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Research Article

Acceptance of technological advancement in communication gadgets among geriatric population – A cross-sectional research

Kamalanathan Parasuraman[1*], J. Radhika[2], Shantanu Patil[3]

[1]Department of Community Physiotherapy, SRM College of Physiotherapy, SRMIST, SRM Nagar, Kattankulathur, Chengalpattu – 603203, Tamilnadu, India.
[2]Department of Anatomy, SRM Medical College Hospital and Research Centre, SRMIST, SRM Nagar, Kattankulathur, Chengalpattu – 603203, Tamilnadu, India.
[3]Department of Translation Medicine and Research, SRM Medical College Hospital and Research Centre, SRMIST, SRM Nagar, Kattankulathur, Chengalpattu – 603203, Tamilnadu, India.

ABSTRACT
In contemporary times, the utilization of electronic communication networks has emerged as a key means for disseminating information and facilitating health education. Web-based interventions have demonstrated effectiveness and acceptability among the geriatric population, hence serving as a potential means to persuade older persons to engage in interventions. The aim of this study is to investigate the extent to which the elderly population accepts technological advancements in communication devices. A cross-sectional study was conducted among a sample of 300 individuals utilizing the simple random sampling approach. The study utilized the Technology Acceptance Survey among the geriatric population. The assessment employed in the recent investigation was designed to gather demographic data and assess participants' engagement with technology, self-rated computer knowledge, competence in internet skills, as well as their perception and willingness to utilize tele-rehabilitation. There are more men than women among the 300 subjects interviewed and were more from rural areas than from metropolitan ones. The majority of the subjects in the survey were native Tamil speakers (89.6%). The findings of this study indicate that greater percentage (49.4%) of the geriatric population surveyed reported using smart phones. Furthermore, a significant proportion of these individuals expressed a willingness to participate in a geriatric rehabilitation program. Finally, it was concluded that technological intervention in geriatrics aids in the promotion of telephysiotherapy, which enhances physiotherapy while lowering patient costs, hence improving patient satisfaction and establishing the scope of physiotherapy.

Keywords: Geriatrics, information communication technology, tele-rehabilitation, technology, mobile phones.

***Author for correspondence: Email:** physiokamal1977@gmail.com*

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INTRODUCTION

People over 60-year age old are considered elderly or senior citizens according to the 1999 National Policy concerning older people (Malik *et al.*, 2021). Elderly person (≥60-year age), oldest old (≥80-year age), centenarians (≥100-year age) and supercentenarians (≥110-year age) are four categories concerning older people (Lee *et al.*, 2018). Ten percent of Indians are over the age of sixty. According to the 2011 Census, 8% of all senior people were observed to be older than 60-year age old while it was 7.4 as per 2001 Census. By the time the Census is conducted again in 2025, that percentage is predicted to rise to 12.7% (Srinivasan *et al.*, 2010; Prajapati *et al.*, 2022). People ≥60-year age will make up 2.1 billion (currently which is 900 million) of the world's population by year 2050. Between 2020 and 2050, there will be three times as many people ≥80-year age, who will make up 426 million

people (Girelli *et al.,* 2018; World Health Organization, 2024). Based on the research conducted by D. Kathirvel, it is projected that a significant majority, specifically 80 percent, of the elderly population will originate from developing and impoverished nations (Bassem and Kim, 2011).

A multifaceted, multidisciplinary evaluation of an older person's functional capacity, physical and mental health, as well as socio-environmental contexts is known as a geriatric assessment (Kathirvel, 2017). Telemedicine is a significant advancement in the realm of healthcare (Holčapek *et al.,* 2023). In this treatment, a medical practitioner can effectively attend to the well-being of a patient through the provision of adequate social care, even when the patient and physician are geographically distant from one another. Maintaining wellness, freedom, and the ability to reside in one's home environment is highly advantageous for older individuals. This is made possible through the utilization of Information and Communication Technology (ICT) (Bujnowska-Fedak and Grata-Borkowska, 2015; Kraus *et al.,* 2021). The ICT is predominantly designed to cater to the needs of elderly individuals who experience restricted physical mobility and cognitive impairments. ICT has been shown to have a positive impact on the cost, efficiency, and accessibility of healthcare services. By leveraging ICT tools and systems, healthcare providers are able to streamline processes, leading to cost reductions. Additionally, ICT enables healthcare professionals to save time by automating administrative tasks and facilitating the exchange of medical information. Furthermore, ICT plays a crucial role in improving access to medical services, as it allows patients to remotely connect with healthcare providers, eliminating geographical barriers and enhancing convenience (Boxer and Ellimoottil, 2019; Gajarawala and Pelkowski, 2021). Tele-rehabilitation employs video conferencing as a substitute means for facilitating direct medical consultations. Tele-rehabilitation facilitates patients in developing self-assurance and empowers them to effectively manage their health issues within the confines of their domestic environment (Yafit *et al.,* 2019).

In contemporary times, the Internet has emerged as a key avenue for administering physical activity therapies to adults. This mode of intervention delivery has distinct advantages in terms of geographical reach, flexibility in scheduling, and cost-effectiveness, as opposed to traditional face-to-face interventions. Web-based interventions have been found to be well-received by older persons, resulting in a notable rise in physical activity levels when compared to their younger counterparts. The primary obstacles encountered in web-based physical activity are the issues such as diminished satisfaction, website utilization, and retention rates, all of which impose constraints on the achievement of sustained behavioural objectives (Baez *et al.,* 2017; Ambrens *et al.,* 2023).

Contemporary solutions to challenges such as loneliness, social isolation, and health-related concerns among the elderly involve leveraging social networks, particularly through online platforms. Engaging in physical activity can effectively minimize the risk of falls. This technology-driven strategy facilitates the participation of elderly individuals with varying capacities in remote group exercise sessions, effectively concealing these differences within the group dynamics (Cattan *et al.,* 2011; Tate *et al.,* 2015). Most elderly people aren't physically active to the required levels, and many are lacking in access to programs that encourage behavior change in their lives. Telehealth care and tele-rehabilitation are anticipated to become crucial components of the future global healthcare landscape. Therefore, the purpose of this study was to investigate the level of acceptance of novel technologies and technological approaches in the provision of healthcare services among the elderly population.

MATERIALS AND METHODS

Study area

In the southern Indian city of Chennai, in the Chengalpattu district, a cross-sectional research was carried out. The study was conducted in SRM college of Physiotherapy from January 2020 to June 2020.

Study design

The older adults in the geriatric community were chosen for this study using a simple random sample selection technique. A systematic sampling procedure was used to enroll individuals who were sixty years of age or older encompassing both male and female participants. The subjects who displayed a lack of interest in engaging with the survey were omitted from the study. Finally, 300 subjects in all finished the interview. The subjects chosen are subsequently requested to fill out the Technology Acceptance survey. The survey utilized in the aforementioned research was meticulously designed and encompasses various demographic variables. It includes specific categories that enable participants to evaluate their level of engagement with technology, self-assessed computer proficiency, competence in internet skills, as well as their perception and willingness to adopt tele-rehabilitation methods.

Ethical approval

Before commencing the poll, ethical clearance obtained from SRM Medical College Hospital and Research Centre (1760/IEC/2019) of SRM Institute of Science and Technology (Chengalpattu, Tamil Nadu, India). Also ensured that informed consent was obtained from all participants in the survey.

Questionnaire Investigation

Questionnaire adapted for this survey is a sustainable engagement with technology and willingness to use tele rehabilitation developed by Seidman *et al.,* (2017). Trained investigators used established questionnaires to conduct the interview. The questionnaires encompassed questions on subject's socio-demographic features, level of education, nature of their work, spoken language, access to devices (mobile phone, computer, laptop, tablet), utilization of advanced technology in health care. Following participant's completion of interview, each questionnaire was reviewed by the interviewer using a parallel entry procedure.

Statistical analysis and software used

The collected data was tabulated in Microsoft excel and was analysed statistically using SPSS software.

RESULT

Distribution of subjects

Between February 2020 to August 2020, 300 subjects were interviewed as part of the research population. Table 1 illustrates the overall distribution of subjects by age and sex. There are more men than women among the 300 subjects interviewed. Of the 300 subjects, the age group 60-70 years old accounted for more subjects (77.6%) and the age group 81-90 years old (7.0%) for less subjects. When it comes to gender distribution, it's interesting to note that there is a higher percentage of men (61.0%) compared to women (39.0%). Recognizing language communication in the geriatric population can help determine whether a patient is feeling sick or has a health issue. The majority of the subjects in the survey were native Tamil speakers (89.6%). Other major speakers included malayalam and telugu among various other languages.

Table 1. Subjects distribution according to age, sex and language spoken.

Parameter	Frequency of subjects	Percentage of subjects (%)
Based on age (years)		
60-70 year	233	77.6
71-80 year	46	15.3
81-90 year	21	7.0
Based on sex		
Male	183	61.0
Female	117	39.0
Based on language spoken		
Tamil	269	89.6
Malayalam	4	1.3
Telugu	8	2.6
Others	19	6.5

Economic status and living area

For the elderly to have a healthy and worry-free existence, they should be financially comfortable. For this, knowing about their source of income is necessary. Table 2 displayed the number and proportion of subjects with various income sources. A significant number of them were retired, according to the data (45.3%). Table 2 displays the research subject's demographic information. There were significantly more subjects from rural areas than from metropolitan ones.

Table 2. Mode of working and living area of subjects.

Parameter	Frequency of subjects	Percentage of subjects (%)
Based on mode of working		
Working full time	62	20.6
Working part time and or semi-retired	27	9
On sick leave	4	1.3
Retired	136	45.3
Not employed	71	23.6
Based on living area		
Rural	211	70.3
Semi urban	56	18.6
Urban	25	8.3
Metropolitan	8	2.6

Access to devices

Availability and accessibility of mobile phone, computer, laptop, tablet among selected geraitric population were assessed. Table 3 displays the summary of accessibility of devices to the subjects under investigation. All the participated subjects have access to either smart phones or normal keypad phones. Among the 300 elderly participants, the majority had standard keypad phones (50.6%), utilized their phones frequently throughout the day, and used their mobile devices for accessing the internet. When it comes to the frequency of mobile phone usage, a whopping 75.3% of individuals rely on them on a daily basis. Just over half of the population (53.2%) prefers using their mobile phone for internet access. The majority of the elderly participants have limited access to a desktop (33.8%), laptop (37.7%), or tablet (21.8%), and they also use them less frequently to access the internet. Most the of elderly participants responded that they lack computer and internet skills. The overall information regarding the modes and usage of mobile phone are provided in Figure 1.

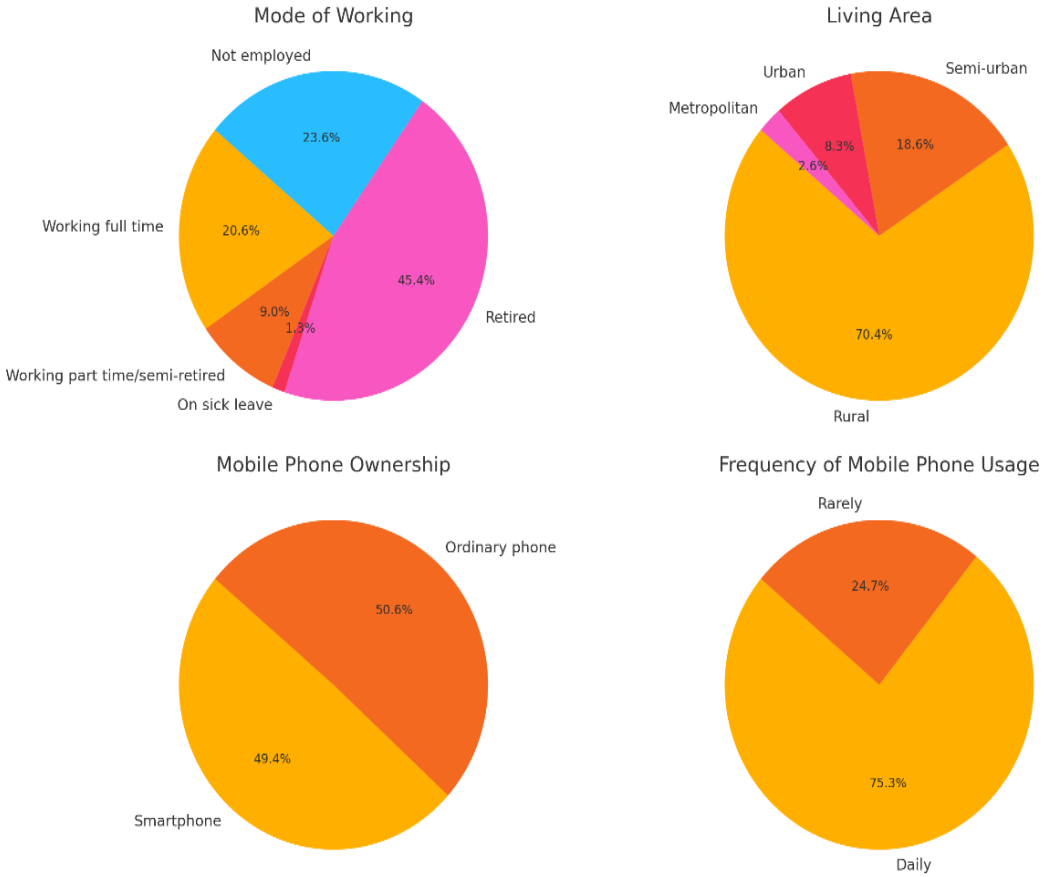

Figure 1. Modes and usage of mobile phone

Table 3. Availability and accessibility to devices and internet.

Questionnaire	Relative answer	Frequency of subjects	Percentage of subjects (%)
About mobile phone, other device and their internet connectivity			
Do you have a mobile phone?	Smart phone	148	49.4
	Ordinary phone	152	50.6
How often do you use your mobile phone?	Daily	226	75.3
	Rarely	74	24.7
Does this device have internet access?	Yes	160	53.2
	No	140	46.8
Other devices			
Desktop computer	No	199	66.2
	Yes	101	33.8
Laptop	No	187	62.3
	Yes	113	37.7
Tablet	No	238	79.2
	Yes	62	21.8
Do you use these devices to access the internet at home?			
Desktop computer / Laptop / Tablet	No	206	68.8
	Yes	94	31.2
Do you use a computer, laptop or tablet outside of your home to access the internet?			
NO		249	83.1
Yes		51	17
Overall How would you rate your Computer and internet skills			
Adequate		101	33.8
Less		199	66.2

Subjects' understanding of the advancement of technology in healthcare

Investigations were conducted on the attitudes and level of satisfaction of the participants regarding their comprehension of the advancements in health care technology. Table 4 presents a summary of the findings from those studies. A mere 36.4% of individuals rely on the internet for information regarding health-related subjects. A significant majority of individuals, approximately 71.4% express a strong inclination towards utilizing technology for receiving medical treatment within the comfort of their own homes. Additionally, there is a strong eagerness to acquire knowledge (83.1%) when individuals are provided with free educational opportunities. A small percentage of respondents have expressed reservations about the use of technology in healthcare. A significant portion of the participants, 55.8% to be precise, expressed optimism about the potential of technology and the internet in enhancing healthcare delivery in the future. A significant portion, 24.7% to be exact, believed that they would hold great value. The Table 4 shows that majority of participants in this investigation responded that they won't use the internet to access any health information or discussion sites. More percentage of participants responded "I PROBABLY WOULD USE IT" to access health services and complete their exercise classes at home using the internet and technology rather than needing to come into the hospital. Also, more of participants responded that they were willing to learn how to use a computer for healthcare management. The greater percentage of participants do not have concerns about using technology. Good number of participants account for the usefulness of the internet and technology in the delivery of health care for future generations. The overall data of gadget usage and internet connectivity are provided in Figure 2.

Table 4. Advancement of technology and health care in geriatric population.

Relative answer	Frequency of subjects	Percentage of subjects (%)
Do you currently use the internet to access any health information or discussion sites (e.g. Lung Foundation Australia website, using Google for health information or to answer questions you have)?		
Yes	109	36.4
No	191	63.6
It is now possible to access health services and complete your exercise classes at home using the internet and technology rather than needing to come into the hospital. You would continue to interact (speak, listen and see) with your physiotherapist live face		
I definitely would not use it	12	3.9
I probably would not use it	16	5.2
I am undecided if i would use it or not	58	19.5
I probably would use it	183	61.0
I definitely would use it	31	10.4
Would you be willing to learn how to use a computer for your healthcare management, if free training was available?		
Yes	249	83.1
No	51	16.9
Do you have any concerns about using technology (such as a computer or mobile phone) for your health care?		
Yes	27	9.1
No	218	72.7
Total	245	81.8
Missing System	55	18.2
What is your opinion about the usefulness of the internet and technology in the delivery of health care for future generations?		
Extremely useful	74	24.7
Useful	167	55.8
Unsure	51	16.9
Not useful	04	1.3
Not useful at all	04	1.3
Total	300	100.0

Figure 2. Gadget usage and internet connectivity

DISCUSSION

This is a cross-sectional study with 300 samples using a simple random sampling procedure. There is limited in-depth literature exploring geriatric population perspectives and experiences of physical therapy intervention through technological innovation using communication gadgets. Utilizing the questionnaire "Technology acceptance survey among elderly populations," this study investigated the determinants of technology use for health and care services using various devices among the geriatric population. This prepared survey was established in a recent research study and has certain categories that allow them to assess their involvement with technology; self-rated technical knowledge; competency in online abilities; and perception and desire to utilise tele-rehabilitation. The survey questionnaire was translated into a few languages and given to the participants.

We discovered in this study that the geriatric population has a high level of adoption and wide use of modern information and communication technologies. Chou *et al.,* (2013) in their research findings revealed that elderly people with better social welfare and health who used the device on a routine basis had a higher quality of life and were more accepting of technology use. While researching the utility of the internet, communication, and technology in the delivery of health care to future generations among the geriatric population, the study concluded that it was more useful. More objective recognition of emotional illnesses is possible with ICT than with self-administered questionnaires. They deliver more accurate assessments and are less likely to make mistakes. This allows for constant monitoring as well as the possibility of non-pharmacological therapy (Gramaglia *et al.,* 2021).

Male senior citizens account for 61 percent, while female senior citizens account for 39 percent, because female senior citizens have fewer opportunities to investigate these technologies due to age-related ailments, a lack of interest, and daily housework. According to Kim *et al.,* men were more likely than women to access and use ICT. ICT access was linked to all types of social involvement among women, but only with men's informal social participation (Kim *et al.,* 2017). The percentage of surfing the web in India is greater across men than women: 57.1% of men and 33.3% of women use the internet nationally. In rural India, where just one in four women had ever accessed the internet, the gender disparity in internet usage was also noticeable, with just under 49% of males in the same area having done the same (Joshi *et al.,* 2020; Scott *et al.,* 2021). Based on this data, our study might have involved a lower number of female participants.

People use the internet for acquiring intervention purposes, regardless of what technology gadgets they use. This is especially accepted by those who are in need of it. The utility and awareness of the internet are also determined by one's level of education. Individuals with a low economic background may find it difficult to utilise a laptop or desktop computer. It's possible that some people are not really aware of

how to use it. Merkel *et al.*, stated that the probability of using internet-based health and social services and their accompanying advantages strongly depends on socioeconomic background (Merkel and Hess, 2020). Training and educational programmes might be helpful to mitigate these differences. Health practitioners must also advocate in order to raise public awareness.

The majority of the senior population prefers smart phones to other technological gadgets because they have quick internet access, are convenient to carry and use anywhere, and are affordable to people of all socioeconomic backgrounds. It was reported that that 18% of senior individuals are users of smart phones, while 59% of seniors engage with the internet. In comparison, the general percentage of adults using the internet stands at 86% (Lesauskaitė *et al.***,** 2019). These statistics indicate a significant proportion of patients utilizing both internet and mobile phone technologies. Interactive technologies have the capacity to modify patient behavior and enhance their engagement in physical activities. The primary means of promoting physical exercise is largely conducted through online platforms, which may be accessible via various electronic devices such as computers, tablets, or mobile phones. Internet intervention refers to a holistic approach that encompasses evidence-based strategies, continuous monitoring, and feedback regarding modifications in behavior. Feedback, self-monitoring, goal setting, urging, and action planning are incorporated as interactive components inside programs. Small, portable, wearable technology equipped with network capabilities have been employed as physical activity monitoring tools to effectively follow a patient's behaviour (Nurgalieva *et al.***,** 2019).

Compared to working senior citizens who have a strict daily routine, retirees have more time at home to explore, so they can feel free to search, analyze, and experience the utilization of tele-rehabilitation. Busch, et al. discovered that older people have a low prevalence of problematic smartphone usage (Busch *et al.***,** 2021).

CONCLUSION

This study concludes that technological intervention in geriatrics helps to promote telephysiotherapy, which improves physiotherapy while cutting patient expenditures, thereby boosting patient happiness and establishing the scope of physiotherapy. This study also concludes that a geriatric individuals aged 60-70 in rural areas lack confidence in their computer and internet proficiency, despite owning smartphones. Despite this, they are eager to learn and adopt digital healthcare technologies, emphasizing the need for digital literacy programs. The limitation of the current study is that the study sample size was small (300 participants). The participants would understand the english-language questionnaire notably better if it was translated into their native language.

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Conflict of Interest

The authors declared nil in this investigation

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