






Challenges of longevity in the digital age: a study on the effectiveness of digital inclusion programs in health literacy for older adults

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Abstract

Objective: analyze the effectiveness of a digital inclusion program on the digital health literacy of elderly people participating in social groups. *Methodology:* Quasi-experimental study without a control group, of the before-and-after quasi-experimental type, conducted in health district 4 in Recife/PE with elderly social groups between April and November 2023. People of both sexes were included, and those with severe cognitive impairment, identified using the 10CS cognitive screening tool, were excluded. The digital inclusion program consisted of three workshops, each lasting three hours, held once a week. Health digital literacy was measured using the eHEALS scale. *Results:* Of the 210 study participants, 119 had low digital health literacy ($p < 0.001$). About 66% of older adults with low literacy moved to moderate and high digital literacy, and men showed improvement in digital literacy compared to women. *Conclusions:* The digital inclusion program proposed in this study had a positive effect on digital health literacy, especially by reducing low literacy.

Keywords: Elderly.
Information Technology.
Health Literacy.

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INTRODUCTION

One of the most striking characteristics of recent decades has been the rapid expansion of technological development accompanied by the interconnection of online communication and information devices. Older adults have been thrust into the world of digital information and communication technologies (DICTs) without assistance in developing informational competencies for autonomous and safe use¹.

DICTs number among the technologies most used by older adults, allowing easy access to information related to health, tourism, instant messaging, bank accounts, searches, shopping, electronic mail, among others, via platforms such as e-government, e-banking, e-shopping, e-health, and e-learning. In the health sphere, applications for e-health are increasingly common, offering services and products that aim to meet the health needs of the older adult population².

For older adults to fully exploit the benefits of technology in a broader fashion, exposure to digital devices must advance to include critical analysis of the content available³, i.e., digital literacy. This approach is understood as an educational social practice for the development of technological skills that facilitate digital practices with an element of reflection by users, entailing the inclusion of social, cultural, and discursive aspects in the learning process⁴.

The concept of digital health literacy can be defined as the ability to search, find, understand, and evaluate health information from electronic sources and apply knowledge acquired to address or resolve a health problem⁵. The level of digital health literacy of older adults can be evaluated using the digital health literacy scale – eHEALS, one of the first of its kind developed to measure level of digital health literacy⁶.

Population aging, in an increasingly digital society, calls for strategies promoting inclusion of older adults in a way that allows them to fully exploit these novel technological-digital solutions during the process of aging⁷. Emphasis on education is one of the approaches to be considered, not only with respect to literacy of older adults in general, but also digital literacy⁸.

It is noteworthy that, in Brazil, low educational level, absence of appropriate programs/social projects for digital literacy tailored to users, and a lack of free spaces for access to computers and the internet, are barriers that hinder older adults' access to technological resources⁹.

Low digital health literacy among older adults can result in difficulties accessing, navigating, monitoring, and managing health information available on digital platforms. Failure to carry out critical analysis of available content can lead to the propagation of false information, potentially causing harm to the health of older adults, warranting the promotion of digital awareness programs for this population.

The study by Botelho¹⁰ analyzed scientific output on digital inclusion of older adults and associated factors. The author reviewed 30 digital inclusion studies, with 15 having interventions based on workshops administered in-person, remotely, or by telephone. However, none of the studies addressed digital health literacy.

Therefore, the objective of this study is to analyze the effectiveness of a digital inclusion program on the digital health literacy of older adults participating in social groups in health district 4 of Recife, Pernambuco state, Brazil.

METHODS

A before-and-after type quasi-experimental study without a control group was conducted. The study involved social groups of older adults in health district 4 (HD4) of Recife (Pernambuco state) and at the Center for Older Adults (NPI) of the Federal University of Pernambuco (UFPE). Recife is the capital city of Pernambuco state in Brazil, with an area of 218.843 km² and population of 1,488,920 people¹¹. The aging index in Pernambuco is 48.7 older adults for every 100 children; The Recife Health Department divides the city into eight health districts. Health district 4 (HD4) covers the neighborhoods of Caxangá, Cidade Universitária, Cordeiro, Engenho do Meio, Ilha do Retiro, Iputinga, Madalena, Prado, Torre, Torrões, Várzea, and Zumbi.

Under a partnership with the City of Recife, the contacts of Community Health Workers (CHWs) were made available. Through these CHWs, the contacts of leaders of social groups of older adults in HD4 linked to Family Health Units (USFs) were obtained. With the support of the CHWs, social groups of older adults, location, and opening hours were mapped, and telephone contact was made. The City of Recife also provided the contacts of coordinators of Social Assistance Reference Centers (SARCs) and Community Peace Centers (CPCs) located in the HD4 area. After participants had agreed to take part in the study and signed the informed consent form, data collection began.

The NPI of the UFPE encompasses the health care sector and the Open University for Older Adults (UnAPI). The health care sector serves as an outpatient unit that offers health care services focused on active and healthy aging, while the UnAPI represents a space for group socializing, with encouragement for active participation of older adults, valorizing their potential and talents, running courses that facilitate the acquisition of new knowledge and integration into society.

Given the lack of official information about the functioning of the social groups and number of participants severely affected by the COVID-19 pandemic, a convenience sample was employed.

For the study, older adults aged 60 years or over, of both sexes and residing in HD4, were included. Individuals with severe cognitive impairment, as diagnosed by the 10CS cognitive screening instrument, were excluded. The expected losses of the study refer to older adults who underwent evaluation but did not attend the reassessment.

The digital inclusion program was performed in three stages:

- Stage 1 - older adult evaluation: at this stage, demographic and socioeconomic data were collected, and the level of digital health literacy measured using the eHEALS scale.

The demographic and socioeconomic profile questionnaire consisted of four blocks: general details on respondent, educational level, housing, and income,

comprising a total of 13 questions. The first block, collecting general details on the respondent, probed: name, age, date of birth, sex, marital status, and family arrangement. The second block, covering educational level, collected the following information: illiteracy, educational level, retired or pensioner/social assistance benefit (BPC) recipient, and current occupation. In the third block, housing, the following information was requested: type of group, how long have you been part of this group? In the fourth block, income, the following information was collected: family income (minimum wage/2023-MW = R\$1,302.00).

Cognitive screening was performed using the Portuguese version of the 10-Point Cognitive Screener (10CS) developed by Apolinário¹². The 10CS is a questionnaire divided into four blocks: temporal orientation, learning/memory, verbal fluency for animals, and recall. Scoring is as follows: ≥ 8 points for normal cognition, 6-7 points for possible cognitive impairment (mild impairment), and ≤ 5 points for probable cognitive impairment (severe impairment).

The eHEALS scale was developed by Norman and Skinner⁶ and validated for use in the Brazilian older adult population by Oliveira¹³. The scale measures level of digital health literacy. The Brazilian version used in the present study has shown excellent psychometric properties for measuring levels of digital health literacy in Brazilian adults.

The eHEALS contains eight statements: 1) I know what health resources are available on the Internet; 2) I know where to find useful health resources on the Internet; 3) I know how to find useful health resources on the Internet; 4) I know how to use the Internet to answer my questions about health; 5) I know how to use the health information I find on the Internet to help me; 6) I have the skills I need to evaluate the health resources I find on the Internet; 7) I can distinguish high-quality from low-quality health resources on the Internet; 8) I feel confident in using information from the Internet to make health-related decisions.

Responses vary on a five-point Likert-type scale, where 1 (never tried), 2 (not at all), 3 (not very easily), 4 (with some ease), and 5 (very easily), potentially totaling 8-40 points. A higher score indicates greater digital health literacy.

The study by Mialhe¹⁴ presents the normalization of scoring ranges for the Brazilian version of the eHEALS and establishes three classification ranges for digital health literacy: low, moderate, and high, with score classification controlled for educational level of the respondent. Adults with an educational level up to incomplete secondary education have their digital health literacy classified as follows: low (≤ 10), moderate (11-26), or high (27-40), whereas respondents with complete secondary education through higher education are classified as low (≤ 24), moderate (25-32), or high (33-40).

- Stage 2 - intervention: at this stage, older adults participated in the digital inclusion program. The program consisted of three digital inclusion workshops, held once a week, with each meeting lasting 3 hours.

The digital inclusion workshops were run by a team of 14 researchers, previously trained through a 60-hour course on applying data collection instruments and conducting the workshops.

The ratio of the digital inclusion workshops was 1:4 (1 researcher for every 4 older adults). The content of the workshops centered on mobile phone handling and safe internet browsing in search of health information. Topics such as fake news and scams were also addressed. Through a problem-based methodology based on the Maguerez Arch¹⁵, relevant and significant themes for the group were addressed at the meetings. Thus, at each meeting, the group expressed their needs, which formed the basis of activities to be carried out that day, with a consistent focus on mobile phone handling and safe internet browsing in search of health information.

Importantly, the participant's own mobile phone was used in the workshops. This is a relevant criterion that enhances the continuity of use. Additionally, highly specific needs, such as: handling spreadsheets, text and image applications, video editing, etc., were noted for offering future courses targeting these needs.

As support material, a digital inclusion booklet with photos and step-by-step instructions for mobile phone handling was prepared by the research team. The booklet contained illustrated information about the basic functions of mobile devices,

communication, data and file storage, internet, calendar, entertainment, privacy, and problem-solving. The booklet was printed and delivered to each research participant.

- Stage 3 - older adult reassessment: during this stage, the eHEALS scale was reapplied.

To characterize the demographic and socioeconomic profile of the older adults assessed, percentage rates were calculated and respective frequency distributions constructed. For comparing the prevalence of categories of the variables evaluated, the chi-square test was applied to compare proportions.

The Shapiro-Wilk test was used to determine the normality of the sample. When non-normality was established, the median was used to represent the level of digital health literacy measured on the eHEALS. Comparison of the medians of eHEALS scores between initial and second assessments was performed using the Wilcoxon test.

The chi-square test for homogeneity was used for classification of digital health literacy into low, moderate, and high, based on Mialhe's¹⁴ classification.

Comparison of the medians of eHEALS scores at reassessment for the demographic and socioeconomic profiles of participants was performed using the Mann-Whitney test and the Kruskal-Wallis test, depending on the number of categories in the factors assessed. A significance level of 5% was considered for all statistical tests performed.

The study complies with Resolution No. 466/2012 and Resolution No. 510/2016 of the National Health Council and was approved by the Research Ethics Committee involving Humans of the Health Sciences Center of the Federal University of Pernambuco (REC/HSC/UFPE), CAAE: 77124023.7.0000.5208, opinion No. 6.813.185 dated May 9, 2024.

DATA AVAILABILITY

The full data set underpinning the study results is available from the original article database at <https://doi.org/10.6084/m9.figshare.31198045>.

RESULTS

The study population initially comprised 311 older adults, of which 32 (10.3%) had severe cognitive impairment and were subsequently excluded. There were also 69 losses (22.2%) consisting of participants who did not attend stage 3 of the Digital Inclusion Program (reassessment), giving a final study sample of 210 participants.

Regarding the demographic and socioeconomic profiles of the sample, participants were predominantly female (84.3%), retired (85.2%), living without partner (57.1%), had high educational level (36.2%), and income of 1-3 minimum wages (39.1%) (Table 1).

The vast majority of older adults in the sample were classified as having low digital health literacy. Results at reassessment showed an increase in the number of older adults with high digital health literacy (Table 2).

Table 1. Distribution of demographic and socioeconomic profile of sample (N=210). Recife, Pernambuco state, 2023

Factor assessed	n(%)	p-value
Sex		
Male	33(15.7)	<0.001 ¹
Female	177(84.3)	
Age (years)		
60-69	107(51.0)	0.783 ¹
≥70	103(49.0)	
Family arrangement		
With partner	90(42.9)	0.038 ¹
Without partner	120(57.1)	
Educational level		
Up to incomplete secondary	70(33.3)	<0.001 ¹
Complete secondary to higher	140(66.7)	
Retired or pensioner		
Yes	179(85.2)	<0.001 ¹
No	31(14.8)	
Occupation		
Employer/self-employed	31(14.8)	<0.001 ¹
Formally employed	6(2.8)	
Unpaid work	48(22.9)	
Does not work	125(59.5)	
Type of group		
Community group (registered with city hall)	31(14.8)	<0.001 ¹
Community group (unregistered)	5(2.3)	
Social group CRAS/COMPAZ	22(10.5)	
Family Health Unit group	54(25.7)	
NPI	98(46.7)	
Family income (MW)		
< 1	4(1.9)	<0.001 ¹
1	62(29.5)	
> 1-3	82(39.1)	
> 3	62(29.5)	

¹p-value of chi-square test for proportion comparison. MW: Minimum wage; CRAS: Social Assistance Referral Centers; COMPAZ: Community Peace Centers; NPI: Center for Older Adults.

Table 2. Classification of digital health literacy at initial assessment and reassessment (N=210). Recife, Pernambuco state, 2023.

eHEALS classification ranges			<i>p</i> -value
	Assessment	Reassessment	
Up to incomplete secondary education			
Low	50(71.4%)	15(21.4%)	<0.001 ¹
Moderate	18(25.7%)	18(25.7%)	
High	2(2.9%)	37(52.9%)	
Complete secondary to higher education			
Low	69(49.3%)	52(37.1%)	0.019 ¹
Moderate	44(31.4%)	41(29.3%)	
High	27(19.3%)	47(33.6%)	

¹*p*-value of chi-square test for homogeneity

The medians of eHEALS scores revealed for which classification ranges the intervention proved effective. There was a significant increase in the medians of scores for both low and moderate literacy groups (*p*-value <0.001) (Table 3).

All medians of eHEALS scores at reassessment showed a significant increase relative to initial assessment. However, median scores showed smaller increases for two items: "I have the skills I need to

evaluate the health resources I find on the Internet" and "I feel confident in using information from the Internet to make health-related decisions" (Table 4).

With respect to demographic and socioeconomic factors, at reassessment men showed a significantly greater increase in median eHEALS score than women. For the other factors evaluated, no significant differences between categories were observed (Table 5).

Table 3. Evaluation of digital health literacy level at assessment and reassessment. (N= 210). Recife, Pernambuco state, 2023.

eHEALS classification ranges	Assessment		Reassessment	
	Median	IQR	Median	IQR
Up to incomplete secondary education				
Low	11.4	8.0	23.0	6,0
Moderate	16.0	10.0	28.0	11,0
High	35.0	0.0	36.0	8,0
	<i>p</i> -value	<0.001 ¹		<0.001 ¹
Complete secondary to higher education				
Low	15.0	10.0	16.0	14,0
Moderate	28.0	5.0	31.0	3,0
High	37.0	6.0	37.0	4,0
	<i>p</i> -value	<0.001 ¹		<0.001 ¹

IQR - Interquartile Range. ¹*p*-value of Kruskal-Wallis test.

Table 4. eHEALS scores of older adults at initial assessment and reassessment. (N=210). Recife, Pernambuco state, 2023.

Item assessed	Assessment	Reassessment	<i>p</i> -value ¹
I know what health resources are available on the Internet	2.0	4.0	<0.001
I know where to find useful health resources on the Internet	2.0	4.0	<0.001
I know how to find useful health resources on the Internet	2.0	4.0	<0.001
I know how to use the Internet to answer my questions about health	2.0	4.0	<0.001
I know how to use the health information I find on the Internet to help me	2.0	4.0	<0.001
I have the skills I need to evaluate the health resources I find on the Internet	2.0	3.0	<0.001
I can distinguish high-quality from low-quality health resources on the Internet	2.0	4.0	<0.001
I feel confident in using information from the Internet to make health-related decisions	2.0	3.0	<0.001
TOTAL SCORE	18.0	31.0	<0.001

¹*p*-value of Wilcoxon test. Data expressed as median

Table 5. eHEALS scores of older adults at initial assessment and reassessment for demographic and socioeconomic factors. (N=210). Recife, Pernambuco state, 2023.

Factor assessed	Assessment		Reassessment		<i>p</i> -value
	Median	IQR	Median	IQR	
Sex					
Male	16.0	17.0	33.0	7.0	<0.001 ³
Female	19.0	20.0	29.0	14.0	<0.001 ³
	<i>p</i> -value	0.798 ¹		0.009 ¹	-
Age (years)					
60-69	18.0	19.0	32.0	13.0	<0.001 ³
≥70	16.0	19.0	31.0	13.0	<0.001 ³
	<i>p</i> -value	0.560 ¹		0.627 ¹	-
Family arrangement					
With partner	16.0	21.0	32.0	13.0	<0.001 ³
Without partner	18.5	18.0	29.0	14.0	<0.001 ³
	<i>p</i> -value	0.576 ¹		0.062 ¹	-
Educational level					
Up to incomplete secondary education	13.0	8.0	32.0	13.0	<0.001 ³
Complete secondary to higher education	25.0	17.0	30.5	15.0	<0.001 ³
	<i>p</i> -value	<0.001 ²		0.170 ²	-
Retired or pensioner					
Yes	18.0	18.0	28.5	12.0	<0.001 ³
No	19.0	22.0	29.0	19.0	0.067 ³
	<i>p</i> -value	0.554 ¹		0.375 ¹	-

to be continued

Continuation of Table 5

Factor assessed	Assessment		Reassessment		<i>p</i> -value
	Median	IQR	Median	IQR	
Occupation					
Employer/self-employed	23.0	20.0	32.0	22.0	0.110 ³
Formally employed	20.5	27.0	31.5	11.0	0.172 ³
Unpaid work	24.5	17.0	29.0	10.0	0.022 ³
Does not work	16.0	18.0	30.0	12.0	<0.001 ³
	<i>p</i> -value	0.055 ²	0.647 ²	-	
Type of group					
Community group (registered with city hall)	19.0	22.0	30.0	13.0	<0.001 ³
Community group (unregistered)	8.0	12.0	34.0	12.0	0.043 ³
Social group – CRAS/COMPAZ	16.0	15.0	28.5	15.0	0.002 ³
Family Health Unit group	15.0	8.0	29.0	11.0	<0.001 ³
NPI	26.0	16.0	32.0	15.0	0.012 ³
	<i>p</i> -value	<0.001 ²	0.842 ²	-	
Family income (MW)					
<1	8.0	7.0	37.0	12.0	0.068 ³
1	15.0	15.0	29.0	18.0	<0.001 ³
>1-3	16.0	15.0	32.0	12.0	<0.001 ³
> 3	28.0	11.0	31.0	12.0	0.594 ³
	<i>p</i> -value	<0.001 ²	0.334 ²	-	

IQR: Interquartile Range. ¹*p*-value of Mann-Whitney test. ²*p*-value of Kruskal-Wallis test. ³*p*-value of Wilcoxon test; CRAS: Social Assistance Referral Centers; COMPAZ: Community Peace Centers; NPI: Center for Older Adults; MW: Minimum Wage.

DISCUSSION

In this study, the majority of median scores for the digital health literacy level showed an increase at reassessment relative to initial assessment. The two items whose median scores showed smaller increases were: "I have the skills I need to evaluate the health resources I find on the Internet"; and "I feel confident in using information from the Internet to make health-related decisions". With respect to demographic and socioeconomic aspects, men showed a significantly greater improvement in level of digital health literacy than women, with no significant difference among the other factors at reassessment.

Digital inclusion of older adults is extremely important as it enables them to access a host of information, from entertainment to education, and provides this group with a range of knowledge that empowers them to make decisions regarding their own health¹⁶. Older adults with a high level of

digital health literacy are capable of researching and accurately discriminating health information, judging the veracity of context, and increasing resilience to misinformation on the internet¹⁷. The significant increase in the median eHEALS scores for most of the items assessed demonstrates the potential of offering courses and technological experiences for older adults as effective strategies for promoting learning and supporting the lifelong learning model¹⁸.

The vast majority participants had digital health literacy classified as low. At reassessment, there was an increase in the number of participants with high digital health literacy, likely drawn from the moderate literacy group, given the number of individuals classified with low literacy was only slightly reduced at reassessment. The medians of eHEALS scores revealed an increase in scores in the groups with low and moderate digital health literacy, while performance was largely unchanged in the high literacy group.

Studies by Nunes¹; Liu¹⁹; Kyaw²⁰ reported that older adults feel insecure with information found on the internet, and many do not know how to differentiate true from false information, or fake news. Given the intervention centered on digital inclusion, and not health literacy in particular, this might explain the smaller increase in median scores for the dimensions of assessment and decision-making concerning health-related information. A significant contingent have difficulty evaluating the accuracy of information found online. Participants aged over 50 years had lower levels of confidence, suggesting the need for greater support for this group to evaluate and filter health information more effectively²¹.

Despite the likely success of the Program in improving the level of digital health literacy of the population studied, no evidence is available in the literature on more effective program models for this purpose, with a wide variety of protocols used²²⁻²⁴. Promoting digital literacy for older adults confers many benefits, such as the ability to evaluate the reliability of information found online, protect personal privacy and security, and deal with interactions on social networks^{1,20,25}. Older adults participating in the Geronto Network, an international network of gerontology research and studies created in 2016 with the goal of integrating academia, services, and civil society to promote quality of life and autonomy of older adults, showed a moderate level of digital health literacy, with greater security in the stages of searching and accessing information, but weaknesses in critical evaluation and in transforming the information into care actions²⁶.

The current program proved effective for older adults who had low and moderate digital health literacy, increasing their scores at reassessment. Many participants classified with high literacy on initial assessment, at program completion, later reported they had self-evaluated as having high literacy, but noted, at reassessment, that the program was effective and in fact they did not have high literacy initially. The study by Domingues²⁷ highlights the importance of digital inclusion initiatives aimed at the older adult population since, according to the study, the individuals felt more participatory in their contexts (cultural, personal, and virtual) after the workshops.

Analysis of the demographic and socioeconomic aspects of the sample showed that participants were predominantly female, retired, living without a partner, had high educational level, and a family income of 1-3 minimum wages. Additionally, 46.7% of the individuals in the sample were members of the NPI of UFPE.

Women typically seek health services more often, exhibiting greater self-care than men. The prevalence of women may reflect men's resistance to seeking technological innovations and improvements in quality of life²⁸. In the study by Domingues²⁷, the sociodemographic profile of the sample also showed a predominance of women, framing as justification that women are more interested in engaging in new experiences and learning new things, while men believe the time to learn and have new experiences is over. Data from the National Health Survey (NHS)²⁹ showed that women tend to seek health services more frequently, whether for preventive check-up consultations or specific reproductive health issues, such as prenatal care, preventive exams, etc. The proportion of women who consulted a doctor in the 12 months prior to the interview was 82.3%, while the percentage of men was 69.4%³⁰.

Male gender, higher income and educational level, as well as younger age and better functional capacity, are predictors that favor learning in the use of technologies¹⁰. In this study, the finding was surprising, given the predominance of women in the sample and the theory that men show resistance to seeking innovations. However, it is noteworthy that women, from an early age, were encouraged to be mothers and "homemakers" while men were taught leadership activities, to be the provider of the household, factors which, over time, brought men into closer contact with the technological world. This hypothesis finds support in the results of the studies by Romano³¹ and Gallo³².

Teaching-learning group workshops favor collaboration in learning and performing activities, promote socialization, and improve self-efficacy. The high educational level of the sample may be related to the fact that a high percentage of the sample were members of the NPI. The individuals engaged in this program frequent spaces where teaching activities

centered on lifelong education are promoted, have greater access to health information, and are part of groups with more intense social activities, and tend to have higher educational level and live under social conditions that are more favorable for personal development. The use of DICTs is not only relatively uncommon among older adults, but also highly stratified by differences in sex, age, professional activity, marital status, and educational level³³.

Retired older adults who enjoy a good level of income and are not engaged in work usually occupy their free time with leisure and social activities. Therefore, the vast majority of this group attend teaching and socialization groups. Some investigations corroborate this finding, such as the studies by Figueiredo²⁵; Oliveira¹³; Nunes¹. Having a higher income guarantees more opportunities to own digital devices, such as smartphones, tablets, and internet access, and has a significant association with digital health literacy²⁰⁻³⁴.

The study has some limitations, such as the lack of a control group, which would have conferred greater reliability to the findings, and the fact that no sample size calculation was performed, with a convenience sample being used instead. Thus, future randomized clinical trials evaluating the effectiveness of the intervention are warranted. Notwithstanding, the study furnishes important data on the use of digital inclusion interventions for older adults, which can contribute to future programs aimed at this group.

CONCLUSION

The digital inclusion program in this study positively influenced digital health literacy, reducing low literacy and increasing the number of older adults with moderate and high levels. The vast majority

of participants had low digital health literacy. After completing the digital inclusion program, there was an increase in the number of older adults with moderate and high digital health literacy. Despite the improvements in digital health literacy, difficulties ascertaining the safety of information on the internet persist. Further studies exploring this issue should be conducted, with the aim of identifying the shortcomings of the older adult population regarding internet use and difficulties developing critical thinking with respect to health information retrieved.

AUTHOR CONTRIBUTIONS

- Raissa Luisa S. Batista - Database cleaning and organization, analysis, discussion and interpretation of data, writing and revision of the article.
- Carla Cabral S. A. Lins - Review of ethical research requirements and text revision for article writing.
- Maria das Graças W. S. Coriolano - Devising of the research theme, definition of the research question, objectives and data collection instruments, discussion and interpretation of data and article revision, study oversight.

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