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## Reflections on technological adaptation for online interventions with elderly

### *Reflexões sobre a adaptação tecnológica para intervenções on-line com idosos*

#### ABSTRACT

This article aims to reflect on the technological adaptation for online interventions with the elderly. Despite advances in cognitive-behavioral interventional practices for this population, areas such as Design and User Experience can contribute to a better experience for the elderly with recommendations on the usability of Digital Information and Communication Technologies (TDICs). This is a theoretical study based on a review of the literature, in which reflections about: aging markers relevant to the use of TDICs, the relationship of the Brazilian elderly with technology, factors that inhibit the use of technology, integration of cognitive-behavioral therapy with technology and functional technology for the elderly. It discusses the interlocation of factors that mediate this interface between psychological practice with the elderly, technology, design and accessibility. It is concluded that, despite all the technological development available in this century, an incipient area of ??studies is identified, especially when a combination of knowledge is sought in favor of a more effective and inclusive psychological practice for this population.

**Keywords:** Health of the Elderly; Cognitive Behavioral Therapy; Technology.

#### RESUMO

Este artigo tem por objetivo refletir sobre a adaptação tecnológica para intervenções online com idosos. Apesar do avanço nas práticas interventivas cognitivo-comportamentais para essa população, áreas como Design e Experiência do Usuário podem contribuir para uma melhor experiência do idoso com recomendações sobre usabilidade das Tecnologias Digitais de Informação e Comunicação (TDICs). Trata-se de um estudo teórico realizado com base na revisão da literatura, no qual se tecem reflexões sobre: marcadores do envelhecimento relevantes para o uso das TDICs, relação do idoso brasileiro com a tecnologia, fatores que inibem o uso da tecnologia, integração da terapia cognitivocomportamental com a tecnologia e a tecnologia funcional para pessoa idosa. Discute-se sobre interlocução de fatores que mediam essa interface entre prática psicológica com o idoso, tecnologia, design e acessibilidade. Conclui-se que, apesar de todo desenvolvimento tecnológico que se dispõe neste século, identifica-se uma área incipiente de estudos, principalmente quando se pretende uma combinação de saberes em prol de uma prática psicológica mais eficaz e inclusiva para essa população.

**Palavras-chave:** Saúde do Idoso; Terapia Cognitivo-Comportamental; Tecnologia.

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When we think about population ageing, we cannot exclude any area of human activity from the discussion. Particularly when the discussion regards the impact of new technology on psychotherapeutic processes for the elderly population, specifically when we think about Cognitive Behavioral Therapy (CBT) with this population during a pandemic, we can perceive the impact of limitation of access and accessibility to the use of digital media by itself.

Today's seniors and, we can add, next generation's, are not alien beings to this world. However, they cannot be fully considered as natives in the world they live in either, as it is taken by digital Information and Communication Technologies (ICT). It is considered an ICT any product, hardware (e.g: cell phones and laptops), software (computer programs and applications), internet and cell phone providers, that serves as means to inform and communicate with people (Machado, 2016).

Elders, not only in Brazil, strive to adapt to the use of ICTs. This effort is not always rewarded with encouragement, from family or public policies. The combination of biological markers and population ageing in people over 60 years old with access, accessibility and quality of use, might be dangerous. And that is the topic that this article aims to discuss, without dissipating further considerations. Particularly, it intends to initiate contemplation about the urgency of technological adaptability to the Brazilian elderly population, with the intent of facilitating and encouraging its access in a healthy and functional form.

Psychoeducating a senior citizen for that expansive and safe use of technology becomes essential in today's world. In order to do that, we need to comprehend their relation to technology and the biopsychosocial alterations that influence it, so then, we can discuss the possibilities of good use.

There is a need for greater attention to this new reality in which investments are made in the study and functional adaptation of technological means. The therapists, it is up to them to decide that they are performed and provide to the public therapist. In User Experience Design (UX), recommendations are given for the functional use of an elderly patient, granting less frustration and expanding the therapeutic moment (Anjos & Gontijo, 2015).

## RELEVANT AGING MARKERS FOR THE USE OF ICTS

Ageing is a heterogeneous process, marked by normative changes that are expected over the years. It is not practicable to claim that ageing is, in and by itself, a factor of illness or disease. Years of research brought a new paradigm, called lifespan, which defends development reasoning throughout life.

Lifespan is based, among other findings, on the capacity of cognitive reserve (long-term storage capacity) and neuronal plasticity (creation of new synaptic connections), and behavioral (adaptation to the environment. Even at a slower pace and with a different dynamic, the senior citizen can functionally learn, adapt and compensate for losses (Baltes, 1997; Neri, 2013).

Throughout development, the normative sensory losses that are influenced by heritage and the level of noise exposure are considered key to the bilateral neurodegeneration of auditory pathways called presbycusis. The harm starts with the difficulty of listening to high-frequency sounds, progressing to the difficulty of comprehension in noisy environments (selective attention), and finally affecting hearing of mid and low sounds (Bicalho & Cintra, 2013).

The decrease in visual acuity is another important aspect. Presbyopia is the result of the loss of flexibility and dryness of the lenses. There is also the difficulty of adapting to dark environments, and the reduction of the diameter of the pupil and the speed of intraocular conduction of stimulus (Bicalho & Cintra, 2013). It is worth mentioning that screen time can, in a directly proportional way, hasten presbyopia.

Cognitively, there is the decline of mechanical intelligence and the ascension of pragmatics. Thereby, elders tend to obtain greater success in activities that are meaningful or require previous ability. For new and unknown activities, it is necessary to adapt the cognitive and behavioral repertoire and the environmental resources that they already dispose of (Neri, 2013).

During the process of new learning, previous experiences with keyboards and cell phone and laptop screens might evoke positive or negative affections that interfere in the acquisition and adaptation of new knowledge and practices. For instance, audio and video calls have similar elements in terms of graphic pattern recognition that promote a more or less stressful practice in the function of the user's experience with this communication resource.

Besides, an affectionate and comprehensive instructor, that considers the level of instruction and sensorial and cognitive decline of the senior citizen, can help make the process of new learning easier and more comfortable. The elder compensates their losses by selecting, in a balanced manner, resources to optimize their lives in the most diverse degrees of novelty and difficulty (Baltes, 1997).

It is worth pointing out that a young adult processes information faster than a senior. However, seniors keep their capacity to process at a slower pace and, for that reason, tend to accumulate more unprocessed information, being more susceptible to stress, anxiety, and tension for overstimulation. This way, they present a certain tendency to accept valid content without critical analysis, in the function of the affective valence that involves them. This might be particularly dangerous to the mental health of those who consume a large amount of information on social media, aggravating those of negative content or fake news (Fraga, 2020; Ramscar et al., 2014).

For having less control over the environment, seniors use secondary control. While primary control seeks to control and modify the environment, secondary compensates for the losses of primary control, seeking to keep a level of adequate global functioning (Khoury & Günther, 2013). Socioemotional selectivity is another important process in this scope since

seniors tend to be more perceptive over their choices. Even though there is a narrowing of social networks and performed activities, the life experience of seniors tends to take them to seek positive emotional expressions, even if in a reduced intensity (Carstensen, 2006).

Motor losses directly affect the independence of the elderly person: slow walking, the risk of falling, and loss of fine motor skills. Seniors go through deregulation in their bone regeneration process, slowing down their density. It is added to the loss of muscular strength, the increase of adipose tissue, and the decreased reflexes and fine precise movement (Bicalho & Cintra, 2013). The distracted use of ICTs during walks, associated with ergonomic inadequateness, and the use of touch screens can cause accidents and chronic pain cases.

## BRAZILIAN SENIORS' RELATIONSHIP WITH TECHNOLOGY

The Continuous National Household Sample Survey (PnadC), from the Brazilian Institute of Geography and Statistics (IBGE), has been finding an increase in internet use by people over 60 years old. In 2016, 24,7% of the elderly population used to access the internet, this number increased to 31,1% (2017), 37,5% (2018) e 45% (2019) (IBGE, 2018, 2021). As previous to the new Coronavirus pandemic, almost half of the seniors already made use of the computer worldwide web, data from 2020 and 2021 brings us a bigger expectation of use.

Because there is already a greater familiarity, the cell phone tends to be the most accessible ICT. The habitual use for regular phone calls, added to the ease of access to the internet, made the acquisition of the device for personal use go from 63,5% in 2017 to 67% in 2019 (IBGE, 2021). If we consider that access to the internet might happen from their children and grandchildren's devices, we can infer this number to be even bigger. During the pandemic, a survey carried by Kantar IBOPE Media (2021) indicated that 82% of Brazilians connect to the internet via smartphones, 77% via laptops or desk computers, and 12% use tablets for that purpose.

It is questioned, nevertheless, the quality of connection to use, once that IBGE (2021) data reveal that 40 million Brazilians still did not have access to the internet in 2019. Moreover, to the seniors that access the internet, according to Kantar IBOPE Media (2021), their favorite is not only social media, once that 75% of Brazilian seniors have already purchased household appliances online.

What is the quality and adapting the level of devices to aging peculiarities? What is the level of digital literacy of the elders and how much do they know about the devices in their hands? Parallel with greater purchasing power comes debt and bad use of ICTs, which in turn affects the quality of life and increases the risk of mental disorders (Fraga, 2020; Serviço de Proteção ao Crédito [SPC], 2019). Before trying to pave new discursive paths that bring attention to these questions, we need

to present some natural aging changes that might potentially interfere with the use of ICTs.

## INHIBITING FACTORS TO THE USE OF TECHNOLOGY

Technological tools have a big influence on modern's society day-to-day life. Beyond providing leisure, ICTs are seen as independence promoting tools, reducing wait time and deconstructing everyday tasks' bureaucracy. Every day, new technologies are launched in the market, but not all of them are inclusive.

The expression digital inclusion is used to name the democratization of access and use of ICTs process, inserting all economic classes, with the intent of deconstructing inequality to its use (Pischetola, 2019). The elderly public, even being more and more immersed in the digital world, is faced with ICTs that are not suitable to welcome them, their particularities, and limitations.

The first inhibitor factor to the use of technology by elders is the lack of digital literacy. This ability relates comprehension, organization, interpretation, and fact-checking in digital and virtual media, besides applying their acquired knowledge about technology while using it, amplifying the capacity of contact with digital media (Ribeiro & Coscarelli, 2017).

Given the difficulties of insertion in the technological world, the elderly public faces a lack of accessibility and usability. Accessibility presents itself as the responsible agent to reducing factors that might prevent people with disabilities or reduced mobility to make use of a certain ICT, be it hardware or software (Santos et al., 2012). Usability is characterized as the agent that, when applied, facilitates the use of an interface, making it more effective, efficient, and satisfying to the user, according to Nielsen (2012). The author points out five necessary quality components to obtain good usability: ease of learning, the efficiency of use, ease of memorization, error recovery, and subjective satisfaction.

Technologies that do not present accessibility and usability are hard to handle and usually contain illegible information, tasks that need many steps to be concluded, and require a good level of ability to use ICTs, which leads to stress and user's abandonment (Nielsen, 2012). For the elderly, simple tasks might be hard because of the physical and cognitive limitations related to their age. Thus, the necessity of making a phone call, adding a new contact to the list, and sending pictures on WhatsApp might be a reason to abandon technology and cause the feeling of frustration (Anjos & Gontijo, 2015).

When facing difficulty and needing help from someone to perform a task, the feeling might also be of dependency, which also contributes to the inhibition or total avoidance of the use of ICTs (Parrião, 2017). According to the research "TIC Domicílios", of the Centro Regional de Estudos para o Desenvolvimento da Sociedade da Informação ([Cetic.Br], 2020), which was performed in person in 23.508 houses in 350 counties, between October of 2018 and March of 2019, 72% of senior citizens do

not use the internet, as they feel inept and incapable to. Another important factor is the fear of being a victim of a scam or losing their privacy.

The problems experienced in moments of interactions with ICTs contribute to the social isolation of this group, considering that independence, communication, and access to information frequently happen by the use of technological tools and are realized in the virtual world (Silva et al., 2020). To serve this audience, user's experience design attempts to apply techniques that adapt the interfaces and tools to the particularities of the public, contributing to their social and digital inclusion.

## INTEGRATION OF COGNITIVE BEHAVIORAL THERAPY WITH TECHNOLOGY

Over the years, the 21st century individual finds himself using more and more technological tools that involve multiple chores in his daily life. Paying bills, grocery shopping, and going to college became tasks that can be done virtually.

Investment in technology in the health area is extensive. According to the International Data Corporation (IDC), around R\$ 10 billion will be invested in health techs until 2022. With this investment, taking care of one's health becomes more viable and is consolidated as a digital world tool, a resource that approximates and facilitates the connection between professionals and patients and promotes self-care (MV Informática, 2021).

Virtual care requires knowledge and good ICT management. Technological tools provide production, manipulation, and sharing, facilitating access to information in an integrated way, optimizing performance, but challenging the professional to develop new abilities and digital competencies.

In Brazil, internet appointments were already existing practice, although they gained more strength during the pandemic. E-Psi registration was launched and the appointments and services available via the internet were regularized by the Psychology Federal Council (CFP) when the resolution CFP nº 11/2018 was published. Afterward, in the face of the pandemic, the resolution CFP nº 4/2020 was also published, which reduced the requirements for online psychotherapeutic support, enabling the growth of new professional registers and amplification of a virtual psychological support network (Resolução nº 4, 2020).

In Brazil, online psychological support platforms exclusive and adapted for elders do not exist. In general, there are many recommendations given to the familiarity with technology, care with security and privacy, but few are the observations about a User Interface (UI) adapted to this public and on the improvement of User Experience among psychotherapists that realize virtual appointments.

During the CoVid-19 pandemic, social isolation was a necessary act, studies point out that people who experienced the isolation period presented a higher chance of developing some type of mental disorder (Nascimento & Maia, 2021). The loss of relatives, the fear of being contaminated, unemployment,

and domestic violence provided the creation of a scenario full of factors to the increase of suicidal behavior (Pereira et al., 2020).

Older people remained in social isolation for longer, on account of being considered a risk group. Therefore, during the pandemic, they found a safe and effective way of taking care of their health through available virtual interventions. In turn, the psychologist is now present anywhere there is a good internet connection in the world, remotely, and sanitarly safer.

Even before the pandemic, CBT had already been paving its way on the virtual world, maximizing, at this moment, an expansion of its modes of action with the use of the internet in diverse intervention methods, such as synchronous, asynchronous, and hybrid. For each one of the technical, methodologic, and ethical orientations are given by CFP. The synchronous modality, in particular, requires a stable internet connection and safe video conference platforms (Google Meet, Zoom, Skype, among others).

For the adaptation of elderly people to the use of platforms, the psychotherapist performs several moments of psychoeducation on how to use hardware, software, and how to activate the accessibility resources included in the settings of some of those devices. The latter, hidden in labyrinths contained in user flows not designed for seniors, are not disclosed, which obstruct even more the access to a resource capable of providing comfort in the use of ICTs.

According to Andersson e Cuijpers (2009), Internet Cognitive Behavioural Therap (iCBT) presents itself as a therapy of asynchronous, or hybrid and self-administrated type of therapy, that combines accessible self-help with the support and encouragement of a therapist that, now and then, also forwards therapeutic activities via email. With the use of smartphones and computers, therapy is offered in a range of websites and applications, in which treatments are found in text, audio, and video format, unattached to the presence of a psychotherapist.

Besides fitting in an asynchronous therapy modality, iCBT also fits into the hybrid modality. In some types of treatment, the patient needs to use virtual platforms and is guided by a therapist via phone calls or in-person sessions. Older studies already point out that iCBT has presented efficiency in some types of treatment, such as: insomnia, anxiety, panic disorder, and depression (Andersson & Cuijpers, 2009). Older people with severe depression, that show a high risk of suicide, with language deficits or cognitive impairments are not suitable for treatment with iCBT (Titov et al., 2015).

Studies point out that, for the elderly patient, iCBT meets important requirements, as efficiency, acceptability, and viability. It has shown itself effective not only for treatment but also in the prevention of disorders. Elders who suffer from multimorbidities have a higher risk of developing depressive disorders. The randomized clinical trial by O'moore et al. (2018) evaluated the effect of a ten-week iCBT intervention on depression associated with knee osteoarthritis. A total of 69 adults aged 50 years or older were divided into two groups: iCBT and usual treatment

versus usual treatment. The results showed superiority in the group undergoing iCBT, including measures for depression, pain, and self-efficacy.

In a recent study, Read et al. (2020) divided 302 patients over 65 years old who presented multimorbidity, chronic diseases, and subclinical cases of depression into two groups. The 150 patients submitted to iCBT presented significantly fewer cases of depressive disorders than the control group, indicating that iCBT constitutes a tool to prevent depressive disorders.

In another clinic study (Read et al., 2021) they selected another sample of 302 elders over 65 years old, destining 150 to iCBT and 152 to conventional treatment. The first group presented high acceptability and engagement in treatment, providing support for preventing depressive symptomatology. The group with online intervention presented a smaller number of depression cases at the end of the 24 months protocol, compared with the other group (15% and 27%).

In a systematic review, Cremers et al. (2019) analyzed 26 articles, from those, 16 randomized clinical trials, that used iCBT in elders from 60 to 70 years old, with females of a higher level of education and urban life majority. Most of the subjects presented an increase in the mental health indices of the participants. The therapy is effective in reducing symptoms of mild and moderate depression. For anxiety, e-therapy showed good results in mild and moderate levels.

In the same year, Xiang et al. (2019) reunited in a systematic review with meta-analysis of nine studies (three randomized clinical trials, two clinic studies without randomization, two clinical studies without control, and two naturalistic evaluations), from those, seven involved a therapist and two were self-guided. With a total of 1.272 participants around 66 years old, results point out that iCBT is a promising alternative in the treatment of late depression with mild to moderate symptoms, despite some flaws found in the execution of some of the studies.

In the pandemic context, Ying et al. (2021) proposed a five-week iCBT intervention for 137 elders without a cognitive deficit in eight Long-stay Institutions for the Elderly. The effects for the symptoms of depression, anxiety, general psychological distress, and functional disability were investigated. With the maintenance of the results after a month and the high rates of adherence and satisfaction, the authors indicated that this type of intervention might contribute to the institutionalized elderly wellbeing during the pandemic.

According to Titov et al. (2015), whenever we talk about therapist-oriented iCBT, there are several favorable points to its use. In the case of senior citizens, we can emphasize: 1) the reduction of the stigma of going to the therapist as something “bad”; 2) motor limitations do not interfere with going to treatment; 3) no need to depend on accessible environments; 4) treatment costs; 5) facilitates access to qualified professionals and, currently, 6) it has been the most preferred type of therapy by elderly men. We can notice that using a smartphone and an

app designed for treatment with iCBT, it is possible to achieve, even considering some difficulties, a functional and effective use. The development of those ICTs cannot be only idealized for younger adults, people with a good level of digital literacy, or native users of digital media. It must also promote accessibility and clinic-psychological support to older patients. In the course of the article of Titov et al. (2015), the profile of the Brazilian elderly is presented, how their relationship with the digital medium occurs, and what are the recommendations of User Experience Design (UX) to the development of platforms that meet the specifics of elderly patients to facilitate and improve the use of applications and other tools used by CBT.

## FUNCTIONAL TECHNOLOGY TO THE SENIOR CITIZEN

UX Design is a study field that seeks to ensure that the person has the best experience when interacting with a product or service, whether online or in the physical world. UX focuses on promoting methodologies and theories that, when applied, provide a fluid, effective, efficient, satisfying, and useful experience. Its study involves stages of user research, business research, visual studies, and others (Norman & Nielsen, 2007).

The designer needs to avoid excluding any type of audience that has limitations, and for this, studies are carried out that identify specificities of user groups (Nielsen, 2012). The inclusion of elder citizens is of absolute importance, considering that our society is aging and digital artifacts need to adapt to the needs of individuals (Nielsen & Budiu, 2012).

In psychological interventions with older citizens, in any modality, there must be attention to the digital platforms chosen, in the sense that the easier it is for the elderly to handle the platform, the more comfortable to use it and, consequently, less waste of energy and a bigger focus on therapy.

Anjos and Gontijo (2015) list recommendations for the development of digital applications for the elderly public and categorize them in: noticeable, operable, understandable, and robust. All the recommendations are directly related to the possible visual, motor, cognitive, and emotional alterations, as presented in Table 1:

The applications developed according to the recommendations offer a more comfortable medium to the senior citizen, which may execute tasks without being exposed to situations of stress and frustration. The limitations of the elderly public increase the level of difficulty ICTs, with the application of accessibility and usability, rules the impacts caused by their limitations are diminished, favoring the expansion of the therapeutic moment. Considering the number of Brazilian seniors, technologies need to offer specific adaptations to this public and provide digital literacy, allowing greater inclusion in mental health care digitally to this part of the population.



**Table 1.** Recommendations to the functional use of ICTs by elders Source: Adapted from Anjos and Gontijo (2015).

<b>Perception recommendations</b>	
Text size	The sources in interfaces developed for the elderly public need to be larger than the standard
Color and contrast	Elderly people have a change in color perception and contrast, in which case colors may not be the only sign to inform about an alert or action. Good visual communication can be transmitted also without color
Icons	They must be composed of elements that are easy to be recognized by the old person, so that great cognitive efforts are not made to understand them
Feedback	The system need to provide visual, audible or tactile feedback
<b>Recommendations for operational and browsing experience</b>	
Browsing and Location	Display a simple browsing that can be performed by various paths
Shortcuts	Shorten paths for tasks to be performed faster and more securely
Role names	Every writing needs to be literal, without double meanings
Screen scrolling	The less screen, the less information and less cognitive effort
Suitability for mobile user context	Analyze and filter which roles meet your needs
Interface not "miniturized"	The interface needs to be designed respecting the limitations of the device
Most important functions and information	The most important information needs to be positioned at the top of the screen
Redize text	Provide the elderly with the ability to resize the text according to their visual limitations
Interface costumization	The interface should be flexible to the preferences and needs of the elderly
Distractions	Provide an interface that minimizes the distractions contained in the screens
<b>Understandable information and user interface</b>	
Page organization	Screen organization is important to facilitate the browsing of the elderly who do not have browsing habits
Number of screens	Applications must display a reduced number of screens
Support for the options selecting	Offer the user to select options instead of typing what they want
Understable language	Abbreviations are avoided and all communication should be appropriate to the task performed
Consistent browsing and labeling	Consistency in browsing information and data
Support for interruptions	Be programed to return to the same point if the interaction is interrupted without needing to perform all steps again
Instructions and incoming assistance	Instructions on data entry should be provide to the user
Error prevention and form recovery	The interface need to alert erros and allow the elderly to correct them
<b>Consistent content and reliable interpretation</b>	
Old cellphones	Old Technologies did not care about flexibility and user adaptation, the can be great difficulties
New technologies	Ensure that pages are accessible even if they are recently developed

## FINAL CONSIDERATIONS

This article aimed to discuss the necessary technological adaptations for functional use by elderly citizens, to intensify the debate about the significance of this population's digital insertion. Some of the major normative alterations of aging, inhibiting factors, and suggestions for technological adaptation focused on this group, as well as advances in the practices of UX Design.

The functional use of ICTs can provide personal benefits that bring the elderly closer to connectivity, allow them to amplify their social network and acquire new abilities, fight the stigma of aging, and bring this population close to the major 21st century information and communication tools. Every day more immersed in the virtual world, it is of great significance to pay attention to new formats of support in digital media. The practice of CBT continues to expand regardless of geographic

and social distancing. It has shown its efficiency as -therapy and offered diverse support modalities, be it synchronous, asynchronous or hybrid.

Similarly, iCBT is a modality that has presented itself quite effective and that keeps breaking accessibility barriers. When planning a client's treatment or developing a platform, the therapist needs to be aware of the experience quality that he desires his client to have, always cautious to inclusive practice. For the elderly public, the attention to detail is even more specific, considering that this population is not a digital native.

UX design has been studying how to accommodate the difficulties of elderly people within digital applications for various purposes, which is of great magnitude for the full functioning of therapy via the internet. Good knowledge of the digital world and its tools is multidisciplinary and interconnects various professionals to provide a better experience. Without exhausting the theme, this work ends in hope that more and more productions, debates, and promising projects within the theme are carried out.

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