APPLICATION OF DIGITAL TECHNOLOGIES IN HEALTH LITERACY IN SITUATIONS OF SOCIAL ISOLATION: A SYSTEMATIC REVIEW

Aplicação de Tecnologias Digitais na Alfabetização em Saúde em situações de Isolamento Social: Uma revisão sistemática

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RESUMO

Objetivo: A alfabetização em saúde diz respeito à capacidade dos indivíduos adquirirem, compreenderem e, consequentemente, agirem de acordo com a informação que lhes é fornecida para tomarem decisões adequadas relativamente ao seu estado de saúde. Cerca de metade da população europeia tem um baixo nível de alfabetização em saúde. Adicionalmente, dado o agravamento do estado de isolamento vivido pela pandemia de COVID-19, o objetivo desta revisão sistemática foi analisar o impacto das tecnologias digitais na alfabetização em saúde em situações de isolamento social. **Métodos**: Foi realizada uma revisão sistemática seguindo as diretrizes *Preferred Reporting Items for Systematic Reviews and Meta-analyses* (PRISMA). As estratégias de busca basearam-se na questão PICO: "Em contextos de isolamento social (P), qual o impacto (C) das tecnologias digitais (I) na melhoria da alfabetização em saúde (O)?" Uma extensa pesquisa eletrônica foi realizada em três bases de dados (PubMed/MedLine, Cochrane e Web of Science (WoS)). Foram incluídos artigos publicados nos idiomas inglês, português e espanhol de 2011 a 2021; que abordaram o isolamento social, institucionalizado ou com patologias que provocam necessidade de dependência e cuidados de outrem, estudos que avaliem o impacto das novas tecnologias na melhoria da alfabetização em saúde, estudos que comparem aspetos relacionados com estratégias de aplicação da alfabetização em saúde utilizando novas tecnologias, estudos que demonstraram o impacto das novas tecnologias na melhoria da alfabetização em saúde das populações em isolamento social, e todo o tipo de estudos, centrando-se essencialmente em estudos observacionais, estudos analíticos, estudos quase-experimentais e experimentais. **Resultados**: Treze artigos em texto completo foram incluídos no estudo. As tecnologias digitais foram consideradas parte intrínseca do quotidiano das pessoas, apresentando inúmeras vantagens: permitir maior contacto com familiares e amigos, proporcionar um momento de lazer e aquisição de conhecimento, e contacto com profissionais de saúde. Desta forma, as novas tecnologias têm permitido aumentar a alfabetização em saúde dos utilizadores devido ao seu fácil acesso à informação sobre diversas patologias e medidas de promoção da saúde. **Conclusão**: É possível concluir que a existência de indivíduos com acesso aos meios digitais mais capazes de adquirir informação sobre patologias, sua prevenção e tratamento está relacionada com melhores condições de saúde. Assim, a motivação dos profissionais de saúde para que os pacientes utilizem recursos tecnológicos no componente saúde é essencial. Além disso, a constante partilha de informação na internet, aliada ao conceito de telessaúde e ao acompanhamento personalizado por profissionais da área, tem enfatizado a importância do conhecimento e da literacia em saúde.

Palavras-chave: Alfabetização em saúde; Isolamento social; Nova tecnologia; Telemedicina; Telessaúde; COVID 19.

ABSTRACT

Objective: Health literacy relates to the ability of individuals to acquire, understand, and, consequently, act in accordance with information provided to them to make appropriate decisions regarding their health status. About half of the European population has a low level of health literacy. Additionally, given the worsening state of isolation experienced by the COVID-19 pandemic, the aim of this systematic review was to analyze the impact of digital technologies on health literacy in situations of social isolation. **Methods**: A systematic review was performed following the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines. The search strategies were based on the PICO question: “In contexts of social isolation (P), What is the impact (C) of digital technologies (I) on improving health literacy (O)?” An extensive electronic search was performed in three databases (PubMed/MedLine, Cochrane, and Web of Science (WoS)). Articles published in English, Portuguese, and Spanish languages from 2011 until 2021 were included; which approached social isolation, institutionalized or with pathologies that cause the need for dependence and care from others, studies that evaluate the impact of new technologies on improving health literacy, studies that compare aspects related to health literacy application strategies using new technologies, studies that demonstrated the impact of new technologies on improving the health literacy of populations in social isolation, and all types of studies, focusing essentially on observational studies, analytical studies, quasi-experimental and experimental studies. **Results**: Thirteen full-text articles were included in the study. Digital technologies were considered an intrinsic part of people's daily lives, having numerous advantages: allowing greater contact with family and friends, providing a moment of leisure and acquisition of knowledge, and contact with health professionals. In this way, new technologies have made it possible to increase users’ health literacy due to their easy access to information on various pathologies and health promotion measures. **Conclusions**: It is possible to conclude that the existence of individuals with access to digital media who are more able to acquire information about pathologies, their prevention, and treatment is related to better health conditions. Thus, health professionals' motivation for patients to use technological resources in the health component is essential. Moreover, the constant sharing of information on the internet, combined with the concept of telehealth and personalized monitoring by professionals in the field, has emphasized the importance of knowledge and health literacy.

Keywords: Health literacy; Social isolation; New technology; Telemedicine; Telehealth; COVID-19.

INTRODUCTION

Health Literacy was presented at the 7th Global Conference on Health Promotion of the World Health Organization (WHO) and encompasses the “knowledge, motivation and skills of people to evaluate and apply health information in order to make decisions in the about disease prevention, care and health promotion, maintaining or improving their quality of life” (NUTBEAM, 2000; SØRENSEN et al., 2012; HE et al., 2015; BATISTA et al., 2018; REGIONAL COMMITTEE FOR EUROPE, 2024; WHO, 2024).

Reduced health literacy is related to lower demand for preventive health services, delay in medical diagnoses, and poor adherence to medical care proposed by professionals from different areas of health, thus leading to an increase in the cost of health care, as well as an increased risk of mortality (BASKARADOSS, 2018). As such, this topic must be recurrently addressed in the population and the various existing organizations, with its approach being essential through educational means and communication (NUTBEAM, 2000). The degree of health literacy of individuals is a strong indicator of their health status, as well as their behavior in relation to it and their prognosis in case of the presence of pathologies (BERKMAN et al., 2010; BERKMAN et al., 2011; BASKARADOSS, 2018).

Health literacy can be classified into three categories: Functional Literacy (patient's literary and writing skills), Communicative and Interactive Literacy (users' cognitive and social skills), and Critical Literacy (analyzing information and using it conveniently) (BATISTA et al., 2018; VILNIUS DECLARATION, 2024). In Portugal, 5 out of 10 individuals have low levels of health literacy (NUTBEAM, 2000). As such, the General Health Directory of Portugal argues that the promotion of health literacy is both an opportunity and an important public health challenge and, above all, should be seen as a responsibility and as social cooperation (PAAKKARI & OKAN, 2020).

Digital technologies are increasingly being used to support health systems and healthcare professionals, providing different communication options and information sharing. These technologies aim to promote people's health and can, as such, be used to carry out diagnoses, checks, and medical treatments, especially when patients are away from healthcare services (STEINHUBL et al., 2013; FORTUNA et al., 2019; CAETANO et al., 2020; GONÇALVES-BRADLEY et al., 2020). This delivery of health care at a distance is known as telemedicine

and can be performed through mobile or fixed devices (MARCELINO et al., 2016; GONÇALVES-BRADLEY et al., 2020). In this way, the growing technological innovation that we experience today has an impact at a social level as well as at an educational level (CAETANO et al., 2020). Otherwise, sometimes, the information provided by digital means can be wrong or come from unreliable sources of information; it is necessary to pay special attention to these points since many individuals cannot analyze/criticize the information received by different means (HARGITTAI & DOBRANSKY, 2017; KUO et al., 2019).

Poorer oral health outcomes are associated with low health literacy and lower utilization of health services (BERKMAN et al., 2011; HOLTZMAN et al., 2014; WHO, 2024). In the economic sphere, each individual's situations influence their behavior and, consequently, affect their general and oral health (BERKMAN et al., 2010). This component makes it difficult for different health professionals to control each individual's risk factors. Furthermore, it is extremely important that, even in the event of pathologies' appearance, there is a focus on promoting their treatment and preventing future diseases (SHEIHAM et al., 2011). Along with social and economic factors, personal choices are also risk factors for health, namely an inadequate diet, poor personal and oral hygiene, harmful habits such as tobacco, and excessive alcohol consumption (MARMOT & BELL, 2012; BATISTA et al., 2018). For Horowitz and Kleinman (2008), literacy in oral health is extremely important, given that lack of knowledge can lead to the appearance of diseases in the oral cavity, as well as the appearance of pathologies at a systemic level. The authors corroborate the previously presented idea that the low level of literacy in the health area affects people who live at a lower social and economic level, along with the elderly and individuals belonging to minority groups (HOROWITZ & KLEINMAN, 2008). Thus, this systematic review aimed to analyze the impact of digital technologies on health literacy in situations of social isolation.

MATERIALS AND METHODS

This systematic review, which followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines, was recorded in PROSPERO and supported by the guidelines of the Cochrane Database of Systematic Reviews to obtain knowledge about the application of digital technologies in health literacy in situations of social isolation.

The search strategies were based on the PICO question: “In contexts of social isolation (P), What is the impact (C) of new technologies (I) on improving health literacy (O)?”.

Search Strategy and Eligibility criteria

An extensive electronic search was performed in PubMed/MedLine; Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, and Cochrane Methodology Register; and Web of Science (WoS) databases with the following query: “Health Literacy” [MeSH Major Topic] OR Health Promotion[MeSHTerms] OR “Health Education” [MeSHTerms] AND (“Social Isolation”[MeSH Major Topic] OR “Loneliness[MeSHMajor Topic]) AND (“Digital Technology” [MeSH Major Topic] OR “Digital Technologies” [Free Term]). Modifications in the key terms were performed for adaptation in each database.

Articles published from 2011 until 2021 were included (the period when socialization returned and achieved a somber milestone as our reference) in English, Portuguese, and Spanish languages, which approached social isolation, institutionalized or with pathologies that cause the need for dependence and care from others, studies that evaluate the impact of new technologies on improving health literacy, studies that compare aspects related to health literacy application strategies using new technologies, studies that demonstrated the impact of new technologies on improving the health literacy of populations in social isolation, and all types of studies, focusing essentially on observational studies, analytical studies, quasi-experimental and experimental studies.

It was excluded articles that considered the population was not socially isolated or experiencing symptoms of loneliness, studies that evaluated the impact of new technologies in areas outside the scope of health or whose evaluation has no impact on the variables under study, studies that compared other variables outside the scope of the defined objectives, and systematic reviews and meta-analyses.

Data collection and management

Two reviewers (B.P. and N.V.) independently performed the electronic search, filtering relevant articles that fit the study. Firstly, they analyzed the title and abstract for study selection. Any disagreements between reviewers were discussed with a third author (P.C.). Cohen's Kappa test was performed to assess reviewers' agreement.

Reviewers independently extracted data from the articles selected for analysis. They were codified and categorized according to the main conceptual categories, namely “type of study”, “participants”, “objectives”, “methodology adopted”, and

"established evidence"; a concise description was presented for each category. In addition, the title and year of publication were also registered.

RESULTS

After searching databases using the equation described in the previous section and the filtering terms, 137 articles were obtained (110 in PubMed/MedLine, 7 in Cochrane Central Register of Controlled Trials, and 20 articles in WoS). Firstly, duplicated articles were checked and excluded (n=1). Then, the titles of the selected articles were analyzed, keeping 30 articles from PubMed/MedLine and 10 articles from Web of Science. Thirdly, the abstracts were analyzed (n=40), and 27 articles were excluded as they did not meet the inclusion criteria of the present review. Thus, 13 full-text articles were analyzed for eligibility, and all were included in the study (k = 0.95). Figure 1 shows the PRISMA flowchart, which refers to the 4 steps that were carried out to select the articles: identification, respective selection, eligibility, and, finally, inclusion.

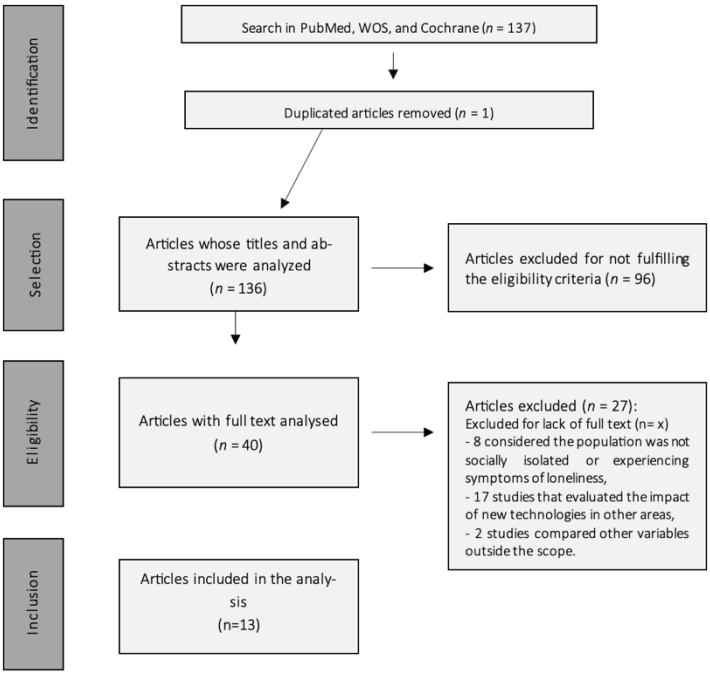

Figure 1. Overview of article selection procedure according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

After analyzing the articles described, it was found that social isolation, loneliness, and depressive symptoms are commonly observed not only in people living in institutions, with severe pathologies and/or dependent on others, but also in the majority of the population in the period after the COVID-19 pandemic. There were significant changes in members of the population in the periods before and after the pandemic, given the high state of stress, anxiety, and uncertainty, which

led to an increase in negative symptoms, decreased satisfaction with life, and lack of mental well-being, such as observed by A01, A02, A04, A05, A07, and A13. An increase in the use of new technologies was reported to combat isolation and the feeling of loneliness, with greater use of them.

Additionally, the use of new technologies made it possible to explore the concept of telemedicine and telehealth, that is, personalized remote monitoring by the medical team, promoting consultations without these users having to leave their homes and institutions. It also improved health literacy, facilitating the management of healthcare for members of the population and, consequently, offering prevention techniques, treatments, and personalized support to individuals, especially those in situations of social isolation (A06, A10, and A11). In this way, it is essential to mobilize research platforms to meet people's needs, with characteristics suitable for the older, more dependent, less familiar, and less literate population in the technological area (A11). Therefore, some characteristics aimed to make platforms more interactive, intuitive, and easy to use (Table 1). A summarization is presented in Table 2.

Table 1. Characteristics of digital applications found in the studies**.**

A03 (MARCELINO et al., 2016), A06 (LINDEMAN et al., 2020), A08 (HARGITTAI & DOBRANSKY, 2017), A11 (NICOL et al., 2020)	- Assisted voice control (*Alexa, Google Home, and Siri);* - Minimalist, intuitive, interactive interface; - Can be used on various electronic devices; - Collection and sharing of information, multimedia documents, and real testimonies; - Easy access and collection of data.

Table 2. Summary of selected articles' results.

Studies	Importance of Digital Technologies	Difficulties in use	Difficulties in accessing digital technologies
1. Fortune *et al*. (2019)	Increased health literacy and help in the prevention and treatment of pathologies.	NR	NR
2. Wójcik *et al.* (2021)	Contact with family and friends; Search for information; Increased health literacy; Contact with health professionals; Try to reduce social isolation and loneliness through calls/video.	Very dependent patients, with motor limitations, with disabilities that prevent the use of older – greater difficulty in use. Less education, less use	NR
3.Marcelino *et al*. (2016)	Increased contact with family and friends; Improves social isolation	Difficulty handling digital equipment	NR

	and loneliness; Increased health literacy; Content sharing		
4. Khan *et.al.* (2016)	Increased social contact; Sharing real testimonies; More contact with the medical team; More sharing of health information; Increased health literacy	Older people, with less education – have more difficulty	People with lower socioeconomic status – have less access to new technologies
5. Saito *et al.* (2021)	Increased social contact to try to combat feelings of loneliness and isolation	NR	NR
6.Lindeman *et al.* (2020)	Allows personalized monitoring by medical teams for their patients, even remotely;	NR	NR
7. Kuo *et al*. (2019)	Increased knowledge in the psychological area in order to provide assistance to individuals with more depressive and isolated symptoms.	NR	NR
8. Hargittai & Dobransky (2017)	Research of information related to health, increasing education in this area, as well as in the social and financial areas; Improving users' quality of life	People with less education have fewer digital skills; People with a disability have more difficulty using technology, as do people who are more isolated.	People with lower socioeconomic status and lower incomes find it more difficult to have electronic equipment.
9. Neves *et al*. (2017)	Increased social contact, with family and friends, to try to combat the feeling of loneliness and isolation; Allows acquisition of information.	Older people have fewer digital skills	Elderly people have less access to new technologies
10.Caetano *et al.* (2020)	Reduction in the feeling of loneliness and isolation due to greater communication between people; They allow greater access to information.	NR	NR
11. Nicol *et al*. (2020)	Access to electronic health records, implementation of teleconsultations and advice to users by health professionals	NR	NR
12. Xie *et al*. (2020)	Direct communication with different services, social interaction with friends and family, increased knowledge, more research into health information	People with a lower level of education have fewer digital skills; Elderly people have more difficulty handling devices	Older and isolated people have greater difficulty accessing new technologies
13. Bastoni *et al.* (2021)	Reduction in the feeling of loneliness and isolation due to greater communication between people	NR	NR

NR = not reported.

DISCUSSION

The occurrence of the pandemic worldwide and the high imposition of social distancing and isolation have indicated an elevation in the severity of adverse physical and psychological symptoms in the population (DOS SANTOS GONÇALVES et al., 2023; PEREIRA et al., 2023). New information and communication technologies play a fundamental role in combating loneliness and social isolation through quick and easy contact with family and friends, also allowing the carrying out of leisure activities on electronic devices, as well as the acquisition of knowledge. Technological innovation in recent years has had a tremendous social impact and has been a trigger point for transformation in education (FORTUNA et al., 2019; KAHN et al., 2022; FERNANDES et al., 2023; MARCELINO et al., 2023; NASSANI et al., 2024).

Research on health education using digital media has focused on several areas, namely the comparison of information and communication technologies used (FORTUNA et al., 2019; WÓJCIK et al., 2021), self-efficiency, user satisfaction, results on acquired knowledge, the development of clinical techniques and their sharing through new technologies, barriers to access and consequent use of digital devices, and, finally, their impact on increasing literacy in the health area. Additionally, online education (commonly known as e-learning) has several advantages, namely accessibility, cost, efficiency, and interactivity in learning (FORTUNA et al., 2019).

The social impact caused by monitoring through new technologies occurs in people of older age groups and in younger members or adults with pathologies that affect their day-to-day lives and social status (FORTUNA et al., 2019). The sharing of updated information about diseases by health professionals, possible existing treatments, and even alternative therapies contributes to increasing understanding and literacy in the area of health among users, improving their quality of life and their social condition, as constant contact between different parties reduces feelings of loneliness and sadness that may exist in patients (FORTUNA et al., 2019). Creating digital platforms for the health sector could allow users to inform their doctors about their health status between control appointments, facilitating personalized remote monitoring (WÓJCIK et al., 2021). Some studies demonstrated that technologically proficient people find the most reliable way to transmit knowledge about the topic. Still, health professionals say they do not know which new technologies consumers use (MARCELINO et al., 2016).

On the other hand, due to social, economic, and demographic variations, many people do not have access to advanced technologies (MARCELINO et al., 2016); then, a great association between socioeconomic status, ethnicity/race of individuals, and the reduced demand for information related to health on their part. These data have consequences for the health literacy of these population members, which could be reflected in their precarious health status. It is also essential to highlight the lack of information and knowledge among caregivers, whether family members or health professionals, about some care and behaviors to be given to users, especially at a psychological level (MARCELINO et al., 2016). Observing this fact, it is possible to allow the development of more effective interventions, but also for their benefit, as this increase in literacy makes it possible to prevent negative feelings, such as those previously described, from invading healthcare providers (KHAN et al., 2016; MARCELINO et al., 2016; NICOL et al., 2020). Authors corroborate this information (NICOL et al., 2020), demonstrating that the knowledge of nurses and other caregivers must be improved.

Technological devices

Smartphones and computers are the technological devices most used to obtain information for contact with family members and health professionals (KHAN et al., 2016). The great use of cell phones may be related to the increase in distancing restrictions and consequent social isolation, so this device is used more for communication between people. On the other hand, the computer is the most used digital means for acquiring knowledge (KHAN et al., 2016; LINDEMAN et al., 2020).

Since we live in the era of tablets and smartphones and unlimited access to information and knowledge via the internet (MARCELINO et al., 2016), it is extremely important to quickly optimize the communication and information provided to patients so that they can access reliable data useful for their health status (FORTUNA et al., 2019). Furthermore, it is essential to understand that access to electronic devices may be more difficult for individuals who are in rural areas, older people, members of the population with financial difficulties and lower salaries, and individuals with a lower level of education, and as such, have more difficulty using new technologies (KHAN et al., 2016).

New technologies and their application

In this era (digital world), where new technologies have an intrinsic role in our daily lives and given the solitary and stressful nature of people's daily lives, especially those who are dependent and/or those who are more socially isolated,

but also of their family members/caregivers, it is extremely important to combine the digital world in combating this problem (KHAN et al., 2016; KUO et al., 2019). There are several existing benefits, namely the fight against loneliness through contact via call or video call with family and friends (KUO et al., 2019), increased empathy by sharing real testimonies on social media, increased knowledge in different areas through research on platforms and contact with professionals (KHAN et al., 2016) who can inform their users, or people who reach you via the internet, information about pathological or non-pathological conditions, physical or psychological, at a systemic or oral level; allowing knowledge of the area, symptom prevention techniques, conventional or alternative therapies, making users' quality of life much better.

The creation of applications aimed explicitly at health features and/or digital applications that allow the improvement of the social context of their users is extremely important, especially if they are appropriately created for older individuals with less ability to understand new technologies (MARCELINO et al., 2016; HARGITTAI & DOBRANSKY, 2017; NEVES et al., 2017). Applications must have a minimalist appearance and interfaces that are easy and intuitive to use since many people are illiterate in technology, and the internet can become aggravating due to the enormous amount of information available and the difficulty of navigating and using it (MARCELINO et al., 2016; NEVES et al., 2017). Additionally, applications must allow the creation and sharing of informative and social content, such as sharing testimonies and information about pathologies, in order to allow members of the population to help each other and become more vital and with more strength and motivation to overcome their personal situations or illness conditions that they may be going through (MARCELINO et al., 2016; HARGITTAI & DOBRANSKY, 2017).

Since the beginning of 2020, the global COVID-19 pandemic has affected the population around the world, putting public health and economic activity in all countries at risk and causing consequences for human beings and their lives in various areas (CAETANO et al., 2020). The imposition of the closure of all commercial establishments, the need for strict quarantine and social distancing and isolation of the population has, on the one hand, reduced the infection curve by the Sars-Cov2 (NICOL et al., 2020) virus, but on the other hand, it has negatively affected all individuals physically, psychologically, economically and socially (CAETANO et al., 2020; NICOL et al., 2020). For this reason, we need to use the technological resources we have at our disposal increasingly.

It is crucial to analyze and use strategies with and without technology to transmit reliable information to patients and their family members and/or caregivers (BASTONI et al., 2021), alternating between face-to-face contact and technology.

Additionally, understanding whether patients have all the conditions to access telehealth is crucial, as well as a sufficient understanding of health to have a consultation alone with doctors or whether a companion is required (XIE et al., 2020).

Then, technologies permit interaction and sharing of knowledge, increase literary capacity in the area of health, and improve social status, resulting in an alleviation of symptoms of anxiety, depression, and loneliness; finally, an improvement in the quality of life of people in several areas (STEINHUBL et al., 2013; XIE et al., 2020; BASTONI et al., 2021).

Future recommendations

In the future, research on this topic should focus on evaluating the knowledge acquired when using technologies, comparing before and after the intervention, as well as the degree of user satisfaction and the progress made in acquiring knowledge. It is important to verify whether the knowledge acquired through new technologies increases health literacy and improves patients' clinical outcomes.

CONCLUSIONS

It is possible to conclude that the existence of individuals with access to digital media who are more able to acquire information about pathologies, prevention, and treatment of the same is related to better health conditions. Thus, the motivation on the part of health professionals for patients to use technological resources in the health component is essential.

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