Learning Information and Communication Technologies in active aging: A qualitative study in Buenos Aires

Aprendizaje de las Tecnologías de la Información y la Comunicación en el envejecimiento activo: un estudio cualitativo en Buenos Aires

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Abstract

The objective of this research was to explore the learning of Information and Communication Technologies (ICTs), specifically the use of mobile phones, in older adults committed to active aging. It is recognized that learning is a continuous process throughout life, through which new knowledge is integrated into previous schemes, allowing the construction of new knowledge. This study was developed through a qualitative approach using the constant comparative method for data analysis, under the grounded theory design. Semi-directed interviews were carried out with a theoretical sample of 10 older adults (ages between 60 and 95 years) participating in workshops on the use of ICTs in the As-

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sociation of Retirees and Pensioners, a club and a protected workshop in AMBA, Buenos Aires. The research results suggest that learning technology has a significant impact on the active aging of older adults, facilitating their integration into contemporary digital society. Additionally, the technologies of the R-relationship are explored, a concept that integrates the relational aspect with technology, and the approach of Educommunication through educational intervention in the media.

Keywords: Active aging; Adult learning; Educommunication; ICT; Mobile phones; Older adults; R-relationship technologies.

Resumen

El objetivo de esta investigación fue explorar el aprendizaje de las Tecnologías de la Información y la Comunicación (TIC), específicamente el uso de teléfonos móviles, en adultos mayores comprometidos con el envejecimiento activo. Se reconoce que el aprendizaje es un proceso continuo a lo largo de la vida, mediante el cual se integran nuevos conocimientos a esquemas previos, permitiendo la construcción de nuevos saberes. Este estudio se desarrolló a través de un enfoque cualitativo utilizando el método comparativo constante para el análisis de datos, bajo el diseño de teoría fundamentada. Se llevaron a cabo entrevistas semidirigidas con una muestra teórica de 27 adultos mayores (edades entre 60 y 95 años) participantes en talleres sobre el uso de TICs en la Asociación de Jubilados y Pensionados, un club y un taller protegido en AMBA, Buenos Aires. Los resultados de la investigación sugieren que el aprendizaje de la tecnología tiene un impacto significativo en el envejecimiento activo de los adultos mayores, facilitando su integración en la sociedad digital contemporánea. Además, se exploran las tecnologías de la R-elación, un concepto que integra el aspecto relacional con la tecnología, y el enfoque de la Educomunicación a través de la intervención educativa en los medios de comunicación.

Palabras clave: Aprendizaje en el adulto; Educomunicación; Envejecimiento activo; TIC; Teléfonos móviles; Personas adultas mayores; Tecnologías de la R-elación.

INTRODUCTION

This research aimed to understand the learning of technology for active aging among older adults in AMBA, consisting of the Autonomous City of Buenos Aires (Lugano and Barracas) and the southern zone of Buenos Aires, to generate new strategies. Currently, there are ICTs specifically aimed at promoting active aging; they are tools that stimulate cognitive capacity and improve health (López-Alfayate, 2018). That is why, from the field of Psychopedagogy, it will be essential to understand the role of Information and Communication Technologies (ICTs) and the use of mobile phones in the aging processes of older adults.

ICTs, the R-relational factor, and educommunication through the application of new technologies offer a range of multiple relational implications that enable adaptive learning, as well as encourage collaboration and cooperation in proposals, favoring assis-

tance and group work in social contexts, as highlighted by Hernández-Silvera et al. (2022) and Gabelas-Barroso and Marta-Lazo (2020). Educommunication integrates educational strategies with media and communication technologies to support inclusive and meaningful learning. It fosters emotional engagement and motivates older adults by connecting learning with real-life social interaction, storytelling, and cultural content.

Hernández-Silvera et al. (2022) stress that ICTs can enhance relational aspects and educommunication through the use of pedagogical tools such as mobile phones. These open up various relational implications that promote adaptive learning, especially relevant for older adults. Integrating the use of mobile phones and other information technologies is crucial to promoting digital inclusion, facilitating social connection, and fostering continuous learning among older adults.

Problem statement

Lifelong learning is essential for personal development and active aging. New technologies are an option for aging, so it is interesting and necessary to understand the adaptations to these current advances and transformations, leading them toward improved autonomy and promoting quality of life (Martínez-Gálvez & Ortega-Expósito, 2021).

The technological gap excludes older adults from numerous opportunities and services available in the digital age. By studying their technological learning, the barriers and challenges they face are identified, and strategies are developed to incorporate this population into society (Melo-Martínez et al., 2017).

On the other hand, these scaffolds allow them to carry out activities autonomously, such as making online purchases, accessing government services, managing their finances, and staying informed. Saavedra-Bautista et al. (2020) point out that the use of technology can foster social participation by facilitating communication and interaction with others, reducing social isolation, albeit with the necessary follow-up.

Likewise, this learning involves a process of acquiring skills and knowledge that stimulates the minds of older adults. It helps maintain and improve cognitive functions, such as memory, attention, and problem-solving. Fajardo-Cuéllar and Wobbeking-Sánchez (2020) point out that aging involves facing personal changes and adapting to a society where rapid progress is occurring. This implies the stimulation of cognitive reserve, providing learning opportunities to achieve individual and collective demands through the exchange of meanings, knowledge, strategies, and experiences to develop skills and knowledge to improve their quality of life. In this way, the capacity for knowledge and learning expectations are kept active, and they benefit from the confidence and security that each teaching provides (Cambero-Rivero & Díaz-Galván, 2019).

The objective of this study is to explore the impact of learning about Information and Communication Technologies, especially mobile phone use, on active aging among older adults in the Autonomous City of Buenos Aires. It sought to understand how continuous learning of these technologies contributes to the social integration and participation of this age group, as well as identify the perceived benefits and difficulties encountered during this process.

Background

Several authors have significantly contributed to the study of the use of Information and Communication Technologies (ICTs) by older adults. Vásquez-Rizo et al. (2020) focused on technological interest, state responsibility, digital literacy, and technological appropriation in older adults, concluding that this group faces risks of technological exclusion due to personal, motivational, educational, social, and governmental factors.

Casado-Muñoz et al. (2015) analyzed the evolution of computer and Internet use by older adults in university settings over nine years, highlighting a significant increase in the frequency and diversity of use motivated by the desire to stay active, up-to-date, and connected, as well as by the perception of a continuous need for learning.

Muñoz-Alarcón et al. (2020) investigated the use of ICTs in the aging process, concluding that policies and pedagogies that promote technological appropriation improve living conditions and favor active aging among the elderly, despite initial resistance.

Cabezas-Mery (2022) focuses on the uses and gratifications that older adults in the Biobío Region obtain from ICTs, finding significant benefits in terms of information, entertainment, family communication, learning, and financial management.

Cambero-Rivero and Díaz-Galván (2019) explored the relationship between active aging and continuous learning, highlighting that learning not only involves acquiring academic knowledge but also promoting personal development and social relationships among older adults.

López-Alfayate (2018) stressed the importance of developing technologies adapted to the needs of older adults, highlighting ICT as key tools to support active aging and improve various aspects of quality of life.

On the other hand, the contribution of transmedia storytelling can be crucial in helping to acquire technological skills effectively. The Transmedia Storytelling approach allows for the use of multiple platforms and media to tell a cohesive and enriched story, which could be especially beneficial for this demographic. For example, instead of simply teaching mobile device use in a traditional classroom, transmedia storytelling could design learning experiences that integrate accessible online video tutorials, interactive applications specifically designed for older adults, and perhaps even digital stories that guide the learning process step by step in an entertaining and motivating way (Montoya & Páez, 2021).

These studies demonstrate that technological learning promotes active aging by providing older adults with significant benefits that improve their daily lives, enhance their cognitive capacity, and empower them to use social media and influence transmedia storytelling. It is essential to understand how and why they embrace ICTs, overcoming barriers and promoting their overall well-being.

ADAPTIVE LEARNING AND TECHNOLOGIES ON COMMUNICATION IN OLDER ADULTS: PSYCHOPEDAGOGICAL APPROACH AND EDUCOMMUNICATION PERSPECTIVES

Interdisciplinary work with older adults is essential due to the physical, cognitive, emotional, and social changes inherent to the aging process (Marcos-Pardo et al., 2021). Despite stereotypes suggesting that learning declines with age, current evidence shows that older adults can continue learning and acquiring new knowledge. Hernández-Silvera and Leonardelli (2022) argue that population aging poses various challenges to families, communities, and societies, in aspects such as economic growth, economic security in old age, the organization of health care systems, and the strength of family support systems. Along with increasing life expectancy, keeping older adults active by providing spaces for development and bonding improves their quality of life.

The integration of information and communication technologies (ICTs) into the education of older adults can have a significant impact on their daily lives. However, it is crucial to recognize that some older adults may face difficulties adopting these technologies due to physical, cognitive, or social limitations, as well as a lack of familiarity with them. Therefore, it is essential to offer an educational approach tailored to the individual capabilities, needs, and preferences of each older adult.

In this context, educommunication and Relationship and Communication Technologies (TRIC) play a fundamental role. The TRIC concept, as proposed by Gabelas-Barroso and Marta-Lazo, expands the concept of traditional ICTs by focusing on how technology facilitates emotional connection, interpersonal relationships, and social inclusion. These relational aspects are particularly relevant for older adults, as they strengthen digital literacy and promote active aging in a connected society. Educommunication, as a concept introduced by Bernal-Meneses et al. (2019), emphasizes the integration of education and communication to facilitate meaningful learning processes adapted to the specific needs of older adults. TRIC, according to the approach of Gabelas-Barroso and Marta-Lazo (2020), focuses on the use of technologies to strengthen interpersonal relationships and communication, fundamental aspects for the well-being and social integration of older adults.

In addition, the educational psychologist plays a key role in providing the necessary tools for older adults to address the learning challenges that arise in later life stages. This includes resolving everyday situations in which they are involved, intervening with the family, and collaborating with other professionals who work with older adults (Bianchini, 2022). The choice of competence from the field of psychopedagogy as a theoretical framework is relevant to its focus on the cognitive, emotional, and social processes of learning, which is essential to understanding how older adults appropriate ICTs. By combining psychological and pedagogical aspects, psychopedagogy allows us to analyze both the internal factors and individual aspects that comprise the most appropriate teaching strategies. Likewise, the concept of relationship technologies, closely linked to psychopedagogy, is key to understanding how ICTs can promote social relationships and the

well-being of older adults. Although educommunication shares with psychopedagogy an interest in technology-mediated teaching-learning processes, the former focuses on the analysis of media in a broader context. In this study, psychopedagogy provides a more individualized perspective focused on the internal processes of learning, which is essential to understanding the experiences of participants. On the other hand, according to González (2019), "psychopedagogy provides a more complete perspective by integrating psychological and educational dimensions, which is crucial for designing effective interventions that consider the emotional and cognitive needs of the learner" (p. 93). This integration allows for a more holistic and effective approach to addressing difficulties in the learning process.

Likewise, in educommunication, especially with the use of ICTs, digital technologies are recognized as having a significant impact on motivation and the emotional aspect of learning. Czaja et al. (2024) highlight that "the integration of ICTs in older adult education not only improves access to knowledge, but also plays a crucial role in the motivation and emotional engagement of the learner, facilitating a more immersive and personalized educational experience" (p. 45). Technological tools, being interactive and adaptive, can improve participation and appropriation of educational content.

In short, working with older adults in the field of psychopedagogy and educommunication involves considering their specific characteristics and adapting teaching strategies to foster continuous and meaningful learning, both in the technological field and in other aspects of their personal, emotional, and inclusive social development..

THEORETICAL FRAMEWORK

Older Adults: Learning Technology

Older adults constitute a segment of the population that has passed middle age and is generally between 60 and 65 years old. This stage of life is characterized by physical, cognitive, emotional, and social changes typical of aging, according to various authors such as Agüero-García et al. (2022), Valarezo-Carrión et al. (2020), and Gulisano-Basso et al. (2022). Despite stereotypes that suggest that learning declines with age, current evidence shows that older adults can continue learning and acquiring new knowledge throughout their lives. This process of acquiring skills, knowledge, and experiences requires a constant and active effort that spans all stages of life, including older adulthood.

In this sense, Vicente and Vila (2017) add that aging should not be seen as a limitation in this process, but rather as another time where information continues to be assimilated. They also highlight the importance of considering older adults' skills and prior experiences to maximize their learning potential.

Caballero-Figueredo (2022) highlights the importance of considering the individual characteristics of older adults in the learning process, such as cognitive style, educational level, and motivation. Although the process may be slower, Caballero points out that it is no less effective.

In relation to this, Vásquez-Rizo et al. (2020) add the value of adapting teaching strategies to the social context and their characteristics, highlighting motivation and interest as key factors for this particular group.

On the other hand, Gulisano-Basso et al. (2022) comment that the use of ICT can have a significant impact on this transformation and on their daily lives. In addition, other research, such as that of García and Heredia (2017), mentions that ICTs enable older adults to access information, services, and activities online, stay connected with their loved ones, and participate actively in the digital society.

However, some authors have pointed out that this age group may face difficulties in this transformation due to their physical, cognitive, and even social limitations, as well as their lack of familiarity with new technologies. "The adoption of technologies by older adults implies a change in their practices and lifestyles, which can generate a certain fear and resistance" (Rice et al., 2019, p. 4). Similarly, Agüero-García et al. (2022) suggest that the lack of familiarity with ICTs, the lack of confidence in their use, and the perception that they are complicated and difficult to learn hinder technological learning in this population group.

In addition, Caballero-Figueredo (2022) highlights the importance of personalizing technology-based educational strategies for older adults, ensuring that they adapt to their capabilities, needs, and preferences. For their part, Concepción-Breton et al. (2020) agree that technological learning for older adults should be an adaptable and continuous process, focused on developing practical skills and considering the unique characteristics of each individual.

In summary, learning in older adults involves a constant process that can be influenced by multiple individual, social, and contextual factors. However, it cannot be seen as a limitation to continued learning. Although they may experience difficulties in adopting new technologies due to a lack of familiarity with them and the presence of negative stereotypes about these skills, there are strategies adapted to this age group that can significantly improve older adults' daily lives and help them overcome all kinds of barriers.

Active aging

The concept of active aging has recently gained importance due to the significant increase in the older population. Active aging focuses on improving the physical, social, and mental well-being of older adults throughout their lives, promoting their participation in society according to their needs, interests, and capabilities (Román-Graván et al., 2021, p. 111). This approach includes the use of mobile devices to develop media skills and expand knowledge about social media through Information, Communication, and Relationship Technologies (ICTs). Gabelas-Barroso et al. (2012) suggest that experience in ICT technological environments facilitates interactions through social media, thus enriching a more adaptable online educational approach. For example, older adults can benefit from interacting on platforms such as Facebook or WhatsApp, where they can share experiences, stay informed, and connect with family and friends, thus promoting continuous learning and active social participation. Additionally, applications like Skype or Zoom allow for

video calls, facilitating face-to-face communication over distance, which is especially relevant for older adults who cannot easily get around.

This expansion offers additional examples of how ICTs can improve the social and educational lives of older adults by using specific tools that promote interaction and connection with others.

In contrast to the traditional view of aging as a period of decline and deterioration, an increase in the quality of life, interest in new activities, and the development of new social networks are seen (Cambero-Rivero & Díaz-Galván, 2019).

The Organization of American States (2015), in the report of the Second World Assembly on Aging, establishes that "older people can participate in the economic, political, social and cultural life of their societies" (p. 3). In this sense, Parra-Rizo (2017) presents the initiatives of this organization and mentions that there are actions that ensure a long and healthy life, opting for active and healthy aging. Agost-Feliz et al. (2021) propose that active aging is a process that involves both the individual and the social environment in which they develop, and that aims to promote autonomy and well-being in old age. Likewise, Fajardo-Cuéllar and Wobbeking-Sánchez (2020) point out that active aging involves stimulating cognitive reserve (CR). This is related to the acquisition of new skills and participation in activities that challenge the brain, which contributes to the creation and maintenance of CR and a higher quality of life at this stage. Similarly, Hernández-Silvera and Leonardeli (2022) state that cognitive reserve influences the delay in the onset of symptoms of deterioration; this explains the importance of continuing to be active to cope with injuries.

These definitions highlight the importance of the individual's dynamic role in their aging process. Furthermore, Agost-Feliz et al. (2021) emphasize that the social environment in which an individual operates is a decisive factor in active aging.

Cambero-Rivero and Díaz-Galván (2019) highlight the importance of lifelong learning, considering active aging as an essential strategy that facilitates the acquisition of new knowledge and skills, in addition to contributing to the prevention of neurodegenerative diseases. According to these authors, lifelong learning (LLL) provides people with continuous opportunities to acquire knowledge, skills, values, and attitudes that promote their personal and professional development.

López-Alfayate (2018) mentions tools that can be useful for promoting active aging in older adults. This refers to the constant adaptation to change throughout life, thus optimizing opportunities for health, participation, and safety to improve quality of life as people age. He also highlights stimulation through Information and Communication Technologies (ICTs) as an integral part of active aging.

Cambero-Rivero and Díaz-Galván (2019) point out that access to and use of ICTs are not uniform among older adults, and it is essential to consider the barriers that may hinder their effective use. According to Rosado-Álvarez et al. (2020), the digital divide represents one of the main difficulties that limits the effective use of ICTs in the older adult population. These researchers explain that this digital divide, defined as the disparity in access, use, and digital skills among different population groups, can be associated with

factors such as age, gender, socioeconomic status, and educational level. The importance of integrating academic literacy and personal interest into informal education proposals through educommunication is thus highlighted. This is closely linked to motivation for the learning process, as these spaces offer a connection to the social and cultural environment, as well as access to general information and social networks, even facilitating intergenerational debate through music.

Following Gabelas-Barroso and Marta-Lazo (2020), the integration of technology, information, and communication creates stable spaces and relationships of trust that facilitate educational exchange. This approach, acronymized as TRIC, plays a crucial role in promoting life skills, which go beyond the early stages and are essential for empowering older adults in various cognitive and independence aspects. The integration of TRIC fosters the development of life skills such as decision-making, emotional regulation, and effective communication. These skills are essential to maintaining autonomy, resilience, and personal fulfillment in older adulthood.

In short, active aging has become a relevant topic for promoting a healthy and successful aging process in the older adult population. It focuses on recognizing the potential of older adults to continue learning, contributing, and participating in various areas of life. In this context, the use of ICTs plays a fundamental role in providing tools and resources.

These tools enable this age group to participate in society and improve their quality of life actively. However, it is important to address digital divides and ensure training and equitable access to ICTs for all older adults, as these tools have the potential to transform their aging experience positively, but only if they are used effectively and associated challenges, such as online security and data privacy, are overcome.

ON LIFELONG LEARNING AND ITS IMPACT ON OLDER PEOPLE

Lifelong learning is not simply limited to acquiring new knowledge and skills; it also fosters the development of healthy resources and leads to a substantial improvement in the quality of life. This process not only enables people to effectively adapt to a global environment that is agile and constantly evolving, but it has also proven critical in the aftermath of the pandemic, redefining the ways we connect and participate in an increasingly interconnected and dynamic society.

On the other hand, according to Vicente and Vila (2018), human beings take ownership of learning by interacting with their environment, which promotes their personal growth by being immersed and actively participating in society.

Lifelong learning extends to formal, non-formal, and informal contexts, encompassing areas such as school, work, and everyday life. This approach not only focuses on diagnosing and treating learning disorders but also plays an indisputable role in preventing difficulties and promoting mental health. In this sense, it is essential to stimulate cognitive reserve in older adults (Gulisano-Basso, 2022).

According to González-Díaz and Lara-Martínez (2022), professionals must adapt their approaches according to individual needs, using theories that guide both prevention and intervention in specific problems. Authors such as Vicente and Vila (2018) highlight the essential role of personalized learning in older adults, adapting educational strategies to their unique abilities and recognizing the importance of Information and Communication Technologies (ICT) for their personal and social development.

Furthermore, Vicente and Felicitas (2022) emphasize how ICT learning can promote active and healthy aging by providing communication and learning opportunities that would otherwise be inaccessible. This adaptive, person-centered approach enables educational psychologists to improve the quality of life of older adults by promoting their personal growth through educational methodologies that respond to their individual needs and the context in which they operate.

Intervention in the field of older adults plays a vital role in cognitive, emotional, and social development, as well as in enhancing their quality of life and overall well-being. According to Vicente and Vila (2018), there is significant recognition of the importance of addressing functional capacity as an indicator of health and quality of life, as well as risk and protective factors in the aging process. It is essential to understand the biopsychosocial characteristics of this process to facilitate a pleasant and empathetic transformation, promoting interventions that promote health, prevent disease, and address established conditions (Vicente & Vila, 2018).

On the other hand, adhering to the concept of cognitive reserve, which becomes relevant in this context, since it is closely related to optimal aging (Fajardo-Cuéllar & Wobbeking-Sánchez, 2020), highlights the brain's capacity to tolerate deterioration without manifesting clinical symptoms, based on brain plasticity. Stimulating this cognitive reserve becomes a fundamental strategy to slow cognitive decline (Fajardo-Cuéllar & Wobbeking-Sánchez, 2020), based on the idea that brain plasticity is possible and develops throughout life (Casaso la-Rivera, 2024).

In practical terms, various interventions focus on improving the quality of life of older adults and promoting active aging. Troncoso-Pantoja et al. (2020) propose educational workshops and sessions that strengthen social skills, while physical exercise stands out as a tool to increase cognitive and physical functions, promoting autonomy and positive social interaction (Troncoso-Pantoja et al., 2020). On the other hand, Martín-Valle (2022) suggests that workshops can change the pathologizing perception of aging, providing information about the physical and cognitive changes that occur during this process, reducing fear and prejudice.

In conclusion, intervention strategies for older adults emphasize the importance of stimulating cognitive reserve and improving quality of life through programs tailored to individual needs. These educational interventions play a fundamental role in promoting healthy, active, and socially participatory aging, contributing significantly to the well-being and personal satisfaction of this population.

Based on the above, the general objective of this study was to understand how ICT learning, specifically the use of mobile phones, impacts the quality of life and active aging

of older adults in the Metropolitan Area of Buenos Aires (AMBA). The aim was to explore the benefits, challenges, and motivations underlying this process, as well as to identify effective pedagogical strategies for teaching ICT to this age group. To this end, the advantages and difficulties encountered by older adults are identified.

This study aimed to determine the impact of older adults on technology learning through a stratified sample by geographic location in AMBA (Buenos Aires City and the southern area of Buenos Aires). Furthermore, the aim was to describe the reasons that encourage older adults to learn how to use devices, explain the relationship between technology use and active aging, and identify applications and programs that promote active aging. A new objective is to analyze the most effective pedagogical strategies for teaching technology to older adults in AMBA.

METHOD

In this work, a qualitative methodology with a grounded theory design was chosen. This approach consisted of understanding the phenomena from the perspective of the participants in their natural environment (Hernández-Sampieri & Mendoza-Torres, 2018, p. 364). Design refers to the plan or strategy conceived to obtain the desired information (Hernández-Sampieri & Mendoza-Torres, 2018, p. 120).

Type of study

A grounded theory type of study was used, which includes inductive logic, exploring, and describing, to generate theoretical perspectives.(Hernández Sampieri et al., 2010). According to Corbin and Strauss (2022), this theory is derived from data systematically collected and analyzed through the research process.

Instrument

Twenty-seven semi-structured interviews were conducted using a question guide, allowing the interviewer to add additional questions to obtain more information (Hernández-Sampieri et al., 2010, p. 418). The questions were open-ended, allowing the older adults to elaborate on their experiences.

Sample and context

The sample was theoretical, used to understand an idea by observing cases that favor its comprehension (Hernández-Sampieri et al., 2010, p. 399). A sample cut or stratified sampling by geographic location was made from different specific geographic locations such as Avellaneda, Lugano (CABA), and Barracas in Argentina.

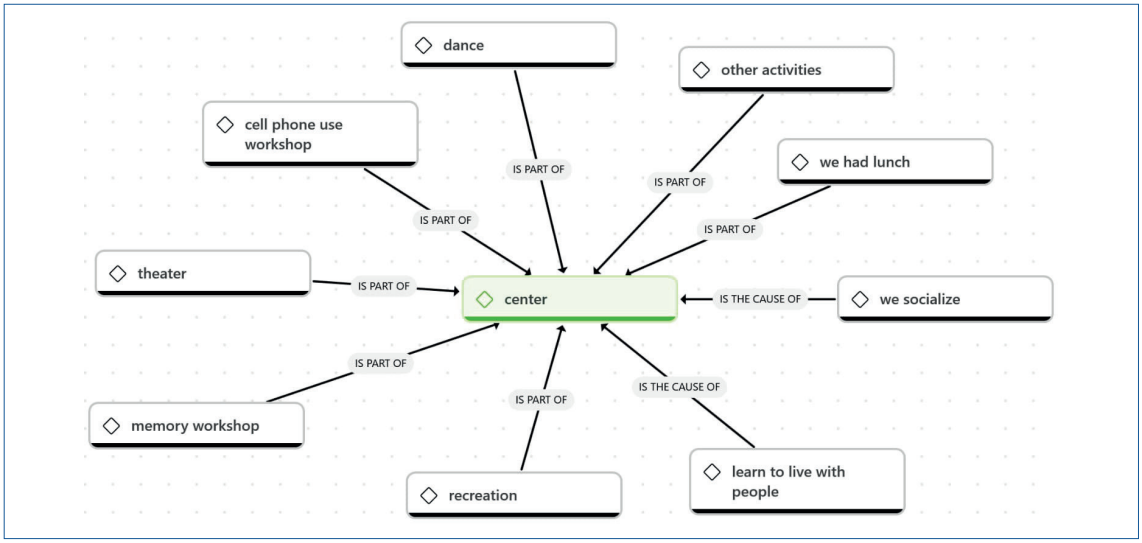
This approach is used to ensure that the collected sample adequately represents different geographic areas relevant to the study. Each geographic location is considered a stratum, and samples are selected within each of these strata to capture the geographic diversity of the population of interest. The sample consisted of older adults who attended the

Association of Retirees and Pensioners in Villa Lugano, Buenos Aires City; older adults who attend clinics and are regulars at the Union of Commerce Employees in the southern zone of Buenos Aires; and older adults who attend a sheltered workshop in Barracas, Buenos Aires City. The sample consisted of 27 adults, aged between 60 and 95 years, who had attended the workshop continuously for three months. These locations offer activities and workshops for the comprehensive well-being of older adults, promoting the exchange of experiences among peers.

CONCEPTUAL DEVELOPMENT

In the framework of this study, Figure 1 presents a visual representation of the activities diagram developed using the ATLAS.ti software.

Figure 1
Senior center activity diagram



Note: This diagram shows the set of relationships established in pension and retirement centers for older adults. Source: Authors.

This representation allows us to observe and analyze the relationships between the different codes extracted from the qualitative data analysis. It highlights various activities carried out in the area, such as memory workshops, dance activities, spaces for lunches and socializing, and theatrical presentations, among others. This visual analysis provides a deeper understanding of the diversity and relevance of the activities offered in the center (or area) in the context of active aging and social integration of older adults. Highlights of the activities carried out in the area include:

- Memory workshop: to stimulate memory and prevent cognitive decline.
- Dance: dance activities for recreation and physical exercise.
- Lunch: A space is provided for lunch and socializing with other participants.

- Theater: Theater plays are presented for entertainment and reflection.
- Other activities: The existence of other activities not specified in the diagram is mentioned.

On the other hand, the flow of activities shows:

- Activities are divided into two categories: workshops and recreation.
- Workshops are offered in a dedicated space, while recreation activities can be held at various locations in the city center.
- Participants are free to choose which activities they wish to participate in—for example, the memory workshop, dance, and theater activities.

Activities can also have a positive impact on the physical and mental health of participants.

Regarding the interviews administered, the use of Information and Communication Technology learning in older adults within the framework of active aging is observed.

In order to examine the ICT learning process in older adults, in the context of active aging, the importance of understanding how this demographic group acquires and uses technological skills to remain active and connected in contemporary society is recognized.

The constant comparative method was employed to analyze the collected data, aiming to understand participants' experiences, perceptions, and learning strategies regarding ICTs, utilizing the Atlas.ti software.

A causal relationship is established between the activities in the established settings and the emotional and social well-being of participants. Moreover, these activities not only promote emotional and social well-being but are also an essential part of a holistic approach to addressing the physical, emotional, and social needs of older people. These areas provide a space conducive to social interaction and mutual support, especially relevant for those with limited family interaction. Furthermore, the activities and proposals are considered an integral part of a broader program of recreation and comprehensive care for older people.

In this sense, the activities offered for older adults play an essential role in promoting general well-being and creating an enriching environment that encourages active participation and healthy aging.

Figure 2, a word cloud, highlights the most frequently used proposals. The interviews reveal that workshops, networks, retirement, and other defined aspects significantly contribute to the process that enables access to socialization. Their concern about dependency, health processes and changes, depression, and aging is also noted

Figure 2

World cloud diagram in interviews

Note: The word cloud highlights the most frequently mentioned proposals from the interviews, with significant emphasis on workshops, networks, and retirement. Source: Authors. .

Procedure

Data collection and analysis

Data were collected through 27 semi-structured interviews with open-ended questions, focused on exploring older adults' experiences with mobile phones and other ICT use in active aging contexts. The interviews were transcribed and analyzed using the constant comparative method of Grounded Theory, following the procedure established by Corbin and Strauss (2022). This approach allowed for the development of an emergent theory based on the collected data.

Variables and context

Relevant variables were selected for the research, and theoretical background searches were conducted. Sampling was conducted by convenience and stratified by geographic location to ensure adequate representation of different areas. The analysis focused on identifying significant patterns and relationships within the data, subsequently organizing them into categories and metacategories.

Data analysis methodology

The data analysis process included three coding stages:

- Open coding: In this initial stage, emerging concepts and phenomena were identified and labeled from the significant data extracted from the interview transcripts. This generated a preliminary list of categories. For example, older adults' emotional experiences with ICTs were coded, such as initial adaptation and perceived usefulness of digital tools.
- Axial coding: Relationships were established between the categories identified during open coding, grouping the data into more specific subcategories to better un-

derstand emerging interactions and patterns. One example is the organization of categories related to emotions and motivation into subcategories such as "Emotional barriers" and "Motivation for ICT use."

– Selective coding: The final stage involved integrating the categories and subcategories into metacategories that reflect the central themes of the study, consolidating the emerging theory. For example, subcategories were integrated into metacategories such as Emotional Adaptation and Impact of ICTs on Active Aging, providing a comprehensive view of the impact of ICTs on older adults..

Type of analysis

The analysis followed the constant comparative method of Grounded Theory, proposing a theory related to the observed information (Vasilachis-de-Gialdino et al., 2006, p. 155). The procedure of Corbin and Strauss (2022) was followed with the following coding stages to generate a new theory:

– Open coding: significant data were sought to identify initial concepts and categories.
– Axial coding: subcategories were established, organizing the data in thematic relationships.
– Selective coding: Categories were integrated to develop a solid theory based on the data.

Category organization

To enhance the understanding of the analysis, various figures are presented illustrating the organization of metacategories, categories, and subcategories, and their relationship at different levels of analysis.

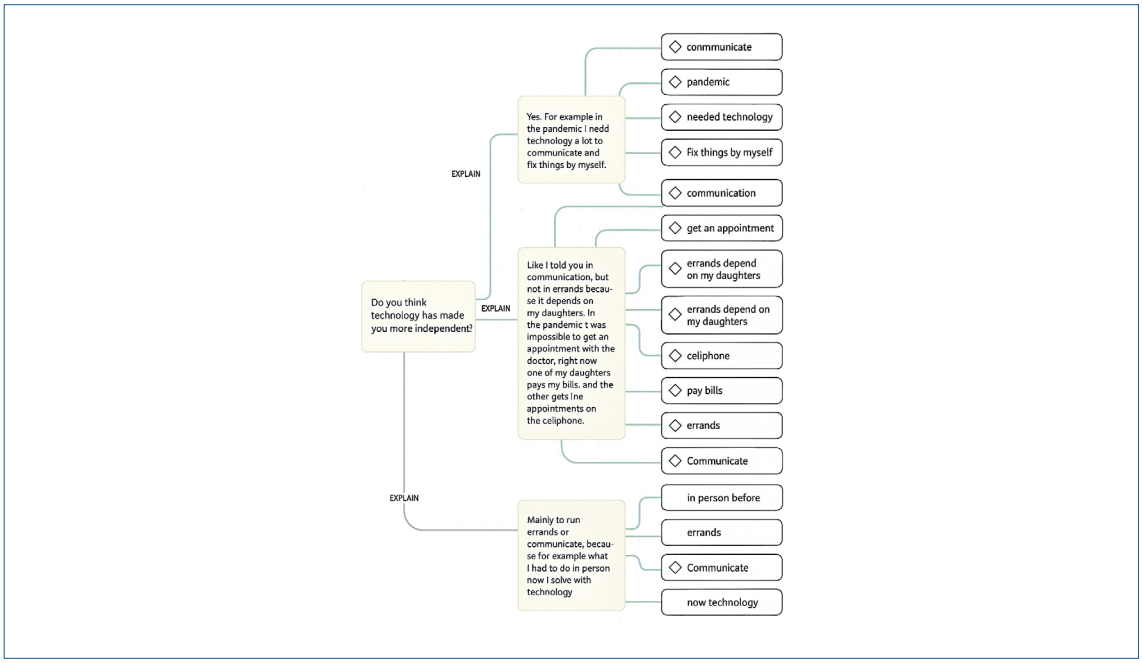
In open coding, significant data are sought to identify initial concepts and categories. The figure above reflects how these initial concepts about technology and older adults' autonomy were identified and categorized. It also represents the initial patterns observed and categorized in the data.

Technology has facilitated increased autonomy for these participants in several areas of their lives, including communication and managing paperwork. Through the adoption of technological tools, older adults have achieved greater independence in activities that previously required assistance. However, it also highlights that, despite these advances, certain dependencies and the need for ongoing support persist.

Technology, although beneficial, does not eliminate the difficulties faced by older adults, which underscores the importance of continuing to offer support and assistance.

Figure 3

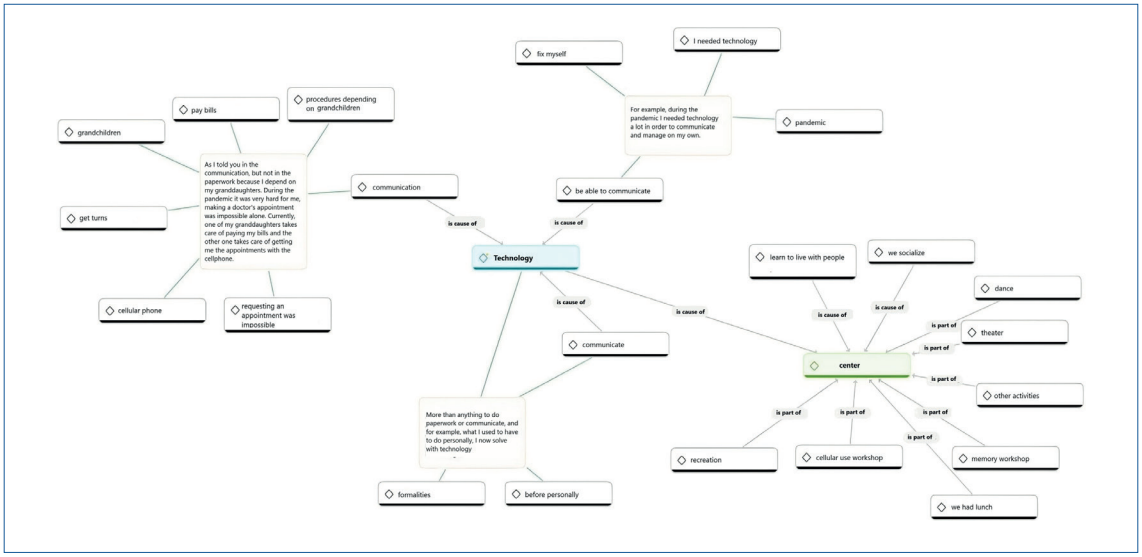
Conceptual network of the relationships between technology, autonomy, and dependency in older adults.



Note: The figure corresponds to an open coding process, showing how technology has allowed older adults to increase their autonomy in various areas of their lives, from communication to managing procedures, while also revealing the persistence of dependencies and the need for support. This figure can be inserted after the description of the subcategories in the axial coding process to show how they relate to the themes of autonomy and dependency. Source: Authors.

Figure 4

Technology in the daily lives of older adults: opportunities and challenges



Note: This figure illustrates the different aspects of daily life impacted by technology, with nodes showing the relationships between these aspects. This figure highlights established themes such as Emotional Adaptation and the Impact of ICT on Active Aging. Source: Authors.

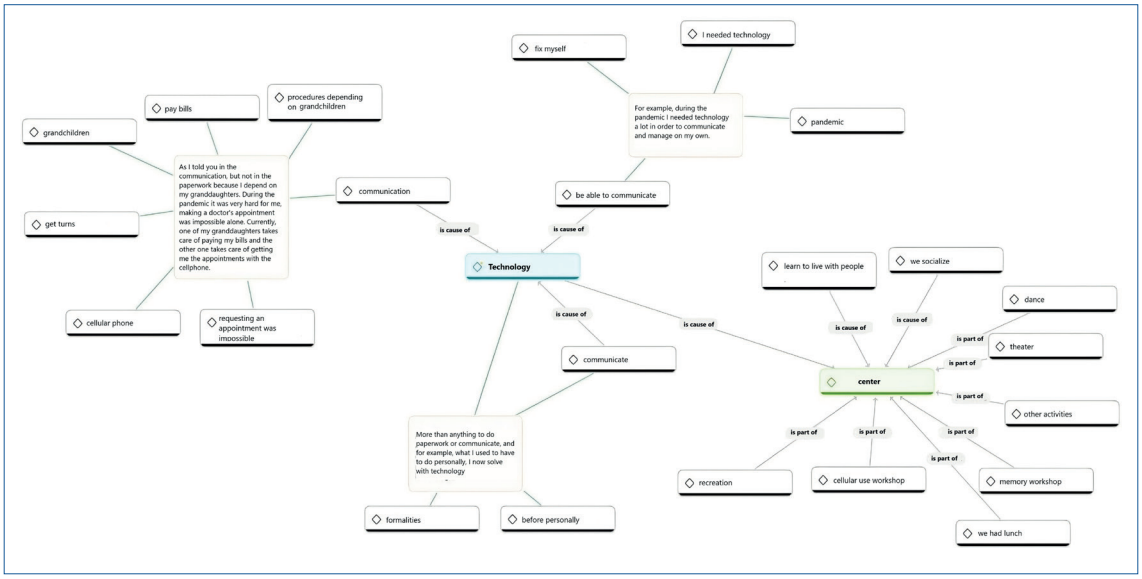
During axial coding, the categories identified in open coding were organized and related. Figure 4 shows how subcategories were established and how they relate to each other, providing a structured view of the data and thematic connections. In this phase, we sought to connect concepts and categories to understand their relationships and subcategories better.

According to recent studies, such as those conducted by Professor Laura Carstensen (2021) in the field of aging and technology, the incorporation of ICT can have profound effects on the quality of life of older adults, fostering greater autonomy and active aging. Boot (2020) argues that technology facilitates social connection and access to essential resources, which can improve emotional adaptation when facing the challenges of aging. However, it is also important to recognize that technology does not eliminate the barriers older adults face, such as the digital divide and the need for support in using new tools.

Figure 4, therefore, not only shows the positive impacts of ICTs but also highlights areas where challenges persist and the need for continued support. When placed alongside the axial coding section, the figure provides a visual representation that underscores how the themes consolidated in the analysis reflect both the opportunities and limitations associated with technology in the context of aging.

Figure 5

Categorization of the relationship between technology and older adults



Note: This figure illustrates how key patterns and concepts have been identified and categorized in the research, allowing for a better understanding of the relationship between technology and older adults. The selective code categorizes the data in relation to technology adoption and use, highlighting the main concepts and emerging patterns that explain the interaction between older adults and ICTs. Source: Authors.

Figure 5 identifies and classifies key patterns and concepts throughout the research. The representation facilitates a deeper understanding of the relationship between older adults and technology, highlighting how the adoption and use of ICT influences their lives. According to Boot's (2020) research, the integration of ICT into the lives of older adults can vary significantly in terms of impact on their well-being and emotional adaptation.

The selective coding in this research categorizes relevant data around technology adoption and use, highlighting emerging concepts and patterns that explain how older adults interact with ICTs. Carstensen (2021) highlights that while ICTs can offer significant opportunities for autonomy and social connection, they can also present challenges related to adaptation and the necessary support. The figure synthesizes these findings by providing a comprehensive view of how the identified patterns relate to each other and contribute to a broader understanding of the influence of technology on aging.

Furthermore, during coding, the categories were integrated and refined to develop a consolidated theory. This figure provides a final summary of the key concepts and patterns, showing how they were integrated and synthesized to form a coherent theory on the interaction between technology and older adults. This highlights the consolidated themes and provides an overview of the main findings.

This model allows us to observe how ICTs facilitate the autonomy and social inclusion of older adults, while highlighting areas where challenges and barriers persist. This approach aligns with the ideas of Sherry Turkle, whose recent work, *The Empathy Diaries: A Memoir* (2021), explores how technology affects interpersonal relationships and the emotional experience of older individuals. Turkle (2021) argues that while technology can improve access to information and social connections, it can also introduce new forms of isolation and technological dependence. Figure 5 seeks to capture these nuances by showing how emerging categories and patterns interrelate and contribute to a more holistic understanding of the impact of technology on aging.

Key findings of the study

From the coding, it is sought to understand the meanings that people attribute to their experiences and the context in which these occur, using an interpretive approach that seeks to understand reality from the perspective of the research participants. The software facilitated the analysis of interviews, focus groups, and other types of textual data. From the interviews conducted, the following analytical categories emerged: related to older adults' learning and use of ICTs and general participation in the center. Some of the topics included:

1. Participation in activities: Participants highlighted the importance of participating in recreational and educational activities offered by community centers. These activities include memory workshops, yoga, theater, gymnastics, and others.
2. Overcoming technological challenges: Some older adults expressed initial difficulties learning to use technological devices such as cell phones and computers. However, with time and practice, they managed to overcome these barriers and became more comfortable with technology.
3. Social and Family Support: Many participants mentioned that they received support and encouragement from friends and family in their technological learning process. The help of loved ones was essential for gaining confidence and skills in using electronic devices. Many older adults received help and encouragement from their loved ones in learning how to use technology and overcoming their fears and

limitations. This support ranged from teaching them how to use specific devices to providing them with technical assistance when they needed it.

4. Expand knowledge and communication: Participants highlighted the importance of ICTs for expanding their knowledge and communicating more efficiently. Previously, completing paperwork or communicating with family members required going in person or coordinating in advance, whereas now they can complete these tasks more quickly and easily through technology.
5. Use of mobile devices for communication: The use of cell phones has become a fundamental tool for communication. Older adults mentioned that they use their cell phones primarily to communicate with family members, especially children and grandchildren who live far away, allowing them to stay in touch more frequently and quickly.
6. Learning and adapting to the use of technology: Although some participants expressed initial difficulties in learning to use technological devices, such as cell phones and computers, over time, they managed to overcome these barriers and acquire skills to communicate and complete online procedures. Social and family support played a crucial role in this learning process. Likewise, some interviewees expressed difficulties using cell phones, mentioning that they do not understand how to do so, that they find it complex or unsafe, and that they do not know how to solve problems when they arise. The dependence on children or grandchildren to manage technological aspects, such as making medical appointments or completing procedures, is notable. Some interviewees mentioned that they prefer not to use certain cell phone functions or that they do not like using them, preferring activities such as reading, gymnastics, or dancing.
7. Usefulness of technology in everyday life: Participants highlighted the usefulness of technology for banking, communicating with relatives abroad quickly, and accessing relevant information via the internet. Furthermore, the use of applications such as WhatsApp and email has become indispensable for staying connected. In addition, the use of ICTs to search for the meaning of words through Google is mentioned, which highlights the importance of technology in meeting everyday needs, such as searching for information.
8. Security and privacy concerns: Despite the benefits, some participants expressed concerns about security and privacy when using technological devices. Fear of theft of personal and banking information was mentioned as a significant concern.
9. Recreational and social activities: Activities such as gymnastics, dancing, theater, memory workshops, and others are mentioned as ways to stay active and socialize. Reference is also made to activities outside the center, such as excursions or outings, which are organized for the interviewees.
10. Family relationships: The importance of communicating with family via cell phone is highlighted, especially for interviewees who have relatives living far away or abroad. Some interviewees express concern about not being able to communicate with their family members, being able to adapt to technological changes, and feeling dependent on their children or grandchildren in this regard.

11. Autonomy and independence: Some interviewees mention their desire to maintain independence and autonomy, especially concerning using technology and completing procedures. The importance of learning to use technology to avoid depending on others, especially children, and to maintain autonomy in daily life is highlighted. Furthermore, it was found that technology is not viewed as subservience but rather as the possibility of an independent attitude toward its use and learning.
12. Other concerns and preferences: Some interviewees express concern about their family members' lack of patience when teaching them how to use technology. They mention preferences for activities such as watching movies on YouTube or listening to Korean music, as opposed to traditional activities such as watching television or reading books. They also highlight the desire to avoid excessive use of cell phones or social media, prioritizing other activities or enjoying silence.
13. Boredom on Saturdays and Sundays: It describes how, although people engage in various activities during the week, they spend the weekends without specific plans, which can lead to boredom. Additionally, it details the activities some people do within their daily routines, from the moment they wake up to the tasks they perform throughout the day.
14. Feelings of loneliness or loss: some interviewees mention they feel lonely on certain occasions, which implies the presence of feelings of loneliness or loss, although they also call their family to feel accompanied.
15. Mental health: motivation, detachment, exclusion, frustration, family conflict, financial stress, depression, restraint, emotional pain. These aspects are not addressed in detail, but could be important aspects to explore in future interviews to understand the psychological well-being of the interviewees better.
16. Absent-mindedness and distraction: Absent-mindedness is mentioned in some cases, which can influence daily life and the way one approaches different activities.
17. Walking up and down stairs: This activity is mentioned as part of the daily routine, which can be important to stay physically active.
18. Supermarket: as part of their daily activities, which highlights the importance of purchasing food and other products for their daily lives.
19. Regarding hobbies, the theater stands out as an activity in which the interviewees participate, suggesting that it is a popular form of entertainment and artistic expression for them. On the other hand, dancing is also highlighted as an activity that the interviewees enjoy. This activity can have physical and emotional benefits, in addition to being a fun way to socialize. Aspects that complement gymnastics, such as other physical activities like Zumba and yoga, are mentioned, indicating that they value staying active and taking care of their physical health.

    Likewise, the most frequently mentioned social and recreational activities included walks, which they engage in to stay active and socialize. Among these recreational activities, we also find craft activities such as drawing and weaving workshops.

    This indicates that some interviewees enjoy expressing their creativity through artistic activities. On the other hand, they take trips or go out on city outings on

several occasions, suggesting that they value the opportunity to explore new places and experiences.

20. Self-Taught Learning: This study highlights how some people learn to use technology and other new skills on their own, either out of necessity or personal interest. For example, they learn how to use a cell phone, send emails, take screenshots, etc.
21. Memories and past experiences: Some people share memories and experiences, such as trips, previous jobs, family experiences, etc. These memories can influence their current activities and decisions. .

Some people mention important changes in their lives, such as retirement, loss of loved ones, moving, etc., and how they adapt to these changes by seeking out new activities and social relationships.

DISCUSSION

This qualitative study explores ICT learning among older adults within the context of active aging. Through semi-directed interviews with 27 older adults, their experiences and strategies regarding technology use were examined. The results confirm the importance of continuous learning and participation in meaningful activities, highlighting the significant role of ICT in this process.

Key findings

Diversity of Interests, Needs, and Community Participation

Older adults display a wide diversity in their technological interests and needs, ranging from basic skills, such as mobile device management, to specific interests, such as participating in sewing workshops and recreational activities. This diversity reflects not only the variability in this population's technological skills but also their multiple motivations for learning and using ICTs. The importance of community participation is highlighted as a crucial factor for digital inclusion and overall well-being, which is consistent with previous studies that underscore the need to accommodate individual differences in technological skills and experiences (Fisk et al., 2020; Hogan, 2022). This variety of interests and participation in community activities not only fosters socialization and lifelong learning but also promotes a sense of belonging and social support essential for active aging.

Impact of ICT on autonomy and social relationships

ICTs have proven to be a powerful tool for increasing the autonomy of older adults, facilitating personal tasks, health management, and communication with family and friends. This finding highlights the importance of ICTs in promoting independence and improving quality of life, aspects that are consistent with the current literature on active aging and technology (López-López & Álvarez-Aros, 2021). Furthermore, the relational dimension of ICTs facilitates connection and the maintenance of social networks, which is vital to counteract isolation and promote an active social life. Educommunication and

ICTs not only facilitate educational communication but also address emotional aspects related to autonomy and self-worth, which reinforce learning and technological adaptation in older adults, thus expanding their role beyond mere technical instruction.

Challenges and facilitators in ICT adoption: security, social support, and autonomy

Older adults face several challenges related to ICT adoption, particularly security and privacy concerns, as well as the importance of social support for successful adoption. Concerns about security and privacy in technology use are significant, underscoring the need for ongoing education on digital security issues, such as personal data protection and fraud prevention. This highlights the importance of integrating educational and communication (ICT) components specifically geared toward older adults to strengthen their skills and confidence in managing these risks.

Social and family support is identified as a crucial facilitator for ICT adoption. This support, which ranges from technical assistance to emotional motivation, helps older adults overcome technological challenges and fosters the confidence needed to explore and use new technologies. Hogan (2022) emphasizes that participation in community activities and social network support are essential for older adults' autonomy and well-being, which is reflected in the findings of this study by highlighting the role of the social environment in technological adaptation.

Autonomy and independence are strongly valued by older adults in the context of ICT use. The ability to manage personal tasks and daily activities through technology reinforces their sense of control and contributes to active aging. This desire to maintain independence reflects a positive attitude toward technology adoption and aging, aligning with the principles of active aging, which emphasizes self-determination and ongoing participation.

Together, these elements suggest that integrating digital security education measures, fostering social support, and promoting autonomy are essential to maximizing the benefits of ICTs for older adults. A comprehensive approach that addresses both barriers and facilitators will allow for the design of effective interventions that promote the safe, confident, and autonomous adoption and use of technology, thereby improving the quality of life of this population.

Recommendations for future research and programs

- Development of personalized educational programs: Create specific learning programs for older adults, tailored to their individual needs and abilities.
- Promoting digital inclusion: ensuring equitable access to technology and learning opportunities for all older adults, collaborating with community organizations.
- Ongoing social and family support: Promote the role of family and community in older adults' technological learning by offering training to family members and caregivers.
- Focus on security and privacy: Provide education on online security and privacy protection, developing workshops on how to detect this phenomenon and maintain secure passwords.

- Additional research on mental health and well-being: Promote studies on the impact of ICTs on mental health and well-being, including longitudinal research.
- Comprehensive approach to active aging: adopting a holistic approach that includes physical, mental, and social health, collaborating with various professionals to design comprehensive interventions.
- Expanding research samples: Conducting studies with larger and more diverse samples to confirm results and gain a more complete understanding.

CONCLUSION

This qualitative study highlights the importance of ICTs as fundamental tools for promoting active, healthy, and successful aging in older adults. Through the analysis of the experiences and learning strategies of 27 older adults, key aspects were identified, such as the diversity of technological interests and needs, the importance of social and family support, and the appreciation of autonomy in the use of technology. These findings not only confirm the existing literature but also reveal new dimensions of how ICTs impact the daily lives of older adults, including improvements in social interaction and health self-management.

Recommendations for creating personalized educational programs and promoting digital inclusion aim to close technological gaps and ensure that older adults not only access technology, but also do so safely and confidently. Furthermore, incorporating a holistic approach that includes physical, mental, and social health aspects is essential to maximizing the benefits of active aging and technology adoption.

It is necessary to continue exploring how ICTs can be effectively integrated into the lives of older adults and what strategies can optimize their use. Future research should focus on longitudinal studies to observe the long-term effects of digital inclusion on health and well-being, as well as on expanding sample sizes to obtain a more diverse and representative view. Likewise, it is important to consider the cultural and socioeconomic characteristics of older adults to design more effective interventions tailored to their circumstances.

In conclusion, leveraging ICTs in active aging represents not only an opportunity for digital inclusion but also a path toward more autonomous, participatory, and connected aging. ICTs have the potential to transform not only the way older adults relate to the world, but also how they perceive themselves within a constantly changing context. Collaboration between professionals from diverse disciplines will be essential to design interventions that truly make a difference in the quality of life of this population.

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APPENDIX

Appendix A. Interview Template

Interviewee: (name, age, gender):

Guiding questions:

- Who do you live with?
- What do you do daily?
- What did you do? What activities do you do to stay active? – What can you tell me about joining the Villa Lugano Retirees and Pensioners Association?
- What activities do you do in this space?
- Regarding the workshop on using cell phones or tablets, what motivated you to attend?
- What technology apps and programs do you know? Which ones do you use? – How long have you been using them? – Why do you use them? What do you use them for? Why don't you have technology? – How much has technology helped you in your daily life?
- Do you think technology has helped you achieve greater independence? – What benefits have you gained from using technology?
- What difficulties did you observe in accessing technology?