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Opinion paper

Social transformation and social isolation of older adults: Digital technologies, nursing, healthcare

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ABSTRACT

Background: The incidence of social isolation among older adults is on the rise in today's health care climate. Consequently, preventing or ameliorating social isolation through technology in this age group is now being discussed as a significant social and health issue.

Aim: The purpose of the opinion paper is to clarify social transformation through technology and shed light on a new reality for older adults in situations of social isolation. Our goal is to persuade the reader that our position on this topic is a valid one. We support our claims with practice-based evidence and published research studies.

Methods: To do so, we checked the most recent literature, most of which came from the last decade. Our literature survey focused primarily on what is known about technology and how technology can affect social transformation and perceptions of social isolation.

Findings: Two dominant transformative realities became the focal points: the precarious implications of loneliness for older adults and the emerging reality of social change through digital technology central to eHealth and mHealth.

Discussion: To benefit from new technologies and reduce the detrimental effects of social isolation, we must engage older adults in a meaningful way and adapt the system of smart devices to reflect the specific physiological and psychological characteristics of the ageing population.

Conclusion: Older adults need to comprehend the meanings of their social experiences to preserve their active lifestyle. Human interactions may be desirable, but technological dominance may also minimize the adverse effects of social isolation.

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Summary of relevance

Problem or issue

Why should older adults relish the convenience of technologies when human-to-human social interaction is more desirable?

What is already known

Older adults are at a higher risk for social isolation, and globally, up to 50% of this age group are at risk of social isolation. Socialisation can be influential to older adults' care.

What this paper adds

The primacy of technology use by older adults has shaped the current reality of social transformation. Social contact through emerging technology and the prevention of adverse effects of loneliness are critically recognised and advanced in nursing and healthcare.

1. Introduction

Recent figures from the United Nations (2015) reflect a significant rise in the world's older population, with people aged 60 years and over making up an estimated 56% of the population. The data also indicate a rise in the elderly population from 901 million to 1.4 billion between 2015 and 2030. Social isolation among the elderly is, therefore, a growing concern. Research has shown that about 30% of older adults experience some degree of loneliness as they get older and more than 50% are at risk of social isolation (Fakoya, McCorry, & Donnelly, 2020). Depending on the scale, the prevalence of social isolation among people aged 60 years and older is 7%-24% compared to 7% in the general population (Hawthorne, 2008). In addition, perceived social isolation is more severe among older seniors (75-85 years of age) than among younger seniors (57-65 years of age; Grenade & Boldy, 2008).

1.1. *Social Isolation among Older Persons*

Social isolation, in particular, poses a real threat to the mental and physical health of older adults and has been identified as a risk factor for all-cause morbidity and mortality, with findings comparable to smoking, obesity, lack of exercise, and high blood pressure. It has been associated with reduced resistance to infection, depression, self-harm (e.g., substance addiction, alcoholism, suicide), higher cognitive and/or physical impairment, and increased mortality (Landeiro, Barrows, Nuttall, Musson, Gray, & Leal, 2017). As a result, the perception of an ageing population and social isolation has become a critical social concern.

Social isolation is a multidimensional concept which lacks a clear and consistent meaning in the literature. Some scholars see it as directly analogous to isolation and use the words interchangeably; others see the two meanings as related but distinct (Nicholson, 2009). For example, social isolation has been described as a lack of interaction with people providing social support. Others have described it as a 2-dimensional term that involves an objective lack of communication or contact interaction and a subjective sense of restricted or lost companionship or social support (i.e., loneliness) resulting from limited contacts or interactions (Dickens, Richards, Greaves, & Campbell, 2011). However, loneliness has to do with how people view, feel, and assess the loss of contact with others (Malcolm, Frost, & Cowie, 2019). Perception of loneliness typically means an unpleasant or harmful feeling that arises when an individual's social network of interactions is perceived to be missing in any meaningful way.

Older adults are vulnerable to deteriorations in social networks and treatments due to multiple factors associated with changes in life and events involving loss (Landeiro et al., 2017). These synergistic influences include events such as retirement, loss of loved ones and other relationships, deteriorating health and increased disability, sensory loss, and mobility restrictions (Medical Advisory Secretariat, 2008). It is also predicted that the older population will have multimorbidity or that 2 or more chronic conditions will coexist. These dependencies and difficulties confront older adults with common age-related deficiencies in mobility, vision, memory, and hearing. Unfortunately, these factors contribute to the predicament that older adults typically encounter and which involves social isolation, loneliness, and depression (Bell & Saraf, 2016). Fortunately, with concerted attempts to help older adults enhance their quality of life by maintaining contact with supportive family members, recent trends suggest that knowledge and communication technologies (Klimova, Simonova, Poulova, Truhlarova, & Kuca, 2016), primarily through 'Self-Monitoring Analysis and Reporting Technology' (S.M.A.R.T.), can be useful and strategic to minimise unexpected and undesirable outcomes.

In the United States of America, the Consumer Technology Association's 2019 report (Leith, 2019) revealed that the health system should expect services for older adults such as active ageing, protection, smart-living technologies, health and remote care, and wellness and fitness applications to cost almost US $30 billion. While the study identified health and remote care as a priority, the use of wellness and fitness technologies are expected to reach $900 million for older adults by 2022. To support the ageing population, there is a need to gain a deeper understanding of technological innovations in promoting older adults' health, thereby supporting the convenience of emerging technologies.

1.2. *Social Transformation*

Social transformation purports that knowledge and information technology can potentially overcome the social and spatial barriers to social interactions by facilitating simple, inexpensive communication and multi-form activities (i.e., text, audio, and/or visual), particularly between older adults and others at anytime and anywhere. Social transformation through the use of technologies is the phenomenon we hope to achieve. We propose evidence-based practice to encourage technology use among older adults to alleviate social isolation.

Considering existing concerns about the costs and demands of care for older adults, this opinion paper focus on baring reasoning for older adults' use of technologies when human interactions appear more desirable, especially when human fragility limits opportunities for socialisation, and the use of digital technologies such as S.M.A.R.T. in promoting eHealth. Our goal is to persuade the reader that our position on this topic is a valid one. Therefore, we support our claims with practice-based evidence and published research studies. To do so, we reviewed the most recent literature, most of which was published during the last decade. Our literature survey focused primarily on what is known about how technology can affect social transformation and reduce perceptions of social isolation. We based our research on social isolation, loneliness, ageism, and age stereotyping in technology use. Previous experiences of co-authors and consultations and references from specialists in gerontology, gero-technology, and science and technology studies have been used to provide a wide-ranging literature.

2. The Influence of Social Isolation and the Ensuing Social Transformation

The two transformative themes that influenced the discussion on social transformation through technologies for older adults in situations conditioned on social isolation were *the precarious consequences of isolation on older adults* and *the new reality of social transformation through digital technologies*. This debate is accompanied by the philosophical and theoretical underpinnings of ageing

and the commitment of social transformation through digital technologies that inform digital health as a new realisation of older adults experiencing social isolation.

3. Philosophical and Theoretical Dynamics of Ageing

The discourse regarding social transformation and social isolation with nursing and healthcare technologies reflects philosophical and theoretical perspectives of ageing and technology as critical underpinnings. In 2002, Gerashchenko proposed that the evolutionary character of the ageing process advances the evolutionary theories of ageing. This philosophical grounding underscores the view of organic human bodies succumbing to their organic composition in which deterioration is a feature.

Impacted by these biological changes, acceptance of technology as enhancing safety, social interactions among the older population, and eventual social transformation are influenced by factors within the following thematic foci: aspects of technology (e.g., high cost, privacy implications, and usability factors); expected benefits of technology (e.g., increased safety and perceived usefulness); the need for technology (e.g., perceived need and subjective health status); alternatives to technology (e.g., help by family or spouse); social influence (e.g., the influence of family, friends and professional caregivers); and characteristics of older adults (e.g., desire to age in place; Peek et al., 2014). These factors influence how healthcare technologies bear on the social isolation of older adults and the consequent social transformation that is provided by technology.

Growing older eventually means an inevitable end, and in the process, people's cognition change, including physical, psychological, and social abilities. While there is no comprehensive list of ageing characteristics, an attempt is made to demonstrate the biological characteristics of ageing to increase understanding of its social and environmental influences. These are regarded as the cognitive changes, physical changes, social changes, and psychological changes.

3.1. Cognitive Changes

The majority of cognitive-related changes that occur in older adults arise from the effects of slower cognitive processing speeds (Harada, Lowe, & Triebel, 2013). This usually begins when entering the third decade of life. This decline in cognitive abilities continues unabated during a lifetime (Salthouse, 2010). Neuron loss may lead to declining cognitive health conditions due to brain injuries and impairments, although not all older individuals will succumb to these effects (Salthouse, 2010). This trend profoundly impacts a variety of reasoning domains. For example, older adults have significantly lower work-memory skills, or they may lose the ability to hold information briefly in recent memory while continuously manipulating related information (Harada et al., 2013).

Research has shown that visual construction skills, verbal fluency, conceptual training, abstraction, mental flexibility, and memory recovery all decline as people age (Singh-Manoux et al., 2012; Lezak, Howieson, Bigler, & Tranel, 2012). These cognition-related situations and conditions among older adults may dramatically increase their risk of injuries, including self-injury, decrease the functionality of daily living activities, and increase both morbidity and mortality (Amarya, Singh, & Sabharwal, 2018).

3.2. Physical changes

Older adults experience a loss of independence, resulting from cognitive disorders and physical-physiological impairment (Faulkner, Larkin, Claflin, & Brooks, 2007). In 2001, Morley et al. estimated that strength declines at a rate of 1.5% per year and may increase to 3% per year after 60. The decline in muscle strength may affect the physical mobility and functional activities of daily living among older adults that, in turn, influence levels of physical activities.

Studies have shown that 85% of older adults are at risk of physical disability. While improvements in healthful lifestyle minimise morbidity and death occurrence, approximately 70% of older adults aged 60-69 years have little or no outdoor activities, and the proportion is higher among those in the 70-year age group and above (Amarya et al., 2015). Disease-related impairments can impede physical activity in older adults with chronic conditions that limit physical functional status or ability to safely negotiate the home or community environment. Physical impairments—including weakness, spasticity, or joint pain—often lead directly to mobility limitations (Macera, Cavanaugh, & Bellettiere, 2016).

3.3. Social Changes

While both cognitive decline and physico-physiological deterioration are supposed to be characteristics of ageing, several studies have highlighted the importance of having a strong social network among people (Charles & Cartensen, 2010). Social improvements were associated with a strong sense of meaning in life and a greater sense of emotional well-being. Older adults who enjoy increased social activity levels are likely to experience less severe cognitive decline than socially disengaged (Charles & Cartensen, 2010). It was also demonstrated that social experiences could protect older adults from dementia (Fratiglioni, Wang, Ericsson, Maytan, & Winblad, 2000).

Older adults, however, have smaller social networks compared to younger adults. Limited social networks result from age-related declines, such as changing societal roles, a companion's death, and functional constraints that limit social connections (Charles & Cartensen, 2010). This promotes social isolation and eventually leads to decreased life satisfaction, depression, and poor health among older adults (Nadler, Damis, & Richardson, 1997). Gupta & Korte, 1994 have since emphasised the importance of having friends and confidants to maintain one's health and well-being.

3.4. Psychological changes

Given that social changes are influenced by cognitive declines and physico-physiological changes in older adults, psychological well-being is critical for healthy ageing. Studies have shown a link between psychological well-being and a healthier and longer life (Sapranaviciute-Zabazlajeva et al., 2018). Nevertheless, some factors do contribute to a decline in psychological well-being among older adults. These include 'aloneness" conditions such as widowhood (Burns, Browning, & Kendig, 2015), disability (Karrpinen et al., 2017), retirement, and social inactivity (Sapranaviciute-Zabazlajeva et al., 2018). Given these common characteristics of older adults and the unidirectional paths of ageing, one can expect that an older persons will experience restricted participation in social activities, particularly during a highly contagious pandemic.

4. Digital Technologies in Digital Health

There is a growing consensus from the global health experts that digital information and communications technologies are essential components and enablers of sustainable systems and universal health coverage (World Health Organization [WHO], 2020). With this, the concept of digital health, or the use of digital technologies for health, has become an important field of practice to address health care needs (WHO, 2019). The broad scope of digital health includes classifications such as mobile health (mHealth), health information technology (IT), wearable devices,

telehealth and telemedicine, and personalized medicine (US Food and Drug, 2020).

The utilisation of digital technologies provides real opportunities to improve health care outcomes and enhance efficiency (US Food and Drug, 2020). Nursing engagements through technologies in healthcare can be harnessed to foster these efficiencies towards optimum health. Ronquillo, Meyers, and Korvec (2020) suggest that the use of digital tools allows patients to better track their own health and wellness by providing holistic views of patients by accessing data and giving them more control over their health (US Food and Drug, 2020). For example, digital devices such as smartphones can be used not only for communication but thanks to added applications these devices can help track changes in blood pressure and blood sugar levels, ensuring compliance for their therapeutic regimen, and monitoring their physical activities (Woods, Cummings, Duff, & Walker, 2018).

Also, the use of digital technologies can empower patients to make informed health decisions and provide new options to facilitate prevention, early diagnosis of life-threatening diseases, and manage their chronic conditions outside of traditional health care settings. Furthermore, digital health technologies are now being used towards reducing inefficiencies in health care, improving its access, reduce its cost, and increase its quality while making healthcare and nursing more personalised (US Food and Drug, 2020).

4.1. Self-Monitoring Analysis and Reporting Technology (S.M.A.R.T.)

The popular term ascribed to digital technologies that generate rapid or timely data is the word 'smart.' However, in the present context, S.M.A.R.T. stands for 'Self-Monitoring Analysis and Reporting Technology' which was initially used to protect and prevent computer hard drive failures and was subsequently designed to monitor and analyse hard drives and provide information about any problems (Christensson, 2006).

S.M.A.R.T. is a catch-all term for a wide range of innovations made possible by the convergence of two trends that are fundamentally changing today's world. First, due to the proliferation of cheap and dominant sensors, most common objects may detect what human beings are doing with them, from canopies that notice instances leading to predictions of rain, to shoes that signal that their parts are wearing out, then sending alerts (Netlingo, 2021). These sensor technologies may also warn about potential problems and identify programmed targets, signifying that these artefacts are no longer unintelligent passive matter but can now 'learn' to differentiate between responsible and irresponsible actions through support from artificial intelligence.

Table 1 lists and describes more than seven types of new older person care technologies, which help them live happier and healthier lives. Advanced digital technologies such as smartphones and sophisticated global positioning systems have enhanced older adults' mobility; evolving medical technologies contributing to eHealth and mHealth have enhanced human sensory skills through audio-visual competencies, minimising memory problems and reducing older persons' isolation entirely and preventing loneliness and its effects.

The S.M.A.R.T. acronym commonly refers to computers or machines that operate or make decisions generally made by humans (Avanade, 2017). Nonetheless, smartphone apps as wearable sensors are available technologies that can influence health-related situations, such as controlling a person's heart rate or allowing family members to track these conditions, thereby easing the family's worries about healthier activities for older adults.

Mobile technologies tend to be handy tools because of their simplicity and consequent effectiveness to protect personal assets, especially financial data. Halpert (2019) has shown that while technical access is innovative, creative and convenient, older adults' demands to engage in this process are often exhausting and may create unwanted effects.

Table 1
Ways in which technology has improved older adults' lives (Halpert, 2019).

Types of technologies	Descriptions
Internet of (Medical) Things	Device connectivity allowing for data sharing.
GPS Services	Global Positioning Services leading to better location accuracy of systems conveying precision positioning.
Cameras	Cameras are indispensable in monitoring physical, emotional, sexual, and neglect in elder abuse cases.
Telephone Apps (Applications)	Monitoring medication, heart rate, and place (with GPS technology) can prevent later complex complications.
Virtual/Robot Assistants	Devices for receiving critical information regarding medical interventions without a person to remind them.
Emergency Response Services	Life alert systems with Emergency Response Service (ERS): e.g., alerts for falls and accidents when no help is around."
Medication Assistance	Older American persons manage approximately 14 prescription drugs at one time leading to misuse of prescription drugs and grave effects of polypharmacy.
Patches and Implants	Glucose level sensors allow for a non-invasive transmitter.

Online banking is one of these practices. It is a simple, age-resistant operation and a technological advantage that many older adults may find challenging. Mobile banking was one of the most significant aspects of technical interest for older adults that Malik (2017) has advocated. The safety features and comfort of online banking are incentives for convenient activities for older adults. However, unwanted problems, such as entering passwords using apps with tiny typefaces, become serious problems for older adults with vision difficulties or experiencing physical challenges requiring finger dexterity. Such security measures may seem unfair to older adults, but they are simple security measures involving attention, recall, and dedication.

Yet, another issue pertinent to older adults' activities is mobile banking through public internet connections. They should be educated in using handheld devices or home machines to access bank accounts. The possibility of identity theft due to memory lapses, e.g., failing to sign out of public computers and/or failing to identify the Internet service provider, would be alarmingly high. The incidence of memory problems, reduced finger dexterity, and easy distraction often leads to concentration loss, which can cause more cognitive problems for the older person.

5. Utilisation of Technologies among Older Adults

According to the American Association of Retired Personnel (American Association of Retired Personnel AARP, 2016), individuals who are 50 years old and above produce $7.6 trillion in economic activity in the US, thus representing an immense financial power. This production will double as older adults live longer by 2050, comprising over 20% of the population (American Association of Retired Personnel AARP, 2016). These 'boomers' want to age consciously, gracefully, and independently; technology is often viewed as a significant opportunity enabling them to achieve these goals, providing a vast opportunity for entrepreneurs to create various types of products.

With virtual reality applications paving the way for new remote locations, older adults with limited mobility can now fight loneliness and boredom. Alleviating the anxiety of relationships about

maintaining healthy lifestyles and ensuring speedy and safe information can be made available, particularly among older adults.

In a study by Vaportzis, Clausen, and Gow (2017) on the perceptions of technology and barriers of contact with technology, they found patterns that exposed obstacles, i.e., lack of guidance and instruction, lack of knowledge and trust, barriers to safety, and costs. They also identified drawbacks and concerns, i.e., too much and too complex technology, feelings of inadequacy and contrast with younger generations. In the end, they found that after a brief exposure to 'smart tablets,' participants expressed the probability of using a portable tablet computer in the future. Nonetheless, regardless of the results, Vaportzis et al. (2017) reported that participants were eager to embrace new technology and very willing to learn how to use it, in particular the smart tablet. However, they expressed apprehension about the current lack of clarity in guidance and support systems, especially for older adults. Understanding perceptions of technology among older adults is essential to serve them well, particularly by incorporating technological devices and leveraging technological utility to improve independent living.

Other studies have shown that older adults with favourable views of the utility of S.M.A.R.T. are more likely to use it (Chiu et al., 2016), especially those that focus on health-related conditions. Adams, Stubbs, and Woods (2005) clarified that their findings also showed that older adults were more likely to use applications if they could be 'extended' to activities which were pertinent to their daily lives, such as communicating with people, gathering information on specific interests, and staying up-to-date with current events and social interests.

Moreover, technologies that form healthcare delivery systems were found to standardise clinical treatment interventions required among older adults (Woods et al., 2018). Wearable technologies were singled-out as a well-accepted technology that has proven its effectiveness, particularly among older adults. Pantano (2019) also described how these smart technologies have become central elements in retailing and consumer behaviour because they control practical concepts such as access to the store, consumer engagement, and experience with new forms of interaction.

Technology seems to have become an integral part of consumerisation by impacting the traditional cultures of shopping, becoming critical to understanding the present and future developments in marketing. The egalitarian utility of digital technologies has become focused on consumers' ways of living, dictating how technologies provide possibilities for older adults to live more meaningful lives.

6. Discussion

The advantages of using digital technologies for older adults are manifold, yet, the importance of technology as complementary to assisting their cognitive and security domains, and optimising their daily lives persists. Strategies and efforts to integrate advanced technologies into older adults' lives can improve overall health while influencing mental health and reducing physical disabilities and costs by integrating protocol-driven models for improved recognition and reporting of deleterious symptoms.

6.1. Technologies and the precarious consequences of isolation on older adults

Technology-based approaches will promote a fruitful exchange of information between older adults and healthcare providers, thereby facilitating self-management. Healthcare providers and older adults work together to enhance their skills and confidence in health management. In addition, technology-facilitated care using digital technologies has the potential to enable early detection of critical clinical symptoms indicative of overall health, enabling health care providers to provide surveillance, advice, and continuity of care. When it comes to initiating early implementation of strategies to enhance adherence and interactive communications that provide compelling insights into seamless support, Melenhorst, Rogers, and Caylor (2001) demonstrated that older adults are prepared and able to learn new skills when they understand the social advantages of using communication technologies.

Although technology is appropriate for older adults, using it has its share of undesirable outcomes. Przybylski and Weinstein (2012) found that the use of digital technologies in social settings would interfere with human relationships that, in most sociological, psychological, and gerontological contexts are central to older adults living their lives more meaningfully. Misra et al. (2014) also found that smartphone technology interactions have produced lower levels of empathy than face-to-face communication while providing insights into how older adults can preserve their socialisation through mobile technologies equipped with high definition cameras. They argued that the absence of smart technological communication was considerably higher for older adults.

Studies involving various social media networks using these technologies indicate that technologies could have adverse effects, such as lower task performance, increased technological stress, and a lower happiness index (Brooks, 2015). In addition, the use of social media was found to lead to decreased extroversion and empathic social skills (Chan, 2014), implying possible replacements of real-life relationships with digital ones, thereby generating social isolation (Elsobeihi & Abu-Naser, 2017).

Since older adults are now linked to intelligent technologies, upon which they become dependent, they would instead prioritise artificial social interaction rather than going to the shop, meet friends, and socialize, preferring less or no physical presence from human-to-human interaction. On the positive side, because advanced digital technologies have been widely adopted and used for social interaction, they can also affect the sense of shared families and friendships. Older adults can decide to forge supportive links with people with whom they want to keep connected.

6.2. Technological functionalities enhancing social transformation

With the technologies available for all persons to use, the Internet of Things (IoT) has created a window towards increasing convenience with social interactions. IoT refers to linking technological devices to the Internet. Connecting different objects with the advent of sensors brings digital intelligence to devices that allow them to communicate data in real-time without involving a human being (Chin, Callaghan, & Ben Allouch, 2019; Kumar, Tiwari, & Zymbler, 2019). The IoT is about connecting machines and systems via actuators and sensors so that essential critical information can be collected from these systems and actions are taken to improve human efficiency and productivity (Ray, 2018). The IoT makes everyday physical objects smarter and more sensitive, merging the physical and digital worlds.

With the introduction of IoT comes a chance for symbiosis between humans and computers (Stephanidis et al., 2019), expressed as collaborative interactions. When IoT devices collect data, a symbiotic human-computer relationship materialises, and AI tools will perform routine data calculations based on individual requirements and prepare insights for evaluation performance and decision making (Ghosh, Chakraborty, & Law, 2018). The fundamental assumption of symbiosis between humans and computers is that humans and computers have complementary problem-solving capabilities and forces. Hassini et al. (2020) explained that when computers and IoT computational power align with human intuition, perception, and 'common sense,' knowledge is enhanced.

6.3. Use of digital technologies in Nursing and healthcare

One of the most popular IoT applications in healthcare is wearable devices. These healthcare devices allow healthcare providers such as nurses, to stay connected to their patients and examine their well-being (Loncar-Turukalo et al., 2019). The primary benefit of IoT-enabled wearable healthcare devices is that these can provide the information needed to control and monitor health outcomes. Soon et al. (2020) claimed that wearable devices give people more visibility thereby influencing their health status, allowing them to make more informed health decisions.

Essentially, using IoT-enabled technologies (such as wearable healthcare devices) allows individuals to track varying medical, fitness, and wellness factors better, and follow their advance towards achievable goals (Dias & Cunha, 2018). Digital devices can track important health indicators as Soon et al. (2020) emphasized, and for people with health conditions requiring close monitoring these devices provide healthcare workers with a broader understanding of their patients' conditions (Durán-Vega et al., 2019).

In her book *Care at a Distance*, Pols (2012) described how telehealth, telemedicine, and telenursing grew out of healthcare demands. These 'tele' processes influencing older population care depend upon the availability of technological advances such as the Internet of Things (IoT) for its success. While human-to-human interaction may be the best way to maintain relationships and prevent and inhibit social isolation, the contemporary representation of technology and human functionality, particularly with digital technologies, relishes the convenience that older adults most commonly desire. To counter social isolation, social transformation through technological advances have become successful in endeavouring nursing and healthcare activities.

7. Summary

Since the advent of tele-healthcare, telemedicine and telenursing have focused on human health and well-being continuing their dependence on advancing digital technologies, and maintaining its premier status for human healthcare. This article explored the types and versions of digital technologies used to transform social isolation among older adults. S.M.A.R.T is dependent on artificial intelligence that renders convenience for eHealth, mHealth, and the subsequent 'care-at-a-distance' (Pols, 2012) for persons challenged by remoteness, mobility, and/or common communication abilities, including those with problems or inabilities to speak. Thanks to digital technologies, these have been made possible thereby impacting the social transformation of older adults.

The focal aspect of this discourse is describing social transformation through technological advances encompassing digital technologies thereby influencing outcomes of social isolation among older adults. With technologies in nursing and healthcare, social transformation is poised to achieve the contextual realisation of digital technologies as valuable commodities for older adult care. Furthermore, outcomes of social transformation with digital technologies were influential in maintaining human interactions even though these were only artificial and representational. In situations of isolation, such as during a highly contagious pandemic, the reality of digital technological advantages brought about by S.M.A.R.T. and the use of smartphones or phablets (phone tablets) enhance older adults' socialisations.

For occasions which may not require physical presence such as when banking and shopping, using technologies foster safer and dependable convenience. Nevertheless, with this convenience and dependence on technologies, older adults will now have less human-to-human interaction and fewer human connections to form more physical socialisations. Eventually, due to these alternative outcomes, digital technologies will become the standard and the eventual 'reality' becoming both a blessing and a 'trap.' These transform human socialisations into 'modern' realities that artificially represent face-to-face encounters using state-of-the-art visual technologies that are already popularized today.

From a nursing and healthcare perspective, an affirming value of digital technologies, such as seen during the COVID19 pandemic, is that they facilitate implementation of the prescribed human physical distancing, thereby mitigating the spread of the contagious disease. The use of S.M.A.R.T., particularly among older adults, can prevent increasing possibilities of exposure to the deadly pathogens, although at the same time increasing the unfavourable effects of social isolation and affecting social transformation.

Besides, with older adults' abilities to use digital technologies, it may seem to be a creation of a time travel scenario, like what occurs in the movie *Back to the Future*. Older adults as grandparents can be more proud of knowing the far-reaching potential effects of communication and digital technologies, thereby advancing social transformations. However, in accepting technology as tolerable through S.M.A.R.T., and promoting healthy living through lifestyle changes, older adults can rely on continuing education through lifelong learning to argue more for, than against the value of technological advances towards enhancing social transformation with technologies in nursing engagements, which may include occasions when they are in institutional settings.

Social isolation and loneliness are crucial issues, particularly among older adults, regardless of where they are located. Along with loneliness and isolation, poor health, adverse health behaviours, premature mortality, and poor cognitive performance (Stockwell et al., 2020) were recognised. However, as older adults spend more time on the internet, it was revealed that they can likely become more prone to increasing loneliness and isolation due to lack of physical interactivity. These are risk factors that can directly and negatively impact their health and quality of life (Hawkley & Kocherginsky, 2018).

Furthermore, while various technologies foster connectedness with families and friends, older adults can easily overwhelm their loved ones. Building age-friendly communities may be helpful in accessing opportunities for social participation. However, with increasing isolation, such as during lockdowns to mitigate and prevent the spread of a highly contagious disease, the time older adults spend online may also affect their levels of social relations. Encouraging the use of the internet and other social media platforms to communicate with friends and families may be ways to relieve their social loneliness.

8. Conclusion

The costs and demands of care for older adults advanced questions regarding technological utility, thereby enhancing social transformations while effectively diminishing the expected consequences of social isolation. This discussion paper focused on the questions, 'Why should older adults use technologies when human interactions are critically more desirable, especially when human fragility limits opportunities for socialisation?' and 'Does the use of digital technologies such as S.M.A.R.T. promote more human-to-human interactions by facilitating social transformation?'

A new reality may be that older adults cannot socialise outside their regular physical and social circles. However, with the valuable incentives provided by S.M.A.R.T., older adults may be persuaded that these conveniences ought to be desired and relished and thereby significantly enhance their social lives. By doing this, lifting them out of isolation towards outcomes of care can be achieved. Digital technologies such as S.M.A.R.T. can promote and weaken older adults' social ties and living responsibilities. However, technologies may also expose them to greater isola-

tion through a newfound appreciation of desired convenience and immediacy of purpose by relishing the convenience with technologies.

The use of technologies for older adults and the influence of adopting technologies in times of social turmoil become the primary factors affecting successful ageing and care in the technological world. Technologies seem to be either a bane or a boon to socially-isolated older adults. As such, they can be expected to exhibit symptoms of declining mental capacities such as memory loss. However, it seems that they can also intently train their minds through mind-exercising technologies, which could boost their cognitive capacities.

Isolation creates stress for older adults and their families. While technologies are valued for improving their socialisation, demands for competencies with high-technology devices can create unintended stresses that can gradually undermine their capacities to socialise, hurting their roles as active members of society. Nevertheless, as Zheng, Chen, and Yang (2019) declared, with the increasing degree of global ageing, the international society's concept of responses has experienced a paradigm shift from that of 'successful ageing,' to 'healthy ageing,' and to 'positive ageing.' For older adults, the new reality is social transformation through digital technologies within the digital era.

Authorship contribution statement

The paper properly credits the meaningful contributions of co-authors and co-researchers.

Declaration and Disclosures

Submission of this article implies that the work described has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or any other language, including electronically without the written consent of the copyright holder.

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Ethical Statement

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Conflict of interest

None.

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