned to digital means to maintain social ties, keep up to date with the news and for purposes of leisure, a widening digital divide by age became increasingly palpable (Wong, 2020; Schlomann et al., 2020). Older adults were of particular concern as they were the least technologically savvy relative to the rest of the population. Based on figures from a 2019 survey by the Infocomm Media Development Authority (IMDA) Singapore, 58 percent of residents above 60 years old are Internet users compared to 89 percent for all residents (Chan, 2021). Moreover, studies demonstrated that Singaporean older adults who used communication technology (e.g., social media, phone calls, text, or smartphone apps to video call others) during the lockdown reported higher levels of satisfaction, well-being and a lower sense of social isolation as compared to those who did not utilize these tools (Goh, 2020).

This gap became an impetus for a slew of government programs to encourage smartphone adoption among older adults, in a bid to promote greater independence and reduce social isolation (Basu, 2020; Asokan, 2020). These programs were in line with the country's "Smart Nation" objectives to "empower (individuals) to live meaningful and fulfilled lives, enabled seamlessly by technology" (Smart Nation Singapore, 2020). The Seniors Go Digital program was launched in May 2020 and aimed to "help seniors embrace digitization so they can lead engaged, informed and fulfilling lives" (IMDA, 2020). As part of this program, SG Digital community hubs were set up at various community centres and public libraries across the island to provide one-on-one guidance for older adults to learn basic digital skills like communication tools, accessing government services and e-payment tools (Chan, 2021; IMDA, 2020).

At the same time, there was heightened attention to a sub-group of older adults who lived alone in public rental housing, had limited social and financial support, and were perceived to be at a greater risk of becoming increasingly "estranged" and "displaced" in a digital world (Wong, 2020). While majority (79%) of the population in Singapore reside in public housing, of which 94% are owner-occupied, the remaining 6% are public rental housing, which account for 3% of the population (Ng, 2020). Public rental housing units, a sensitive indicator of area-level socio-economic status in Singapore, are heavily subsidized flats that cater to lower-income households where the total household gross income should not exceed $1,500 per month (Ng, 2020). By comparison, the median household income among resident employed households in Singapore is $9,425 (DoS, 2014; Low et al., 2016). Older residents in public rental flats face higher risks of frequent hospital admission and re-admission, higher utilization of hospital and Emergency Department (ED) services, and longer lengths of hospital stay (Low et al., 2016). Living in rental flats has also been correlated with poorer physical and mental health, including poorer cognitive function and higher depression rates among the elderly (Wee et al., 2019). In addition to shouldering a higher disease burden, they confront economic deprivation, a lack of social support in case of need, and feelings of social isolation and alienation in a cosmopolitan city-state.

To address the specific needs of marginalized older adults, Project Wire Up (henceforth referred to as "Wire Up") was established in April 2020 after lockdown measures were eased. The project's aim was to improve digital literacy and social connectivity among older adults living in public rental neighborhoods proximal to Singapore General Hospital (SGH), and patients who were discharged from SGH's Hospital-to-Home (H2H) program, a transitional care intervention for frequently hospitalized patients with complex health and social needs (SingHealth, 2020). The project was based in the central region in Singapore, where majority of older adults live in public rental neighborhoods and have limited social and financial support. As part of the intervention, smartphones are provided at subsidized rates to these individuals. Over the course of two months, volunteers conduct one-to-one coaching on digital

skills such as making video calls, connecting to Wi-Fi, performing online purchases, and using government services, depending on the preferences and competencies of individual participants. Sessions are held at irregular intervals depending on the preferences of each volunteer-senior pairing.

Many studies have discussed the impacts and benefits of digital devices on older adults' well-being. However, there is limited inquiry into how older adults living in marginalized neighborhoods perceive digital interventions. In examining this issue, it is important to consider how older adults' social and material circumstances as well as environmental conditions shape their self-perceptions and experiences of smartphone usage. Such an approach will be useful in understanding the factors that influence attitudes towards the adoption of technology. This paper thus hopes to explore older adults' perceptions of Wire Up and analyze how those perceptions relate to the socio-structural contexts in which they are embedded. This thesis will be guided by four specific objectives:

(1) To explore the perceptions of Wire Up among older adults 50 years old and above living in low-income neighborhoods;

(2) To observe the influence of housing, financial, health and age-related precarities on the attitudes, preferences, needs and behaviors pertaining to smartphone usage;

(3) To identify gaps in research, program and policy that are related to facilitating vulnerable older adults' engagement with digital devices; and

(4) To develop key strategies and recommendations for designing digital interventions that are tailored to the needs and socio-structural circumstances of vulnerable older adults.

2. Background & Significance

2.1 Terminology

This paper will focus on older adults' perceptions of smartphones through the Wire Up program. "Smartphones" refer to a web-connected mobile device with features similar to that of a computer. Beyond making phone calls, it enables Wi-Fi connectivity, web browsing, and the running of third-party applications (TechTerms, 2020). Smartphones, like computers, social networking, video-conferencing tools and other media applications, are examples of Information and Communication Technologies (ICT). ICT allows users to access, store or transfer information in a digital manner (AIMS, 2020). While the findings in this paper will be centered on smartphone usage, the literature review section will provide a broad overview of existing research regarding the impact of ICT use on older adults.

2.2 Impact of ICT on Older Adults

The benefits of ICT on the health of older adults have been widely debated. Some studies have demonstrated that ICT use is associated with various positive psychosocial outcomes, including an increased sense of safety, independence, feelings of control, self-esteem and self-efficacy (Damant et al., 2017; Jarvis et al., 2019, Klimova & Poulova, 2018; Berg et al., 2017). This has been attributed to how ICT promotes better access to information and services online, critical thinking and decision-making, processes which in turn improve self-perception and life satisfaction (Chen & Schulz, 2016). Learning to use the phone was also reported to enhance older adults' cognitive functioning in areas such as memory and alertness (Shapira, 2007; Jarvis et al., 2019).

However, the impact of ICT on alleviating feelings of loneliness was inconclusive – while some studies found that ICT use decreased loneliness and social isolation by increasing social contact, support and engaging in activities of interest (Hülür & Macdonald, 2020), others found nonsignificant or short-term impacts (Chen & Schulz, 2016). Contrarily, Yu et al. (2020)'s longitudinal study points to a longer time taken for the positive effects of ICT to be achieved - as Internet usage among older adults aged 55 years old and above in the United States increased over time from 2006 to 2014, reported loneliness decreased over this 8-year period. Internet use may also only contribute to an increase in quality of life if moderated by other factors such as time spent with family members (Khalaila & Vitman-Schorr, 2018). Other authors have suggested a more nuanced picture – whether mobile phones facilitate greater interpersonal relationships or exacerbate feelings of loneliness depends on the purpose of phone usage: use of mobile phones for sociability was associated with reduced loneliness, while using them for entertainment or to pass time increased loneliness (Wang et al., 2018). Qualitative studies examining the impact of ICT have documented that the outcomes of ICT use are often ambivalent and cannot be categorized simply as 'positive' or 'negative'. For example, in the context of migration, a qualitative study situated in South India showed that ICTs helped to reformulate elder care when young women who migrated abroad for work regularly communicated with their elderly parents via ICT (Ahlin, 2017). Findings indicated that the use of ICT may to an extent "mitigate feelings of abandonment" among elderly parents by "transform(ing) geographical distance into intimacy" and creating "feelings of closeness", albeit it can never be a substitute for face-to-face contact.

2.3 Diverse Attitudes towards ICT

Studies have documented heterogeneity in terms of older adults' perceptions of ICT. A study of older adults residing in rural and suburban areas in UK and Canada revealed that those living in rural areas perceived ICT more positively because it enabled them to stay connected with kin and receive information via social media (Marston et al., 2019). In Singapore, a survey of smartphone usage among older adults showed that they generally had positive attitudes towards smartphones, finding them

entertaining and useful for communicating with friends, playing games, and overcoming feelings of boredom (Pang et al., 2014).

However, many studies have found that older adults have less favorable attitudes, such as feelings of heightened fear and anxiety, towards technology (Chen & Chan, 2011). Common barriers cited include negative self-perceptions of skills and competencies (Jarvis et al., 2019), cognitive and psychomotor functions that decline with age (Atlas et al., 2020), visual and hearing impairments or other physical losses that makes it difficult to utilize digital devices or acquire digital skills (Paragas et al., 2010; Olphert & Damodaran; Chen & Schulz, 2016; Schlomann et al., 2020), or a general lack of interest in technology use (Marston et al., 2019). Feelings of apprehension also stemmed from concerns about privacy, safety, and the fear of not being able to keep up with the pace of technological change (Marston et al., 2019). Costs and design features of ICT devices, such as display screens that are challenging to navigate, small icons and overall "low levels of graphic design adaptation" to the needs of older adults may inhibit access altogether (Urban, 2017; Levy & Simonovsky, 2018). McDonough (2016) postulated that older adults' overall feelings of low self-efficacy and discomfort surrounding ICT use stem from the internalization of ageist stereotypes that portray them as "inflexible" or unable to "adapt to new ideas and to use the Internet"; these messages contribute to older adults' beliefs that efforts to learn ICT will be unproductive or "embarrassing".

Sociodemographic factors like age, income, education, gender, disability status, immigration status and urban/ rural residence, result in "distinct positionalities of privilege and disadvantage" that shape a heterogeneity of attitudes and behavior, including technological access, acceptance, perceived usefulness/ benefits, and utilization among older adults (Fang et al., 2019; Wang et al., 2018; Klimova & Poulova, 2018). Studies in the United States and Singapore have consistently stated that adults with higher incomes, across all age groups, tend to adopt ICT earlier and more extensively compared to those with lower income (Paragas et al., 2010; Chakraborty & Bosman, 2005). In the Pew American Life Project, Internet use was lower among those who were older, less affluent, part of a minority group, less educated, living in rural areas and old-old (Hülür & Macdonald, 2020). Studies have also demonstrated that while low-income individuals have increasingly had opportunities to use technology due to widespread diffusion of ICT, they do not use this access (Jensen et al., 2010).

2.4 Perceptions of Low-income Older Adults towards ICT

There are limited studies in the literature examining low-income older adults' perceptions of ICT. One qualitative study examined the perceptions of low-income older adults towards Internet use and found that participants commonly encountered challenges like poor literacy, lower sense of self-efficacy, fears of cybersecurity, poor connectivity, limited access to skills training and limited prior experiences with technology (Kim & Gray, 2016). While no studies in Singapore have centered on low-

income older adults' experiences of ICT usage, Tan and Chan (2018)'s qualitative study on older adults' perception of ICT highlighted that narratives surrounding fear of ICT and "socioeconomic inferiority" were particularly salient among participants of lower socio-economic status. These anxieties stemmed from feeling "compelled" to use OCT, prior negative experiences with technology, "linguistic inadequacies" and costs of earning a smartphone (Tan & Chan, 2018).

Other studies have focused broadly on the experiences of ICT among adults living in deprived communities. Kearns and Whitley (2019) found that while the Internet provided avenues for social interaction and social support, Internet access was not associated with an increase in sense of community belonging and empowerment among participants from 15 deprived communities in Glasgow, United Kingdom (UK); participants did not feel like they could use technology for collective organization or augment their ability to influence decisions or improve matters in the community, as compared to the middle-class who are able to harness the benefits of technology for political decision-making and the use of public services. Additionally, Clayton and Macdonald (2013)'s study on the experiences of technology adoption among marginalized groups residing in socially excluded neighborhoods in Sunderland, UK, demonstrated that digital inclusion does not necessarily translate into social inclusion. While there was increased access to information, engagement in technology did not translate to improvements in social mobility, such as in the realms of educational achievement, social mobility, or local civic participation (Clayton & Macdonald, 2013). Newman et al. (2012)'s study on access to ICTs among low-income residents in South Australia also highlighted that inequalities in digital access are often intertwined with social and health inequalities, with communities that have low Internet use also experiencing higher rates of chronic diseases. Moreover, as health services and governments increase the "level of digitally mediated information and communication", there is a need to address social, health and digital disparities without burdening or pressuring communities to adopt technology in ways that could amplify "stigma, distrust and feelings of losing control" (Newman et al., 2012).

2.5 Aging, Precarity and ICT Use

Precarity refers to the experience of uncertainties, insecurities, and constraints in daily life that places one in a situation of risk and vulnerability (Bates et al., 2019; Grenier et al., 2017). Older adults in this study experience a confluence of intersecting social, financial, and environmental precarities that shape their perceptions of community-based interventions. Public rental housing in Singapore is a form of precarious housing, which is characterized by poor housing quality, hostile living conditions, an insecure tenure, and an overall failure to meet the needs of the individual or household (Bates et al., 2019). While rental flats in Singapore are heavily subsidized, residents experience stigma and exclusion, a lack of safety, poorly maintained public spaces and perceived higher levels of surveillance (CARE,

2020). Living in precarious housing has been found to adversely impact older renters' sense of safety, security, physical and mental well-being, life satisfaction, social connectedness, sense of place and quality of life (Bates et al., 2019). Older adults residing in precarious neighborhoods not only have to confront aging-related precarities/ stressors, including reduced independence, mobility, co-morbidities, sensory impairments, and age-related stereotypes; they also have to grapple with other forms of insecurities like living alone, inability to afford basic living costs, and a "self-consciousness" about living in a marginalized community (Wacquant et al., 2014; Bates et al., 2019; James et al., 2020).

While studies have documented the unequal access/ usage of ICT as shaped by class, gender et cetera, no studies have sought to assess older adults' perceptions towards ICT use through the lens of 'precarity'. Because the experiences of precarities are embedded in older adults' everyday lives, we postulate that ICT learning introduced in this setting will be patterned by the social, structural, and environmental dynamics specific to this context. In Singapore, only one quantitative study has hinted at the intersectionality of social and aging precarities in hindering ICT use. A national survey among 4,000 older Singaporeans in 2016-2017 found that those who were male, of Malay ethnicity, less educated, and who experienced limitations in Instrumental Activities of Daily Living were more likely to encounter difficulties in Internet usage due to poor health (Ang et al., 2020). This suggests that older adults with a lower-education are less likely to use the Internet, and encounter health-related challenges when they do use it (Ang et al., 2020).

2.6 Study Significance

Experiences of places, settings and social-material circumstances contribute to people's motivations, preferences, and expectations of a digital intervention. While some studies have explored the attitudes of individuals living in deprived communities towards ICT use, there is a dearth of studies examining the perceptions of smartphone learning among low-income older adults and exploring how these beliefs/ behaviors are place-based and locally embedded. Additionally, while one qualitative study discussed older Singaporeans' perceptions of challenges encountered using ICT, the study did not center the analysis on the perceptions and experiences of a community-based digital intervention among low-income older adults and contextualize these narratives within a framework of precarity. Therefore, this thesis aims to address this gap by exploring how older adults' attitudes towards a community digital phone intervention are influenced by and intersects with their experiences of 'multi-layered precarities', such as aging-related challenges and income insecurity. As increasing amounts of resources continue to be channeled towards 'wiring up' low-income aging communities to ensure that they are not excluded from the digital sphere, it is imperative to understand their needs, behaviors and perceptions towards these digital tools and the contextual conditions in which these views emerge. Findings from this study may inform the design and implementation of appropriate interventions/ policies that promote the use

of technology in ways that are aligned with older adults' existing needs, routines, and dispositions, and which facilitate, rather than disrupt the achievement of healthy and successful aging goals. Moreover, knowledge of older adults' perspectives can urge a re-think of dominant narratives that view 'going digital' as a necessity and which shame/ stigmatize older adults for failing to be 'plugged in' to technological innovations.

2.7 Theoretical Framework

Bourdieu (1984) argued that people's relations to their body are deeply anchored in their social and material conditions of existence, where people's practices and habits reflect their positions in the larger social structure. Practice is the result of various habitual schemas and durable dispositions (habitus), combined with resources (capital) and activated by certain structured social conditions (field) (Crossley, 2001). Habitus comprises the embodiment of social norms, understandings and patterns of behavior that are structured by the social, cultural, and political contexts that individuals are embedded in, influencing them to think and operate in the world in one way and not others (North et al., 2008). The habitus also exists within a field, which comprises relationships, networks, and events where individuals experience power differently depending on the environment they are in (Navarro, 2006; Bourdieu, 1984). In this context, older adults' differing abilities, reception towards ICT use and its perceived benefits/ utility can be attributed to unequal access to social, cultural, and economic capitals, that predisposes some individuals to perceive its importance more than others. However, the accrual of economic capital is not an adequate predictor for engagement in technology; without the necessary knowledge, skills, and ability (cultural capital) to utilize technology in ways that are "socially valued" or "productive", individuals may find it difficult to meaningfully engage in technology (Clayton & Macdonald, 2013). Thus, both habitus and capital, which are molded by one's social positioning, make decisions to use or value technology "more natural" for some groups than others (Urban, 2017).

For example, Colombo et al. (2015)'s survey of ICT usage among Italian older adults found that individuals who were more likely to own and use ICTs had greater economic capital (financial stability), cultural capital (higher levels of education), used computers during their professional working careers, and social capital (satisfying social relationships). This meant that the use of digital technologies had "penetrated (their) everyday life" and relationships, allowing for digital practices/ know-how to be continually reinforced and sustained throughout their life course (Colombo et al., 2015). The notion that ICT adoption/ acceptance is a "situated practice", influenced by socio-cultural, historical, political, economic and environmental contexts, was also underscored by Tan and Chan (2018)'s study on older Singaporeans' attitudes towards ICT; the authors argued that access to social and cultural capitals like educational background, linguistic and supportive social networks shape an older adult's habitus within the ICT field and facilitate/ constrain particular "actions and thoughts"

around its use. The significance of 'habitus' in affecting the acquisition of digital practices was also established in other age groups. North et al. (2008)'s case study of Australian youths' use of digital technologies in their everyday lives demonstrated that technology use, or "digital tastes" among students is patterned by their social backgrounds, including their parents' educational attainment, occupation and geographic location. While all participants had similar access to technologies at home and comparable levels of knowledge about ICT, those who were accustomed to utilizing ICT for educational and learning purposes in their home environment, rather than for "play", had dispositions that facilitated an interest and continued acquisition of cultural capital through technology practices in school (North et al., 2008).

Individuals' personal histories and socio-structural circumstances can shape their habitus in ways that limit or enhance their self-efficacy, ability, and interest in ICT use (North et al., 2008). Among individuals who do not have prior experiences of or limited access to ICT, exposure to a new digital intervention may disrupt their existing habitus and produce a sense of "dissonance" (Aitken, 1992). Aitken (1992) describes this dissonance as a disruption in the person-environment homeostasis, in which equilibrium is achieved only through the realignment of habits and norms. Therefore, Bourdieu's framework of habitus was relevant to this study's primary aim of exploring and assessing participants' perceptions of smartphones, and how it is inextricably linked to their everyday experiences of multiple precarities and past life histories.

3. Methods

3.1 Overview

This qualitative research study was part of a larger mixed-methods study (n=400) conducted to evaluate the impact of Wire Up on older adults' socio-emotional well-being, quality of life and acceptance of digital technology. Supported by the Trigenerational Project and Singapore General Hospital, ethical approval to conduct the research was obtained from the SingHealth Centralized Institutional Review Board (Ref No.: 2020/2722) and Columbia Institutional Review Board (Ref No.: AAAT5212).

3.2 Research Design

The study design draws upon phenomenological and ethnographic approaches by seeking to explore and interpret the shared patterns of understanding, experiences, and meanings attributed to a common phenomenon (i.e., digital smartphone intervention) among older adults living in public rental housing neighborhoods in Singapore. Participants' beliefs, attitudes, preferences, needs and behaviors pertaining to the usage of digital devices will also be contextualized within the social, cultural, structural

and environmental context in which they are situated. Semi-structured in-depth interviews were conducted with older persons who had completed the Wire Up intervention.

3.3. Participant Recruitment

The qualitative research team worked closely with the Wire Up implementation team to recruit eligible study participants who were 50 years and older and have successfully completed the program. Completion was determined by program volunteers who assess participants to be sufficiently competent in smartphone usage, or have met the learning objectives identified by the participant at the start of the program. The implementation team referred suitable participants to the study team, who then contacted participants via telephone to ask if they were interested to partake in the study. Interviews were then scheduled with interested participants depending on their preferred date and time. The qualitative study plans to recruit a target of 35-40 participants from the larger quantitative study, with 9 participants having been successfully recruited at the point in which this thesis is written. Between December 2020 and January 2021, the study team conducted 9 interviews (n=9) at the field site at various public rental housing estates in Central Singapore (Bukit Merah, Lengkok Bahru, Henderson Road), where majority of the participants reside. A diverse sample of participants, in terms of ethnicity, sex and language spoken, were recruited to reflect the heterogenous older adult population in Singapore. Participant recruitment is ongoing at the time of this report, and so the results presented here are necessarily partial and provisional in nature.

3.4 Data Collection

The study employs ethnographic research methods, primarily in-depth interviews, to capture participants' experiences and perceptions of the program. Interviews usually lasted between 45 minutes and 1.5 hours, averaged 1 hour, and were conducted in English or local dialects (Mandarin, Cantonese, Hokkien and Malay). Participants were asked about their life histories, daily routines, the challenges they faced during the COVID-19 lockdown, support received, the meanings associated with smartphone and telehealth usage, and their experiences, impact and challenges from participating in Wire Up. The study team interacted with participants in their homes or at the open spaces on the ground floor of the public rental housing blocks, with appropriate social distancing measures in place. While the interview closely followed the semi-structured interview guide, the interviews were also largely conversational and participant-led, and came from a position of learning more about participants' experiences, to minimize the power dynamics between the researcher and older adults as subjects.

3.5 Data Analysis

All 9 interviews were audiotaped (with participant consent), transcribed and translated from local dialects to English. The transcripts were then uploaded to and coded using the qualitative computer

program NVivo 12. Data was analyzed using a reflexive thematic approach (Braun & Clarke, 2019). I first read all the transcripts to familiarize myself with them and obtain an overall impression of the data. Potential categories and preliminary themes were identified and initial codes generated were transferred to the NVivo software. Initial codes were derived using deductive and inductive coding methods – the former was informed by key sections of the interview guide, and the latter comprised codes that identify regularities in ideas and other emergent themes that may be relevant to the research problem. Constant comparative analysis was undertaken to compare the interview data to emerging categories, to determine consistency in coding, creating and refining categories when the data did not fit into particular categories. Memos were regularly written alongside the coding process to aid in the identification and review of analytic categories, and establish connections across major themes. This coding process helped the researcher comprehend how meanings attributed to the intervention are influenced by participants' everyday experiences, challenges and self-perceptions. To maintain confidentiality, pseudonyms have been assigned to each participant and will be used throughout the paper.

4. Findings

4.1 Beneficial but Irrelevant: Feelings of Ambivalence towards Smartphone Use

4.1.1 Pre-Program Expectations

More than half of the study participants (n=6) expressed that they came to know of the Wire Up program through telephone calls by the Senior Activity Center (SAC) (50%) or during visits by community nurses (20%). The SAC, managed by a community service provider, is located on the ground floor (termed "void deck") of rental housing estates in Singapore. Older adults are encouraged to socialize with their peers and participate in "active aging" activities at the SAC, including art and craft, exercise, and karaoke (AIC, 2021). When asked about the reasons for registering interest, majority of participants described their initial hesitation towards partaking in the intervention. On one hand, they recognized that phone ownership can accrue benefits like "convenience", keeping up to date with technology, "safety" and "communicating with others". On the other hand, older adults' knowledge of the advantages of smartphone usage did not necessarily mean that they believed a smartphone would be a productive and meaningful addition to *their* lives or would override their existing doubts about utilizing the smartphone. For example, Mdm. Y recognized that it was a rational, even commonsensical measure to have a phone in case she needed help in the event of an accident; however, she expressed reservations about whether the smartphone might be the most suitable tool for older adults like her.

> I think it's good for senior people like us living here alone to have a phone in case there's any emergency you know, because you see here so quiet, nobody, that's why we have to use a phone, but the smartphone is very sensitive, all of us are poor, no education…Luckily, I know a little bit (but) I also don't have education when I (was) small…that's the trouble. [013; Mdm. Y]

Other participants explained that they were reluctant to participate in the program at the onset because they doubted the applicability/ utility of the phone in relation to their lives, but gradually relented at the persistent persuasion of others. For example, Mdm. C opined that she does not need a smartphone because others can conveniently reach her via telephone (landline); she is also not accustomed to bringing her cell phone out during her morning trips to the market because of its proximity, and trips to places further away are often in the company of others who have their phones. The way she rationalized a lack of "need" for the phone contrasts that of the reasoning presented by the nurse who urged Mdm. C to purchase the phone.

> I don't feel much (about the program), but Alice (the community nurse) said you go out so early, later you fall down, nobody knows ah, give you a phone better. Like that lor. So she help me find (the phone) lor. [011, Mdm. C]

Similarly, Mdm. LKS's decision to participate in the program was influenced by relatively strident, albeit seemingly well-intentioned, forms of suasion by the SAC manager that smartphone learning will be "good for her", despite her feeling that there is no clear purpose to learning at this point in her life.

> At first (the SAC) ask me I also don't want to take, I also don't know words, and don't know how to read it, even if they adjust (the language settings) to Mandarin I also never study…But they keep asking me to take, I said I anything also don't know, then they scold me, the manager at the SAC – "take mah, slowly learn lah, don't know then slowly learn until you know lor". I said aiya already going to die, no point learning, so old already, no one will know what will happen tomorrow, one day at a time, (I am) grateful, grateful [021; Mdm. LKS]

Apart from the discourse employed by community providers and implementers during the recruitment process, participants' understanding of the positive impacts of smartphone learning are also reinforced by pervasive media narratives of other seniors successfully riding the 'digital wave'. As part of the country's nationwide Seniors Go Digital movement, older adults who lead an "active Informational technology (IT) lifestyle" are invited to become "Silver Infocomm Wellness Ambassadors" and are regularly featured on television commercials/ advertisements to encourage their peers to follow suit (IMDA, 2020; Gov.sg, 2020). Thus, participants like Mr. R expressed interest in the program for an opportunity to be included in the 'digital movement' for seniors and fulfil the normalized ideal of becoming a digitally savvy senior.

> On the TV you see some old people learning how to use all these digital stuff. So why not us too? [014; Mr. R]

4.1.2 Perceived Incompatibility with Goals/Needs

Despite knowledge of the positive possibilities that smartphone usage can bring to their lives, majority of participants were not completely certain if the perceived benefits of using the smartphone

necessarily aligned with their needs and preferences. Mdm. Y, who affirmed the need for phone ownership among older adults in the case of an emergency, expressed dissatisfaction at how the design and functions of the smartphone are not applicable for older adults like herself.

> I will tell them no need all these weird patterns (on the phone screen), the letters should be bigger, we also don't use all these things (apps), most important is to do something that is beneficial for us, that we old people will use it, that's most important. If we don't use, only the youngsters use, then how can we use all these things, got camera, take whose picture? A lot of all these games and all this, we also cannot, play games for what. No need all this nonsense, no use to us what's for (shows me all the apps on the phone). It must be something that is useful to us that we old folks understand, one thing you must tell your company you must understand what people you are helping to use the phone, young one ok, you like all this scenery, these funny things, play games, we old people no, we only need the writing big, screen big, simple, like I use the clock ok sometimes when I go out and see what time it is, but all these things obstruct (referring to the apps on the phone) the space, waste so much space, then the writing is so small, you see for yourself. [013; Mdm. Y]

A sense of ambivalence towards smartphone usage also stems from a disconnect between the prospects of learning a new, potentially disruptive technology, and the fundamental priorities that they have at this point in their lives. When asked what it means to be healthy, dominant themes expressed by participants included the ability to "walk", eat as they desired, having a "clear" mind and good eyesight, absence of ailments and difficulties, and "live day by day doing the things (they) enjoy". Therefore, there was an incongruity between the purportedly transformative potential of smartphones and what participants value or perceive as essential to their current life situation. For example, Mdm. LS described that smartphone learning deviates from her aspirations and attitudes towards old age.

> I want my life to be as simple as possible, do whatever I want to do, can eat then eat, want to eat whatever just eat, I just want to be happy, my mind has no space for other more complicated things, I told my younger friends to learn, it is helpful for them, but at my age, I also don't know when I'm leaving this world, learn already also no point [023; Mdm. LS]

Dominant discourses on smartphones as a 'necessity' to the improvement of older adults' lives are constantly perpetuated by community partners, implementers, peers, media, and state narratives. While these narratives enhance older adults' awareness of the advantages of smartphone learning, it simultaneously generates feelings of ambivalence, obligation to learn such skills, even as older adults have to wrestle with the qualms they have about the program's relevance to their life and their sense of self-efficacy. While participants expressed varying degrees of ambivalence towards smartphone learning, with some demonstrating greater aversion than others, the tensions between the pressure to learn something that has been deemed as 'beneficial' and the challenges of smartphone usage were salient in a majority of participants' responses. In the next section, I will discuss how the doubts

expressed by participants at the onset continue to linger and are reinforced during the program, as they experience multiple barriers during the learning process that appear to outweigh the perceived benefits.

4.2 Precarity and the Aversion towards Smartphone Usage

6 out of 9 participants indicated that they encountered various challenges during smartphone learning, thereby contributing to feelings of low self-efficacy and motivation to sustain usage. The dominant theme expressed by participants was perceived cognitive and physical limitations, which compounded by a lack of elderly-friendly phone design and negative aging self-perceptions, influenced their disclination towards learning. Other barriers to learning include illiteracy, language barriers, low self-worth and internalized stigma shaped by their perceived socio-economic positioning relative to others. Older adults' perceptions of these difficulties have to be understood within the context of their experiences of aging and social precarities. As noted earlier, precarity refers to an existence characterized by insecurity, unpredictability and vulnerability that could emerge at an "intersection (of) social conditions" or disadvantages that extend into late life (Grenier et al., 2020). Among study participants, the everyday experiences of age-related stressors/ anxieties, living alone in a hostile or stigmatized housing environment and income insecurity inform how older adults define their 'worthiness', capacity, and ability as learners.

4.2.1 Individual Aging: Aging Precarities and the Internalization of Ageism

The most commonly cited barrier to learning was age-related cognitive and physical decline, including visual and hearing impairment, memory difficulties and decreasing agility in their fingers, which impeded the ability to effectively utilize the smartphone and retain knowledge from each session. Although 7 of 9 participants described that they learnt basic phone functions like "chatting with others", video chat, switching on and off the phone, "see shows" and record voice messages; more than half said that they cannot remember what was taught or that learning these functions did not make a difference to their lives. For example, Mdm. Y and Mdm. LKF described the anxieties and feelings of helplessness related to a perceived "deteriorat(ion)" in their minds that it made it difficult to absorb and apply information learnt, a problem attributed to old age.

> You all (are) young, your minds are good, can put many things inside, our mind deteriorating, old already mah, eyes also can't see, walk also cannot walk fast, this is natural for every people who get old, last time I'm not like that, now I'm like that, what can I do, I can't see [013; Mdm. Y]

> (The volunteer) taught me a lot of things, my brain don't know, a lot lah, she taught me, phone how to press, how to switch on, I can see you, you can see me, I can't remember already (laughs), then when talk can hear lah (inaudible), but I also can't remember already [021; Mdm. LKF]

Additionally, the smartphone design also fails to consider these aging-related cognitive/ physical limitations, therefore making older adults' interaction with the device a stress-inducing and disheartening effort. Participants pointed out that the sensitivity of the touch screen, small font sizes, multiple applications and colorful aesthetics made it confusing to navigate the interface. Mr. T, for example, commented that "(these phones) are very fast, once you press wrongly, it will go all over the place"; he eventually stopped using the smartphone after the intervention ended because of the fear of pressing the wrong buttons and not being able to rectify the problem afterward. Similarly, Mdm. Y also lamented that a combination of poor eyesight and stiff fingers resulted in her accidentally dialing the wrong numbers, incurring the wrath of family and friends -

> When you call it's okay, I'm answering, but when I want to call you, then I make a call, then when the opposite person answer, it's not you, it's somebody's phone. The smartphone is very sensitive, my finger accidentally touch it ah, then the other person's phone will get it, so that is the trouble for (an) old lady, if you ask me. Old lady…everybody eyesight is very poor, if your eyesight is poor, so small the writing how you expect us to see…This (phone) is sensitive lah. That's why I told you it's not suitable for us old people, here is all old people, you all come no use one [013; Mdm. Y]

While age-related physical constraints and an absence of age-friendly smartphone features were identified as main barriers to learning, factors that could arguably be viewed as beyond their immediate or direct control, study participants framed their unsuccessful attempts at mastering smartphone usage as a sign of their inaptitude and the futility of the learning process. Here, participants had a tendency to individualize responsibility for the outcome of smartphone learning and did not wish to be a burden on the volunteers. For example, Mr. T and Mdm. C assessed themselves as learners that were 'not worthy' of the time and attention from the volunteers who have "better things to do".

> I told the volunteer you all are volunteers, all of you need to work, after work just quickly go home and rest, if you come here takes about 1 hour to teach us, we are wasting your time, we don't want, convenient for you, you go home. How much can you teach us, today you teach, after you leave then I can't remember already, now we are old already…Like that obstruct people's time I don't want. Let people quickly go home and rest next day must work. Don't want to trouble them. Sometimes they will call and ask why you don't want us to teach you. Firstly, you have to work, so tiring when you work, can take bus go home earlier, shower, eat and be home earlier by an hour, energy is most important when you work, we don't want to trouble others. (003; Mr. T)

> Don't want lah, then I have to learn all over again, right. Learn all over it's okay, can remember then it's fine, if cannot remember then it's very troublesome. Then waste all your time to teach me, now my house has a phone, very convenient, if anyone calls, I just pick it up. (011; Mdm. C)

Therefore, participants' use of self-deprecating language to rationalize their learning challenges demonstrate that rather than enhancing feelings of self-efficacy, control and empowerment, the program

may have instead reinforced negative self-perceptions among some participants. Participants internalized ageist assumptions by viewing age-related limitations as 'deficits' that prevent them from undertaking smartphone-related activities; such ageist self-judgments exacerbate their poor self-conception, low self-worth (i.e., as learners with no room for growth and whose needs should not be prioritized) and resistance towards learning (Gendron et al., 2015; Horst, 2019).

4.2.2 Social Status/Closure: Social Precarities and the Internalization of Stigma

Participants' perceived lack of interest and confidence to learn smartphones were shaped not only by age-related barriers, but also by the awareness of their social positioning in relation to other older adults. One-third of older adults emphasized that it was particularly difficult for them to learn the smartphone because of language barriers, illiteracy and a lack of educational attainment. For example, Mr. T was quick to distinguish himself from those who were English-speaking and literate, characteristics that he felt predisposed them to increased competency and ability to acquire smartphone skills at a faster pace.

> Those people know words, knows English, knows the language it's different, they learn, teach them it's very fast. For us, we don't recognize words, I teach you 10 times, 10 times also you cannot remember, teach you for what, waste time, waste effort. Just like last time in school, teacher teaches you, if you have no heart to learn, then teach you what, no use. It's like teaching a cow to go up the tree, just now teach you, then suddenly you forget already. [003; Mr. T]

Most Chinese older adults residing in the neighborhood where the intervention was conducted are Mandarin/ dialect-speaking. In Singapore, the English language, a "colonial inheritance", was introduced as the primary language for education since 1974 (Chua, 2009). As national mass education was not fully implemented until the 1970s, a substantial population of those over 40 years old were never formally educated or educated in respective Asian languages in community schools (Chua, 2009). Among those who attended Chinese language schools in the early years of post-independence, regardless of their educational attainment, all non-English speaking Chinese individuals are highly marginalized in the political economy of contemporary Singapore (Chua, 2009). Therefore, there remains a chasm between English and Chinese-speaking older adults, with the former having gained access to more opportunities in the civil service and professional occupations.

Similarly, participants viewed smartphone usage as residing in the realm of the privileged 'other', one that does not align with their identities as "low-income", "uneducated", "working in lower-paying jobs" and "social welfare recipients". For example, when asked how she feels using the smartphone for purposes such as seeing the doctor will change her life, Mdm. Y expressed that smartphones were not suitable for the "kind of people" living in her neighborhood -

> If you get anything online, that's for young one, not for we old people, some like mine, 80 over, 90 over, 70 over, 60 over, some of us are uneducated, if educated they have means or help and the ability to work higher job they will not be living in this area, you must understand what kind of area people live and what kind of people are living inside here, it's not only when you think it's good you can see on TV it's good for old people good, but you must see that they don't have income, they will take money from the welfare department, like me, I take my daughter's, we are old already, who will hire us, right? [013; Mdm. Y]

Mdm. Y's relegation of herself as 'second-class' is emblematic of the internalized stigma she experiences living in a rental housing neighborhood. This observation is reinforced by Wanka (2017)'s qualitative case study on a deprived neighborhood in Vienna, Austria, which demonstrated that older adults living in deprived neighborhoods experienced spatial alienation, loss of agency and place attachment, thereby resorting to strategies like verbally distancing themselves from the neighborhood to prevent their identity from being "stained" by the stigma of living in the environment. Likewise, 7 of 9 study participants said that they do not want to or have not interacted with their neighbors despite living in close proximity, citing reasons such as wanting to avoid gossip/ getting into conflicts or encountering language barriers with their neighbors. In perceiving that smartphone use is not applicable to older adults living in a "kind of area", some participants have 'classified' themselves as failing to belong to the 'in-group' of digitally savvy older adults, thus reducing their self-esteem and motivation to learn.

Overall, experiences of intersecting aging and social precarities among study participants limit older adults' desire and motivation to fulfill normalized ideals of what society has defined to 'age successfully'. Urban (2017) described that successful aging constitutes the "preparation and presentation of the body, (where) the youthful and productive body constitutes the ideal in neoliberal society". Singapore is no exception – local studies have shown the prevalence of ageism in the workplace (The Straits Times, 2014; Chong, 2020), with reduced job opportunities and assumptions about work withdrawal and health that influence negative attitudes towards older workers (Ko, 2019). Ageist notions that associate older workers with being less efficient/ productive are also enshrined in policies that mandate retirement and reducing the amount of social security contributions by the state to older workers (Teo, 1997). In this case, engagement in digital practices correspond to sociocultural conceptions of aging that is "active, engaged, independent (and) highly productive" (Urban, 2017). This is epitomized by the image of a "Silver Infocomm Wellness Ambassador" in Singapore, the elderly individual who uses a smartphone to stay connected, keep in contact with friends and family members, make online purchases and for leisure (Baharudin, 2020; IMDA, 2020).

This section demonstrates that study participants not only have different preferences, priorities, and expectations, they also have unequal access to cultural and economic capitals to uphold these "presentations (of the successfully aging) body", a phenomenon shaped by age, class, education, social

status, and neighborhood factors (Urban, 2017). Moreover, precarities also promote a logic of self-responsibility and self-reliance within a neoliberal capitalist framework, where the inability to fulfill such normalized ideals become seen as a result of "moral failure" (Rosario & Rigg, 2019). Neoliberal notions of personal responsibility through productivity, rather than dependence on welfare, are also reflected in the Singapore government's policy ethos of self-reliance; family is presumptively considered the first line of support to help older adults cope in old age. Public messages continue to showcase the ideal senior citizen as one who ages successfully by being "an active contributor through continued employment, volunteering (and) family caregiving" (Maulod, 2019). Therefore, seniors often internalize ageist attitudes and stigma resulting from their positionality within the social and economic structure, self-perceptions that hinder their commitment to partake in and sustain smartphone learning.

4.3 Sources of Encouragement to Master Smartphone Learning

While majority of participants expressed aversion towards smartphone usage, some expressed satisfaction with particular aspects of the program and perceived positive impacts of smartphone learning. Firstly, one-third of participants stated that their interactions with volunteers were one of the most memorable moments of the program. As 8 out of 9 of participants lived alone, they appreciated having "someone to talk to" and liked that the volunteers were friendly, helpful and provided personalized attention to addressing their queries. The flexibility in curriculum (i.e., what was taught depended on the interests and ability of participants) and lack of a stipulated duration meant that each session could be tailored to participants' needs. Most participants also preferred the one-to-one volunteer-participant ratio as it facilitated a focus on learning and less distraction from other students. Thus, participants appeared to enjoy and value the social exchanges with the volunteers, more so than learning the functions of the smartphone itself.

> Good that there is someone to talk to. If not, I will just be on my own. [011; Mdm. C]
>
> We can chat and get along very well. [013; Mdm. Y]
>
> I miss him (volunteer), because when I sit here, I miss him sitting next to me talking to me teaching me what to do, Ben is a good person, really good, he's working, I said don't worry if there's no issues I won't call you, he said no problem auntie you can call me if you have any problems I can come, but if no issues I won't call him to disturb him lah. [042; Mdm. CHC]
>
> How interested (the volunteers) are with the patients, so that we can contact them, we can know about them. This thing they have shown they are very interested to look after senior citizens and all other people – whoever is concerned. [022; Mr. P]

Secondly, two participants were motivated by the opportunity to learn a new skill, particularly given the low barriers to entry (e.g., cost) for enrolling into the program. In particular, Mr. P's attitude towards learning as a lifelong process, motivation towards smartphone learning and familiarity with

technology may have been shaped by his active early-life professional involvement in various organizations (e.g., as "branch secretary for 25 years", "advisor to the Dealer's Association", "Chairman at a Secondary School Board", "Indian Activity Group Chairman"), before he encountered a crisis and lost his fortune. His interest in learning the smartphone may also be driven and reinforced by his desire to keep in contact with his close-knit family network. He makes regular videocalls with his children and grandchildren, who also help to hone his smartphone skills during in-person visits. The perceived usefulness and relevance of smartphone use to his daily life thus serves as an impetus to sustain learning.

> What I've learnt, you know the knowledge is only (a) handful, it's a whole…this thing I have to learn. So many things you have to learn, you have only learned only a handful. However, you learn also it will only be a handful. The more you learn, the better it is.; Yeah, you have to learn everything. If not what's the purpose, the more you learn, the benefit you have. [022; Mr. P]

> If anybody want to come and teach me something new, I just learn lor. Nobody teach me then there's nothing for me to learn. [020; Mdm. YH]

Thirdly, one participant perceived smartphone usage as a strategy to cope with any forms of stressors or hostilities in the built environment, and as a tool to divert her attention away from the mundaneness of everyday life. For example, when significant noise disturbances from a neighbor living above her caused her to lose sleep and negatively impact her mental health, she channeled her focus to playing games on her phone, a method that helped to ameliorate her fears.

> When I wake up, I just start playing games, after I drink coffee, I just sit here and play games, I really have no troubles, troubles are what you seek, what problems can you have at 70? I'm only thinking about what to buy and what to eat later. What's there to worry? Live one day at a time, when you open your eyes and you see the sky, ah I'm still alive, then can already, then you will be very happy, I'm not troubled. I told them don't think too much, just play the games on the phone. They asked you know how to play? I said yes, they said they don't know, I said oh no wonder you keep overthinking, I said play games very good one, no troubles, and you won't think too much, because you have to focus your attention on the games, so why would you think of other things? I don't care about the pandemic. I think so much for what? I understand that even if you think, you can't think of the solution, you think the more you think, you can think of the solution meh? Every month, my children give me money, so ok lor, whether it's a lot or very little, it's okay. If it's too little, then you just save lah, and you can have money, after that they ask me to join the SAC (Senior Activity Center) activities, they sponsor us, there's food, there's angbao (red packets) to take, what's there to worry about? I'm happy, grandchildren take good care of me, give me money every month, they are very good. [042; Mdm. CHC]

> This has become my hobby already. When you are holding the phone to play, they make so much noise "bang" (upstairs) no issues, "bang" no issues, because my focus is on the phone, whatever they do, I'm fine. If you are not on the phone, you will find it terrifying, because your attention is inside already, so it's not so frightening, so I tell them, play games good! Play games you will not have any worries! (laughs) [042; Mdm. CHC]

Like Mr. R, Mdm. CHC also has strong family support, whom despite not residing together with her, telephones her regularly and provides monthly income transfers. Her first smartphone purchased one year ago was also a gift from her grandchildren, which gave her a head start to learning. Therefore, while building relationships with the volunteers may serve as a catalyst to learning, sustained motivation and interest among a minority of participants were shaped by early-life exposure to technology as well as the establishment of the relevance of smartphone usage to their everyday lives (e.g., socializing with grandchildren), which in turn encourages continued practice and gradual mastery of the skill.

5. Recommendations

In this section, I outline four key strategies to enhance the teaching and learning of older persons. In the current intervention model, participants expressed satisfaction with the convenience of learning from home (e.g., particularly for those who were immobile), the personalized one-to-one attention given by volunteers, and appreciated that volunteers were generally helpful, empathetic and approachable in facilitating an inclusive learning environment. However, in addition to retaining these fundamental intervention characteristics, the inclusion of additional measures could potentially increase the appeal of digital interventions, improve participants' motivation to learn and address the barriers identified by participants.

5.1 Adapting the Diffusion of Innovation Model

The Diffusion of Innovation (DOI) model explains how an idea, product or technology become gradually adopted by a particular population. In this case, "adoption" could refer to a behavioral or attitudinal shift, where an individual begins to use the new product or starts to view it as innovative (Rogers, 2003). Drawing on the DOI model, digital interventions should consider four factors (i.e., trialability, compatibility, relative advantage, and complexity) in its design and implementation process, so as to encourage greater receptivity towards smartphone learning and use (Rogers, 2003).

Firstly, **trialability** enables participants to undergo a 'pilot-testing' of the smartphone before deciding whether to enroll into the intervention or register for a phone plan. This 'trial' phase could involve having volunteers demonstrate usage and then loaning the phone to participants so that they can have a 'feel' of it. Study participants expressed reservations at the onset because they were expected to commit to payment for the phone plan without first experiencing what the smartphone learning process may entail. Some indicated frustration that they did not expect the smartphone to be non-user friendly (e.g., font size too small/ buttons were too sensitive) and subsequently ceased usage. Thus, the opportunity to explore the phone first can ease the stress and uncertainty of enrolling into the program without any prior familiarity with the product they are purchasing.

Secondly, implementers should consider whether the digital intervention and device are **compatible** with participants' needs and preferences. To comprehend the factors that influence participants' motivations and attitudes towards learning a new technology, implementers could conduct a needs assessment to identify participants' healthy aging goals, daily routines, support network and interests, to plan how the smartphone could be relevant to their priorities. Although the current intervention tailors the program according to participants' interests and abilities (where Tier 1 involves learning 'basic' phone functions like videocalls and Tier 3 involves more 'advanced' features like online purchases/ using government services), participants may not be able to derive meaning from learning these functions if they are not useful in their everyday lives. For example, if a participant wishes to increase his/ her social interaction, the volunteer can connect teaching the videocall function to making a call to a family member or befriender, rather than learning how to videocall as an end in itself.

Thirdly, participants need to recognize the **relative advantage** of smartphones as compared to their 'older' phones, such as feature phones or landlines, to motivate and sustain behavioral changes (e.g., making the switch to smartphones or using smartphones more often). The desire for simplicity, convenience, and a desire to stick to the status quo shaped their preferences for non-smartphones, particularly since they are habituated to seeking help and contacting others via these means. Therefore, implementers have to understand what valued attributes like 'convenience' or 'simplicity' mean to older adults, instead of assuming that more advanced digital devices are necessarily perceived as 'convenient' to this sub-group. To enhance the appeal of smartphones, older adults have to be convinced that incorporating its usage into their lives can be seamless and convenient, rather than completely displacing their existing ways of life. Therefore, there should be a balance between preserving what older adults' see as fundamental to their lives, while also introducing new possibilities of seeing and doing that are not alienating for them.

Finally, implementers have to address the issue of **complexity**, which refers to how difficult the technology is to understand or use. Participants commonly describe smartphone usage as "complex", a perception that elicits fear and aversion towards continued usage. Learning tools like step-by-step picture guides of how to operate the smartphone can be utilized to breakdown the learning process into more digestible portions and facilitate retention and application if participants were to refer to the notes for continued practice after each session.

5.2 Strengths-Based Approach to Dismantling Ageist Stereotypes

To address older adults' poor sense of self-efficacy and negative aging self-perceptions, instructors should take a directive approach to dismantle ageist stereotypes and develop participants' confidence before cultivating more independent forms of learning (Maulod & Lu, 2020). Opportunities to contemplate or re-think age-related challenges should be built into the learning model, enabling older

adults to confront their own internalized ageism and challenge their self-perceptions as being a 'less worthy' or 'incapable' learner. For example, techniques like motivational interviewing can be adopted by volunteers to better understand older adults' motivations to learn or resist smartphone learning. Rather than begin from a deficits-based approach (e.g., what older adults do not know), motivational interviewing seeks to affirm participants' strengths, wisdom, values, and experiences, and develops a plan towards change based on their own insights. This approach emphasizes the creation of a non-judgmental, respectful, and compassionate space, where the older adults' choice to learn or not learn the smartphone is not frowned upon or stigmatized. Instructors should also normalize feelings of ambivalence or any learning difficulties (e.g., slower pace of learning/ making mistakes/ not being able to recall or apply what was taught); participants should take comfort in the fact that whether they learn to use the phone or achieve learning objectives is not an indication of their capabilities or self-worth. Instead, the intervention should focus on cultivating an enjoyable and stress-free learning experience that can help to enhance older adults' quality of life. When older adults feel more confident and empowered to learn, they can begin to explore the possibilities of smartphone use and refute previously held conceptions that technology use is in conflict with their identities (i.e., not for "someone like them").

5.3 Strengthening Social Ties through Technology

Smartphones can also be adopted to fulfil relational purposes. Study participants who expressed a strong motivation to learn consistently practiced and utilized the smartphone to stay in contact with kin and friends. Social capital, in the form of family members or peers, can be a "catalytic intermediary" to motivate ICT use (Tan & Chan, 2018). Studies have shown the importance of familial and social support, particularly the efficacy of intergenerational approaches in older adult learning of digital skills, where older adults pick up digital skills more readily from their grandchildren (Chan, 2021; Xu & Liu, 2018). For those who live alone or lack a supportive social network, policies can promote new forms of "social capital for seniors through the formation of new social relationships or maintaining existing social ties" (Tan & Chan, 2018). For example, interventions can trade on the value of social interaction with volunteers, which study participants expressed as a memorable moment of the intervention, to motivate older adults' engagement with technology.

Digital technology can also serve as a medium in which older adults can acquire new skills or habits as part of a learning group. For example, studies like Blažič and Blažič (2020)'s have explored the use of gamification techniques to help older adults from four European countries to learn digital skills by playing games on a touch screen tablet. As part of the intervention, older adults would collaborate with a partner to apply digital skills to solve tasks; the games were designed to improve cognitive and motor skills, facilitate social interaction, and were found to be effective in improving the

acquisition of digital know-how (Blažič & Blažič, 2020). Thus, intervention models that meld problem-solving activities and collaborative peer learning can create an interactive space that eliminates the intimidation of learning.

Therefore, ICT can be harnessed as a "resource for social capital" that promotes a sense of community and belonging through the creation or maintenance of social relationships (Tan & Chan, 2018). Designing interventions to foster interaction with other people and creating systems that facilitate the sustainability of these relationships can also promote continuity in learning and practice in the long run.

5.4 Ensuring Program Continuity

There is an absence of opportunities for continued practice and application when participants have completed the intervention. Program implementers can provide a menu of options to participants based on their levels of interest, skills and aptitude; this could include connecting seniors to guided learning groups to practice skills taught or specific interest groups (e.g., playing mahjong online). Additionally, volunteers or a specific 'troubleshooting' personnel can come around the neighborhood at a fixed time, at regular intervals in a month. These volunteers can help to resolve any technical issues or address any queries that older adults may have with regards to phone use. This is because some participants described frustration at not knowing to how to manage technical challenges (e.g., applications take too long to load) despite following the steps learnt during the program. While volunteers informed seniors that they could contact them if they had any questions, participants recognized that volunteers were working full-time and did not want to trouble them. Thus, having a dedicated personnel and time allocated for troubleshooting smartphone problems could encourage older adults to seek help.

6. Discussion and Conclusion

Older adults in this study demonstrate high levels of awareness of the potential benefits accrued from smartphone utilization, shaped by narratives employed by the state, service providers, volunteers and their peers. These narratives commonly associate smartphone use with increased convenience, safety, sociability, independence and belonging. However, feelings of ambivalence towards smartphone learning ensue when knowledge of these advantages do not translate into beliefs that these digital tools would be applicable to their own needs, preferences and priorities. Perceived challenges during the intervention reinforced these feelings of doubt and aversion towards learning, barriers that are influenced by their experiences of aging, social and financial precarities. Seniors cited age-related cognitive and physical decline as a dominant stressor that hindered knowledge retention, navigation of the phone interface and heightened anxieties during phone usage. A poor command of English, illiteracy

and low educational attainment were also viewed as perceived barriers, pointing to participants' consciousness of their social positioning and perceptions of technological usage as a middle-class phenomenon. Smartphones may also not be perceived as a 'resource' amidst financially precarious circumstances, where the urgent trade-offs in everyday priorities of living (e.g., inability to pay for medical bills, uncertainties of welfare application) mean that smartphone learning and its uncertain 'rewards' cannot be prioritized alongside other competing demands on time and energy. Therefore, the intersection of precarities contribute to internalized ageist attitudes and social stigma among older learners, shaping their negative self-perceptions, low levels of confidence, motivation as well as their identities as 'less worthy'/ incompetent learners.

Additionally, study participants refrain from seeking help from volunteers after each visit because of a fear of troubling them and did not want to be a burden; this attitude was repeatedly echoed in participant interviews through an emphasis on maintaining self-reliance in multiple aspects of their daily lives (e.g., health-seeking). This desire to not be dependent on others, apart from being borne of circumstances (e.g., not having social support, living in a neighborhood where interactions with others are minimal), conform to neoliberal notions of personal responsibility, where the highly motivated individual who "act(s) for themselves, (tries) to help themselves, and (minimizes) dependence on others" (Teo, 2014) is valorized. These norms not only shape low-income older learners' identities, dispositions, and sense of worth, but also generate overall feelings of disempowerment and negative self-perceptions when they see themselves as failing to measure up to or actualize ideals of what it means to age successfully and healthily in Singapore.

These findings are consistent with Bourdieu's theory of habitus, which can help to explain how the ways in which individuals interpret and respond to technological adoption are informed by the social-cultural contexts they live in (Wacquant, 2016). In this study, older adults' dispositions and inclination towards using smartphones in their daily life are patterned by their life histories and material circumstances. For example, the absence of opportunities for prior exposure to technology through education or the workplace limit the acquisition of cultural capital (e.g., digital knowledge, skills), which shape their habitus in ways that limit their self-efficacy and interest in ICT use. A confluence of factors such as participants' experience of multiple vulnerabilities, a lack of a family support system to encourage ICT use, internalized stigma and ageism, lack of early-life exposure to technology all shape their perception and behavior towards smartphones as disruptive of their habitus. Study findings also corroborate Tan and Chan (2018)'s work on ICT use among older Singaporeans, which suggested that older adults' lack of cultural capital contributes to a habitus that is "aversive and fearful of ICT", where accessing it exerts an "emotionally intimidating and socially disempowering effect". Yet, despite the seemingly durable nature of the habitus, it is not immutable or permanent, and can shift under "unexpected situations or over a long historical period" (Navarro, 2006). The study recommendations

seek to change this "field" in which older adults are embedded, so that learners can feel included, empowered, and equal partners in the learning process.

The findings point to a need for future digital interventions to consider allowing for trial periods with devices, compatibility with participants' needs and preferences, communication of the relative advantages of the innovation, and the development of geragogical tools that reduce the complexity of learning a new technology. Throughout this process, there should be a balance between instructor and participant-led learning, where participants should have the capacity to decide what they want to learn and how they want to utilize the device after learning about its different functions. Volunteers and participants can jointly examine ways in which they identify the perceived utility and relevance of the digital innovation to their present routines and life goals. Moreover, it is crucial to recognize that older adults do not necessarily share commonly held assumptions of smartphone as the indisputably 'better', 'more convenient' and 'simpler' option; even if they do, they may also not perceive or understand these terms in the same ways. Thus, program implementers should consult older participants about what they value, the kinds of meanings they ascribe to the purported benefits of the smartphone, and the types of learning approaches that can best meet these needs. Expanding the discourses and meanings attributed to smartphones by different sub-groups, particularly marginalized individuals, can promote intervention frameworks centered on equity and social justice, refuting "structures and systems designed by and for persons in more advantageous social positions" (Fang et al., 2019).

Additionally, interventions should create a compassionate, inclusive, and non-judgmental learning environment that normalizes hesitancy, mistakes, and ambivalence, and respects the choices of seniors to partake (or not) in these activities. Encouraging seniors to learn should also not run the risk of coercing or guilt-tripping those who do not. Efforts must be made to assure seniors that a lack of participation will not deprive them of any other community services or assistance, to reduce the likelihood of seniors participating out of fear or obligation. Moreover, the responsibility should not be placed squarely on older adults to actively engage in and keep up with digital practices, where resistance to learning becomes stigmatized or viewed as a burden or sign of "backwardness"; the consequence would be a subversion of the "discourse of empowerment" that digital technology seeks to promote in the first place (Urban, 2017).

Further studies might consider understanding the perspectives of particular sub-groups who are disproportionately excluded from digital technology (e.g., older-old, ethnic minorities, low-income) or those who choose not to participate in such interventions. The intersectionality of their identities and experiences, how it may "create distinct and multiple barriers for various sub-groups", and the kinds of responses needed to address these "multiple layers of access and use inequities", also warrant further research (Fang et al., 2019). Additionally, studies should be done to develop culturally sensitive

approaches that can promote digital devices as a potential resource that is relevant to the needs of deprived communities, such as in ways that can potentially improve the socio-emotional and physical health outcomes of individuals, or serve as a coping strategy in a precarious environment. Mixed-methods studies using implementation science approaches should also test the effectiveness of digital interventions in low-income communities, understand what works for whom, and devise educational frameworks specific to the teaching of digital skills that can empower older learners.

Overall, study findings add to the literature by demonstrating how older adults' perceptions of smartphones are shaped by their experiences of intersecting aging, social and material precarities, as well as personal histories that facilitate or limit their self-efficacy and interest in these digital devices. Promoting digital inclusion to encourage "active aging" is not simply about the dissemination of digital devices to older adults but exploring the myriad ways in which their quality of life can potentially be improved – but not solely determined by – the use of ICT (Colombo et al., 2015). Community-based digital interventions must be designed with the particularities of the community's lived environment and experiences in mind, and the sensitivity that these digital tools only occupy one facet of participants' lives, alongside other priorities, needs, expectations and experiences. Consideration of these multiple dimensions and how they can be woven into the intervention design to enhance the smartphone's perceived relevance and utility, without being an unwelcomed disruption, warrants further thought. Measures aimed at promoting individual-level adoption of smartphones must also be addressed alongside approaches that tackle structural inequities, ageist structures and stigma that disproportionately disadvantages/ oppresses the experiences and skills of one group of older adults relative to others. Ageist stereotypes and idealized norms of 'successful aging' must be dismantled to make way for a plurality of meanings of what makes for a 'good life' in old age. For those who choose not to ride the 'digital wave', society must be willing to find and support alternate solutions to include these older adults, in ways that promote social contact, autonomy, a good quality of life, convenience, socio-emotional well-being – outcomes that technology purports to achieve – whilst not perpetuating their exclusion.

References

Ahlin, T. (2017). Only Near is Dear? Doing Elderly Care with Everyday ICTs in Indian Transnational Families. *Medical Anthropology Quarterly*, 32(1): 85-102. doi: 10.1111/maq.12404.

AIMS. (2020). Information and Communication Technologies (ICT). http://aims.fao.org/information-and-communication-technologies-ict

Ang, S., Lim, E., & Malhotra, R. (2020). Health-Related Difficulty in Internet Use Among Older Adults: Correlates and Mediation of Its Association with Quality of Life Through Social Support Networks. *The Gerontologist*, https://doi.org/10.1093/geront/gnaa096

Armitage, R., & Nellums, L. B. (2020). COVID-19 and the consequences of isolating the elderly. *The Lancet Public Health*, *5*(5), e256. https://doi.org/10.1016/S2468-2667(20)30061-X

Asokan, A. (2020, April). COVID-19: Ensuring the elderly don't become isolated during the outbreak. ChannelNewsAsia. https://www.channelnewsasia.com/news/singapore/covid-19-loneliness-isolation-among-elderly-safe-distancing-12611158

Baharudin, H. (2020, June). 47 more seniors appointed as digital ambassadors. *The Straits Times*. https://www.straitstimes.com/singapore/47-more-seniors-appointed-as-digital-ambassadors

Banerjee, D. (2020). 'Age and ageism in COVID-19': Elderly mental health-care vulnerabilities and needs. *Asian Journal of Psychiatry*, *51*, 102154. https://doi.org/10.1016/j.ajp.2020.102154

Basu, M. (2020, September). Singapore's seniors pick up smartphones to cope with Covid-19. GovInsider. https://govinsider.asia/digital-gov/singapore-trains-seniors-to-adapt-routines-with-smartphones/

Bates, L., Wiles, J., Kearns, R., & Coleman, T. (2019). Precariously placed: Home, housing and wellbeing for older renters. *Health & Place*, *58*, 102152. https://doi.org/10.1016/j.healthplace.2019.102152

Berg, T., Winterton, R., Petersen, M., & Warburton, J. (2017). "Although we're isolated, we're not really isolated": The value of information and communication technology for older people in rural Australia. *Australasian Journal on Ageing*, *36*(4), 313–317. https://doi.org/10.1111/ajag.12449

Blažič, B. J., & Blažič, A. J. (2020). Overcoming the digital divide with a modern approach to learning digital skills for the elderly adults. *Education and Information Technologies*, *25*(1), 259–279. https://doi.org/10.1007/s10639-019-09961-9

Bourdieu, P. (1984). *Distinction: A Social Critique of the Judgement of Taste*. Harvard: Routledge and Kagan Paul Ltd.

Bourdieu, P. and L. Wacquant (1992) An Invitation to Reflexive Sociology. Chicago: University of Chicago Press.

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806

Centre for Ageing Research & Education (CARE). (2020, January). Local research finds HDB residents are lonelier and less active. https://www.duke-nus.edu.sg/care/news-events/news/articles/articles/local-research-finds-hdb-residents-are-lonelier-and-less-active

Centers for Disease Control and Prevention (CDC). (2020). Older Adults. https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html

Chakraborty, J., & Bosman, M. (2005). Measuring the Digital Divide in the United States: Race, Income, and Personal Computer Ownership. *The Professional Geographer*, 57 (3), 395–410

Chan, C. (2021, January). Commentary: Encourage seniors in digitalisation drive instead of forcing tech adoption on them. *ChannelNewsAsia*. https://www.channelnewsasia.com/news/commentary/digital-transformation-smart-nation-can-leave-seniors-behind-13943332

Chan, A., Raman, P., Ma, S., & Malhotra, R. (2015). Loneliness and all-cause mortality in community-dwelling elderly Singaporeans. *Demographic Research*, 32(39): 1361-1382. Doi: 10.4054/DemRes.2015.32.49

Chen, K., & Chan, A. (2011). A review of technology acceptance by older adults. Gerontechnology, 10(1), 1-12 https://doi.org/10.4017/gt.2011.10.01.006.00

Chen, Y. R. R., & Schulz, P. J. (2016). The Effect of Information Communication Technology Interventions on Reducing Social Isolation in the Elderly: A Systematic Review. *Journal of Medical Internet Research*, *18*(1), e18. https://doi.org/10.2196/jmir.4596

Chong, NQ. (2020, February). Forum: Limited protection against ageism at workplace. *The Straits Times*. https://www.straitstimes.com/forum/forum-limited-protection-against-ageism-at-workplace

Chua, BH. (2009). Being Chinese under official multiculturalism in Singapore. *Asian Ethnicity*, *10*(3), 239–250. https://doi.org/10.1080/14631360903189609

Clayton, J., & Macdonald, S. J. (2013). THE LIMITS OF TECHNOLOGY: Social class, occupation and digital inclusion in the city of Sunderland, England. *Information, Communication & Society*, *16*(6), 945–966. https://doi.org/10.1080/1369118X.2012.748817

Colombo, F., Aroldi, P., & Carlo, S. (2015). New Elders, Old Divides: ICTs, Inequalities and Well-Being amongst Young Elderly Italians. *Comunicar*, 23(45): 47-55. Doi: 10.3916/C45-2015-05

Coyle, C., & Dugan, E. (2012). Social Isolation, Loneliness and Health Among Older Adults. *Journal of Aging and Health*, *24*(8): 1346-1363.

Crossley, N. (2001). The Phenomenological Habitus and Its Construction. *Theory and Society*, *30*(1), 81–120. http://www.jstor.org/stable/658063

Damant, J., Knapp, M., Freddolino, P., & Lombard, D. (2017). Effects of digital engagement on the quality of life of older people. *Health & Social Care in the Community*, *25*(6), 1679–1703. https://doi.org/10.1111/hsc.12335

Department of Statistics. (2014). Key household income trends, 2013. Singapore: DOS.

Fang, M. L., Canham, S. L., Battersby, L., Sixsmith, J., Wada, M., & Sixsmith, A. (2019). Exploring Privilege in the Digital Divide: Implications for Theory, Policy, and Practice. *The Gerontologist*, *59*(1), e1–e15. https://doi.org/10.1093/geront/gny037

Gendron, T. L., Welleford, E. A., Inker, J., & White, J. T. (2016). The Language of Ageism: Why We Need to Use Words Carefully. *The Gerontologist*, *56*(6), 997–1006. https://doi.org/10.1093/geront/gnv066

Goh, Y. (2020, August). Seniors felt less socially satisfied, more isolated during Covid-19 circuit breaker period: Survey. The Straits Times. https://www.straitstimes.com/singapore/lower-satisfaction-levels-higher-social-isolation-for-senior-citizens-during-circuit

Gov.sg. (2020, June). Learning new tech has no age barrier. https://www.gov.sg/article/learning-new-tech-has-no-age-barrier

Grenier, A., Lloyd, L. and Phillipson, C. (2017), Precarity in late life: rethinking dementia as a 'frailed' old age. Sociol Health Illn, 39: 318-330. doi:10.1111/1467-9566.12476

Harden, K., Price, D., Mason, H., & Bigelow, A. (2020). COVID-19 Shines a Spotlight on the Age-Old Problem of Social Isolation. Journal of Hospice and Palliative Nursing, 22(6):435-441. doi: 10.1097/NJH.0000000000000693.

Horst, M. van der. (2019). Internalised Ageism and Self-Exclusion: Does Feeling Old and Health Pessimism Make Individuals Want to Retire Early? *Social Inclusion*, *7*(3), 27–43. https://doi.org/10.17645/si.v7i3.1865

Hülür, G., & Macdonald, B. (2020). Rethinking social relationships in old age: Digitalization and the social lives of older adults. *The American Psychologist*, *75*(4), 554–566. https://doi.org/10.1037/amp0000604

Infocomm Media Development Authority (IMDA). (2020). *More than 16000 Seniors Benefit from Seniors Go Digital Programme*. http://www.imda.gov.sg/news-and-events/Media-Room/Media-Releases/2020/More-than-16000-Seniors-Benefit-From-Seniors-Go-Digital-Programme

James, B. L., Bates, L., Coleman, T. M., Kearns, R., & Cram, F. (2020). Tenure insecurity, precarious housing and hidden homelessness among older renters in New Zealand. *Housing Studies*, *0*(0), 1–23. https://doi.org/10.1080/02673037.2020.1813259

Jarvis, M. A., Chipps, J., & Padmanabhanunni, A. (2019). "This phone saved my life": Older persons' experiences and appraisals of an mHealth intervention aimed at addressing loneliness. *Journal of Psychology in Africa*, *29*(2), 159–166. https://doi.org/10.1080/14330237.2019.1594650

Jensen, J. D., King, A. J., Davis, L. A., & Guntzviller, L. M. (2010). Utilization of Internet Technology by Low-Income Adults: The Role of Health Literacy, Health Numeracy, and Computer Assistance. *Journal of Aging and Health*, *22*(6), 804–826. https://doi.org/10.1177/0898264310366161

Kearns, A., & Whitley, E. (2019). Associations of internet access with social integration, wellbeing and physical activity among adults in deprived communities: Evidence from a household survey. *BMC Public Health*, *19*(1), 860. https://doi.org/10.1186/s12889-019-7199-x

Khalaila, R., & Vitman-Schorr, A. (2018). Internet use, social networks, loneliness, and quality of life among adults aged 50 and older: Mediating and moderating effects. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, *27*(2), 479–489. https://doi.org/10.1007/s11136-017-1749-4

Kim, J., & Gray, J. (2016). Qualitative Evaluation of an Intervention Program for Sustained Internet Use Among Low-Income Older Adults. *Ageing International*, *41*(3), 240–253. https://doi.org/10.1007/s12126-015-9235-1

Klimova, B., & Poulova, P. (2018) Older People and Technology Acceptance. In: Zhou J., Salvendy G. (eds) Human Aspects of IT for the Aged Population. Acceptance,

Communication and Participation. ITAP 2018. Lecture Notes in Computer Science, vol 10926. Springer, Cham. https://doi.org/10.1007/978-3-319-92034-4_7

Ko, H. (2019, August). Commentary: Seniors do well at their jobs yet ageist myths and negative stereotypes persist. *ChannelNewsAsia*. https://www.channelnewsasia.com/news/commentary/retirement-re-employment-age-raised-cpf-withdrawal-65-68-70-11827194

Levy D., Simonovsky E. (2018) Keeping in Touch: Mobile Apps Use by Older Adults. In: Zhou J., Salvendy G. (eds) Human Aspects of IT for the Aged Population. Acceptance, Communication and Participation. ITAP 2018. Lecture Notes in Computer Science, vol 10926. Springer, Cham. https://doi-org.libproxy1.nus.edu.sg/10.1007/978-3-319-92034-4_8

Low, L. L., Liu, N., Wang, S., Thumboo, J., Ong, M. E. H., & Lee, K. H. (2016). Predicting frequent hospital admission risk in Singapore: A retrospective cohort study to investigate the impact of comorbidities, acute illness burden and social determinants of health. *BMJ Open*, *6*(10), e012705. https://doi.org/10.1136/bmjopen-2016-012705

Luo, Y., & Hawkley, L., Waite, L., & Cacioppo, J. (2012). Loneliness, Health and Mortality in old age: A National Longitudinal Study. *Social Science & Medicine, 74*(6): 907-914.

Maulod, A., & Lu, SY. "I'm slowly ageing but I still have my value": challenging ageism and empowering older persons through lifelong learning in Singapore, *Educational Gerontology*, 46:10, 628-641, DOI: 10.1080/03601277.2020.1796280

Marston, H. R., Genoe, R., Freeman, S., Kulczycki, C., & Musselwhite, C. (2019). Older Adults' Perceptions of ICT: Main Findings from the Technology In Later Life (TILL) Study. *Healthcare*, *7*(3). https://doi.org/10.3390/healthcare7030086

McDonough, C. (2016). The Effect of Ageism on the Digital Divide Among Older Adults. *Journal of Gerontology & Geriatric Medicine* 2: 008. doi**:**10.24966/GGM-8662/100008

Navarro, Z. (2006) 'In Search of Cultural Interpretation of Power', IDS Bulletin 37(6): 11-22.

Newman, L., Biedrzycki, K., & Baum, F. (2012). Digital technology use among disadvantaged Australians: implications for equitable consumer participation in digitally-mediated communication and information exchange with health services. *Australian Health Review*, 36: 125-129. https://doi-org.libproxy1.nus.edu.sg/10.1071/AH11042

Ng, KH. (2020). Chapter 2: Social Housing. In Glass, M., Ho, KC., Ng, KH., & Tan, ES (Eds.), *Housing Practice Series Singapore* (pp. 10-25). United Nations Human Settlements Programme (UN-Habitat). https://unhabitat.org/sites/default/files/2020/08/singapore_-_housing_practise_series.pdf

North, S., Snyder, I., & Bulfin, S. (2008). Digital Tastes: Social Class and Young People's Technology Use. *Information, Communication & Society*, *11*, 895–911. https://doi.org/10.1080/13691180802109006

Olphert, W., & Damodaran, L. (2013). Older people and digital disengagement: A fourth digital divide? *Gerontology*, *59*(6), 564–570. https://doi.org/10.1159/000353630

Pang, N., Zhang, X., Vu, S., & Foo, S. (2014). Smartphone use by older adults in Singapore. *Gerontechnology*, 13(2): 270.

Paragas, F., Dyeo, C., Lee, T., & Rahman, N. (2010). Mobile Telephony Uses and Gratifications among Elderly Singaporeans. Media Asia, 37(4): 215-223.

Paragas, F., Dyeo, C., Lee, T., & Rahman, N. (2011). Mobile Telephony Uses and Gratifications Among Elderly Singaporeans: The Role of Gender, Income, and Technological Mindset. Marketing and Public Policy Conference Proceedings. https://www.ama.org/wp-content/uploads/2019/02/2011-ama-mppc-proceedings.pdf#page=39

Perissinotto, C., Cenzer, I., & Covinsky, K. (2012). Loneliness in Older Persons A Predictor of Functional Decline and Death. *Arch Intern Med*, *172*(14): 1078-1083.

Rogers, E. (2003). *Diffusion of Innovations*. Fifth edition. Free Press: New York.

Sepúlveda-Loyola, W., Rodríguez-Sánchez, I., Pérez-Rodríguez, P., Ganz, F., Torralba, R., Oliveira, D. V., & Rodríguez-Mañas, L. (2020). Impact of Social Isolation Due to COVID-19 on Health in Older People: Mental and Physical Effects and Recommendations. *The Journal of Nutrition, Health & Aging*, 24(9), 938–947. https://doi.org/10.1007/s12603-020-1469-2

Schlomann, A., Seifert, A., Zank, S., Woopen, C., & Rietz, C. (2020). Use of Information and Communication Technology (ICT) Devices Among the Oldest-Old: Loneliness, Anomie, and Autonomy. *Innovation in Aging*, *4*(2), igz050. https://doi.org/10.1093/geroni/igz050

Shapira, N., Barak, A., & Gal, I. (2007). Promoting older adults' well-being through Internet training and use. *Aging & Mental Health*, *11*(5), 477–484. https://doi.org/10.1080/13607860601086546

Singapore Management University (SMU). (2020, June). Struggling to stick to circuit breaker rules. https://news.smu.edu.sg/news/2020/06/17/struggling-stick-circuit-breaker-rules

SingHealth. (2021). *Hospital to Home*. singhealth.com.sg/rhs/get-well/Hospital-to-Home

Smart Nation Singapore. (2020). *Smart Nation: The Way Forward – Executive Summary*. https://smartnation-strategy.opendoc.sg/

Tan, K. S. Y., & Chan, C. M. L. (2018). Unequal access: Applying Bourdieu's practice theory to illuminate the challenges of ICT use among senior citizens in Singapore. *Journal of Aging Studies, 47,* 123–131. https://doi.org/10.1016/j.jaging.2018.04.002

TechTerms. (2010). *Smartphone*. https://techterms.com/definition/smartphone

Teo, P. (1997). Space to Grow Old In: The Availability of Public Spaces for Elderly Persons in Singapore. *Urban Studies*, 34(3): 419-439. https://doi.org/10.1080/0042098976050

Urban M. (2017) Embodying Digital Ageing: Ageing with Digital Health Technologies and the Significance of Inequalities. In: Heidkamp B., Kergel D. (eds) *Precarity within the Digital Age*. Prekarisierung und soziale Entkopplung – transdisziplinäre Studien. Springer VS, Wiesbaden. https://doi.org/10.1007/978-3-658-17678-5_11

Wacquant, L. (2016). A Concise Genealogy and Anatomy of Habitus. *The Sociological Review*, 64(1): 64-72.

Wacquant, L., Slater, T., & Pereira, V. B. (2014). Territorial Stigmatization in Action. *Environment and Planning A: Economy and Space*, 46(6): 1270-1280. https://doi.org/10.1068/a4606ge

Wang, Y., Matz-Costa, C., Miller, J., Carr, D. C., & Kohlbacher, F. (2018). Uses and Gratifications Sought from Mobile Phones and Loneliness Among Japanese Midlife and Older Adults: A Mediation Analysis. *Innovation in Aging*, *2*(3), igy027. https://doi.org/10.1093/geroni/igy027

Wanka, A. (2018). Disengagement as Withdrawal from Public Space: Rethinking the Relation Between Place Attachment, Place Appropriation, and Identity-Building Among Older Adults. *The Gerontologist*, *58*(1), 130–139. https://doi.org/10.1093/geront/gnx081

Wee, L. E., Tsang, T. Y. Y., Yi, H., Toh, S. A., Lee, G. L., Yee, J., Lee, S., Oen, K., & Koh, G. C. H. (2019). Loneliness amongst Low-Socioeconomic Status Elderly Singaporeans and its Association with Perceptions of the Neighbourhood Environment. *International Journal of Environmental Research and Public Health*, *16*(6), 967. https://doi.org/10.3390/ijerph16060967

Wong, PT. (2020, May). The Big Read: Digitally estranged, seniors struggle with sense of displacement in pandemic-hit offline world. *ChannelNewsAsia*. https://www.channelnewsasia.com/news/singapore/big-read-covid-19-pandemic-senior-citizens-12697086

Xu, W., & Liu, X. (2018). Gamified Design for the Intergenerational Learning: A Preliminary Experiment on the Use of Smartphones by the Elderly. In J. Zhou & G. Salvendy (Eds.), *Human Aspects of IT for the Aged Population. Acceptance, Communication and Participation* (pp. 571–580). Springer International Publishing. https://doi.org/10.1007/978-3-319-92034-4_43

Yu, K., Wu, S., & Chi, I. (2020). Internet Use and Loneliness of Older Adults Over Time: The mediating effect of social contact. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*. https://doi.org/10.1093/geronb/gbaa004