Saúde e Pesquisa
DOI: 10.17765/2176-9206.2023v16n1.e10988

Technological inclusion: effects on the mental health and quality of life of elders

Inclusão tecnológica: efeitos na saúde mental e qualidade de vida de isosos

Priscila Santos Oliveira[1*], Raiane Caroline Garcia[2], Daniel Vicentini de Oliveira[3], Denerval Mendez Batista[4], Gabriel Valim da Silva[5], Sônia Maria Marques Gomes Bertolini[6]

[1] Departamento de Saúde, Programa de Pós-graduação Mestrado em Promoção da Saúde, Universidade Cesumar (UNICESUMAR), Maringá (PR), Brasil. [2] Departamento de Saúde, Programa de Pós-graduação Doutorado em Promoção da Saúde, Universidade Cesumar (UNICESUMAR), Maringá (PR), Brasil. [3] Departamento de Saúde, Docente do Programa de Pós-graduação *Stricto Sensu* em Promoção da Saúde, Universidade Cesumar (UNICESUMAR), Maringá (PR), Brasil. [4] Departamento de Saúde, Programa de Pós-graduação Doutorado em Promoção da Saúde, Universidade Cesumar (UNICESUMAR), Maringá (PR), Brasil. [5] Departamento de Saúde, Acadêmico de Fisioterapia, Universidade Cesumar (UNICESUMAR), Maringá (PR), Brasil. [6] Departamento de Saúde, Coordenadora e Docente do Programa de Pós-graduação *Stricto Sensu* em Promoção da Saúde, Universidade Cesumar (UNICESUMAR), Maringá (PR), Brasil.

***Corresponding author**: Priscila Santos Oliveira – *E-mail*: priscila-s.o@outlook.com

ABSTRACT
To evaluate the effect of training in digital technology for community elders. This is a quasi-experimental interventional study. The sample consisted of 12 elderly people of both sexes, living in Maringá (PR). The study took place at the premises of a higher education institution and lasted eight weeks, totaling 32 hours. The assessment and reassessment protocol consisted of: collecting sociodemographic data; application of the Geriatric Depression Scale (GDS); and application of two quality of life questionnaires: WHOQOL-OLD and WHOQOL-BREF. There was a significant difference between the pre- and post-intervention moments in the psychological domain (p=0.032) and in the autonomy facet (p=0.032) of quality of life. Training for the digital inclusion of the elderly with the use of smartphones can contribute to improving the quality of life of the elderly in terms of mental health aspects.

Keywords: Aging. Health promotion. Quality of life. Information Technology.

RESUMO
Avaliar o efeito de um treinamento em tecnologia digital para idosos da comunidade. Trata-se de um estudo intervencional quase experimental. A amostra foi composta por 12 idosos de ambos os sexos, residentes em Maringá (PR). O estudo ocorreu nas instalações de uma instituição de ensino superior e teve duração de oito semanas, totalizando 32 horas. O protocolo de avaliação e reavaliação consistiu em: coleta dos dados sociodemográficos; aplicação da Escala de Depressão Geriátrica – *Geriatric Depression Scale* (GDS); e aplicação de dois questionários de qualidade de vida (WHOQOL-OLD e WHOQOL-BREF). Verificou-se diferença significante entre os momentos pré-intervenção e pós-intervenção no domínio Psicológico (p=0,032) e na faceta Autonomia (p=0,032) da qualidade de vida. O treinamento para a inclusão digital de idosos com o uso de smartphone pode contribuir para melhora da qualidade de vida dos idosos quanto aos aspectos da saúde mental.

Palavras-chave: Envelhecimento. Promoção da Saúde. Qualidade de Vida. Tecnologia da Informação.

Received in June 13, 2022.
Accepted on August 10, 2022.

INTRODUCTION

In Brazil, nearly 69.8% of the population has access to the Internet, and due to the speed of technological advancement, this global connection network become a part of the day-to-day lives of people, regardless of their age group.[1] The constant evolution of information and communication technologies (ICTs), associated with the growing percentage of elderly persons in Brazil, increases the need of searching for knowledge on the subject, while also increasing the interest of elders by virtual spaces.[2,3]

Like the ICTs, the ease of access to the Internet allows the elderly to communicate with relatives and friends who live away, in addition to increasing their number of friends and leisure options.[4] The use of ICTs can strongly contribute to deal with the challenges this population faces daily, as long as they learn how to use them. Furthermore, with the emergence of mobile technologies, the definition of communication and the lines of interaction are changing fast, intensifying social contact - smartphones being the main example, nowadays.[5] Elders can and should use technology to their benefit, increasing their autonomy and social contact through the net, especially in the case of those who live alone or in adverse situations.[6]

Furthermore, we know that, due to the pandemic caused by the coronavirus SARS-CoV-2 (COVID-19), there were periods of isolation, leading to a considerable increase in psychological disorders such as anxiety and depression, due to the fact that all family and social contacts were abruptly interrupted.[7] This social disconnection and isolation was imposed in general, not only to the elders, but had a greater effect on this population, increasing its vulnerability for psychological disorders and directly affecting their mental health, reflecting on their quality of life as a whole.[8]

Consequently, this population was suddenly forced to learn about technological advancements, with no preparation or help to maintain a minimal level of independence, which led to psychological consequences, such as anxiety.[9,10]

As a result, it is necessary to implement educational practices in regard to these new technologies for the elders, especially in communication.[11] In this regard, it stands out that it can be more difficult for this group to acquire knowledge about digital technologies, since they are not used to the instruments available today, among which the smartphones themselves.[6]

We believe that, through digital inclusion and smartphone use, elders may be able to broaden their knowledge, and that, through on-line services, they can have more access to their rights. Technology can be an ally in day-to-day activities, an important tool to improve the quality of life of this population.

Considering the above, this study aimed to evaluate the effect of training in digital technology on the mental health and the quality of life of elders.

METHODS

This is a quasi-experimental intervention study, approved by the Ethics Committee for Research with Human Beings, under opinion 5.008.612.

The sample, selected intentionally and by convenience, was formed by 12 elders from both sexes, who were 60 years old or more and lived in the city of Maringá, in the state of Paraná (PR), Brazil. The study included all elders who could independently visit the place of the intervention; had preserved cognitive and psychological functions, as evaluated by the Mini-Mental State Examination (MMEE)[12]; were vaccinated for

COVID-19; and had a smartphone. Illiterate elders were excluded.

The study took place in the facilities of a higher education institution in the northwest of Paraná. Initially, after receiving the ethics approval, the researchers advertised the project using social media and networks (Facebook, Instagram, and WhatsApp). The adds had the form of banners and the snowball sampling technique was used.[13] The elders could apply for the project by calling and sending messages. After application, they were called for an initial evaluation, collection of their signatures in the Free and Informed Consent Form, and assessment of their health conditions in regard to the COVID-19 pandemic. Then, they were included according to the inclusion and exclusion criteria.

The assessment and reassessment protocol was carried out in a multiprofessional approach, which had the following stages: 1) sociodemographic data collection, based on the new Census 2020 for the sample, containing information on age, sex, place of residence, ethnicity, educational level, family income, marital status, and health conditions (perception of the state of health, and presence of disease);[4] 2) Evaluation of the depression indicators using the Geriatric Depression Scale (GDS), developed in 1982 - this is one of the mostly used instruments to screen for depressive symptoms among elders[15,16]; 3) Quality of Life evaluation (QoL), using the questionnaires WHOQOL-OLD and WHOQOL-BREF.[17,18]

The GDS is formed by simple yes or no questions, with a minimum score of 0 (no depressive symptoms) and a maximum score of 15 (several depressive symptoms). Its authors suggest a cutoff point of ≥ 5 to determine the presence of depressive symptoms in the elder.[15,19]

The WHOQOL-BREF is an abbreviated version of the WHOQOL-100, formed by 26 questions. Each domain is evaluated by a single question (24 represent each facet of the WHOQOL-100; 2 evaluate, in general terms, the QoL and the perception of health). Therefore, the WHOQOL-BREF evaluates the following domains of QoL: 1) Physical; 2) Psychological; 3) Social relations; 4) Environment.[18] The WHOQOL-OLD, in turn, is a QoL questionnaire specific for the elderly, with 24 questions divided in 6 domains: 1) Sensory abilities; 2) Autonomy; 3) Past, present, and futures activities; 4) Social participation; 5) Death and dying; 6) Intimacy.[17]

Later, participants went through technological training in the form of an in-person eight-week intensive course, that took place from October to November 2021, with two meetings a week, lasting two hours each, for a total of 32 hours. In the first 90 minutes of each encounter, the new content was taught; in the last 30 minutes, doubts and general curiosity about informatics were clarified. The course was taught by a specialized team, formed by informatics workers and interns/voluntaries adequately supervised and previously trained.

The course contents, shown in the training plan (Table 1), were divided in 16 classes and includes an introduction to the digital world, information about the smartphone, possibilities of social network insertion for affective and interpersonal relations and digital empowerment. Therefore, the elders started their classes learning the basic elements of the digital world and expanded their knowledge according with their preferences. In addition, content such as basic phone functions, use of applications, typing, knowing the equipment and its accessories, managing files, Internet browsing, safety notions, and protection against financial schemes.

Chart 1: Training plan

CLASS PLAN
CONTENT: **WEEK 1** **CLASS 1** • Introduction to the smartphone **CLASS 2** • Creating an e-mail • Identifying which applications are already installed and which need to be downloaded **WEEK 2** **CLASS 3** • Phone, contact list, camera, photo gallery, and alarm clock **CLASS 4** • The App Store and how to use it **WEEK 3** **CLASS 5** • Knowing the browser, accessing Google, basic search notions **CLASS 6** • Introduction to WhatsApp **WEEK 4** **CLASS 7** • Security basics **CLASS 8** • Facebook **WEEK 5** **CLASS 9** • Messenger (getting to know, to use, and to talk with someone) • Security basics **CLASS 10** • Instagram • Security basics **WEEK 6** **CLASS 11** • Introduction to YouTube **CLASS 12** • TikTok **WEEK 7** **CLASS 13** • Introduction to Ifood • Introduction to Uber **CLASS 14** • Introduction to apps from banks and public institutions (INSS, Federal Revenue, City Hall, CAIXA, Detran [DMV], and others) **WEEK 8** **CLASS 15** • CONTINUED: Getting to know and accessing applications from banks and public institutions **CLASS 16** • Review of the main subjects discussed

SOURCE: the authors.

Data analysis

The normality of data was evaluated using Shapiro-Wilk's test. The presupposition of variance homogeneity was evaluated using the Levene test. Bootstrapping procedures were carried out (1,000 resamples; 95% CI BCa), to guarantee a better reliability in the results, thus correcting normality deviations in the distribution of the sample and differences in the sizes of the groups, in addition to reaching a 95% confidence interval for the differences between the means, correlations, and predictions.[20] Student's *t* test was used for dependent samples to compare the scores of depression and quality of life in the pre- and post-tests. The size of the effect was verified using Cohen's *d*, with $d=0.2$ indicating a small effect; $d=0.50$ indicating a moderate effect; and $d=0.80$ indicating a large effect.[21]

RESULTS

The research included 12 elders with a mean age of 69.59 years old (± 6.75). Most elders were male (58.3%), had a partner (75.0%), a family income from R$ 2,001 to R$ 5,000 (50.0%), had a health insurance (63.6%), complete high school (66.7%), and reported great/good health conditions (58.3%).

Table 1: Sociodemographic and health indicators of the sample

VARIABLES	Materials validated	%
Sex		
Male	7	58.3
Female	5	41.7
Marital Status		
Does not have a partner	3	25.0
Has a partner	9	75.0
Family income (in R$)		
Up to 2.000	3	25.0
From 2.001 to 5.000	6	50.0
More than 5.000	3	25.0
Years of formal education		
Complete high school	8	66.7
Complete higher education	4	33.3
Has health insurance[a]		
Yes	7	63.6
No	4	36.4
Health conditions		
Great/Good	7	58.3
Reasonable	5	41.7

[a] **Variable with incomplete answers**

When comparing the scores of depression indexes and quality of life of elders before and after the training in digital technologies (Table 2), the only domain that showed a significant difference was the Psychological domain, ($p=0.032$); the Autonomy facet ($p=0.032$) of the quality of life also showed a significant difference.

Table 2: Effectiveness of the digital technolog y training in the score of the depression and quality of life index among the elders

Variables	Pre-test	Post-test	p	d
	Mean (SD)	Mean (SD)		
Depression index	1.92 (1.62)	1.75 (1.71)	0.761	0.10
QoL domains				
Physical domain	14.95 (2.08)	15.67 (1.51)	0.068	0.39
Psychological domain	15.44 (1.30)	16.11 (1.16)	**0.032***	0.54
Social Relations domain	15.33 (1.84)	15.39 (1.49)	0.917	0.03
Environment Domain	15.25 (1.75)	14.95 (1.62)	0.545	0.18
Total QoL	16.17 (1.99)	16.00 (1.21)	0.820	0.10
QoL facets				
Sensory functioning	66.15 (21.72)	68.23 (19.85)	0.648	0.10
Autonomy	53.65 (19.67)	66.67 (12.87)	**0.046***	0.78
Past, present, and future activities	66.15 (14.46)	71.88 (12.06)	0.176	0.43
Social participation	76.56 (8.05)	74.48 (10.81)	0.560	0.22
Death and dying	66.15 (31.70)	77.08 (21.04)	0.226	0.41
Intimacy	67.71 (12.16)	72.40 (11.13)	0.121	0.19

* Significant difference ($p < 0.05$) - dependent Student's *t* test.

DISCUSSION

This study aimed to evaluate the effect of digital technology training, using smartphones, in the quality of life of depression indexes in elders from the community.

The main results indicated improvements in the Psychological domain and in the Autonomy facet — both are components of the quality of life assessment questionnaire, even if they show no significant differences in the depression indexes.

A qualitative study, carried out with 10 elders from an open university for the elderly, made it possible for the elders to reflect and conclude that they need to become proficient in digital technologies, to improve their communication and interaction relations, in association with an active aging process[6].

Several other studies have shown that Internet access may reduce the reports of negative emotions in elders and improve their wellbeing.-[5,22-24] Therefore, the feeling of inclusion and autonomy allows for an improvement in certain aspects of the quality of life among elders, caused by a better social inclusion and more access to education and health. Nonetheless, if, on one hand the use of the Internet improves social contact, satisfaction with learning, and autonomy, and is enabled by digital technologies, it cannot be said that these technologies can change social cycles and daily situations, since the social mean of the elder must enable this change.[22]

According to the results obtained, total quality of life scores showed no alteration before and after the intervention. In previous studies men have shown higher scores in evaluations about quality of life in five out of the six subscales of the WHOQOL-OLD.[25-27] Women tend to have lower scores in the domains physical and psychological health of the WHOQOL-BREF, but their scores

tend to be higher in the domains Sensory abilities, Autonomy, and Social participation of the WHOQOL-OLD.[25]

Additionally, in a study that evaluated the effects of sociodemographic factors on the quality of life of 50-year-old or older people, including 1,492 participants, researchers found an association between being married and an improvement in all domains of quality of life, with the exception of Sensory abilities), and an association of individuals with higher educational levels with higher scores in many of the domains in the WHOQOL-BREF and WHOQOL-OLD questionnaires.[25]

Some limitations of this study should be highlighted. Firstly, its small number of participants, which does not allow for a good portrait of the elder population. Another shortcoming is that the sample was not proportional in regard to sex, socioeconomic level, and educational level. In addition, it would be necessary to carry out a prospective reevaluation, to analyze the impact of the knowledge taught to the elders in their day-to-day lives, since applying questionnaires immediately after interventions does not allow time for self-learning.

CONCLUSION

The training for the digital inclusion of elders in regard to smartphone use was effective and beneficial in our sample, improving the Psychological domain and the Autonomy facet of the elderly participants.

REFERENCES

1. IBGE - Instituto Brasileiro de Geografia e Estatística. Projeção da População 2018: número de habitantes do país deve parar de crescer em 2047 [Internet]. Estatístricas Sociais. 2018

2. Meneses Fernández MD, Santana Hernández JD, Martín Gutiérrez J, Henríquez Escuela MR, Rodríguez Fino E. Using communication and visualization technologies with senior citizens to facilitate cultural access and self-improvement. Comput Human Behav [Internet]. janeiro de 2017;66:329–44.

3. Hong YA, Cho J. Has the Digital Health Divide Widened? Trends of Health-Related Internet Use Among Older Adults From 2003 to 2011. Journals Gerontol Ser B Psychol Sci Soc Sci [Internet]. 2016;

4. Castellacci F, Viñas-Bardolet C. Internet use and job satisfaction. Comput Human Behav [Internet]. 2019;90:141–52.

5. Sun X, Yan W, Zhou H, Wang Z, Zhang X, Huang S, et al. Internet use and need for digital health technology among the elderly: a cross-sectional survey in China. BMC Public Health [Internet]. 2020;20(1):1386.

6. Antunes TPC, Oliveira ASB de, Crocetta TB, Antão JYF de L, Barbosa RT de A, Guarnieri R, et al. Computer classes and games in virtual reality environment to reduce loneliness among students of an elderly reference center. Medicine (Baltimore) [Internet]. 2017;96(10):e5954.

7. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. Lancet Public Heal [Internet]. 2020;5(5):e256.

8. Santos PA dos, Heidemann ITSB, Marçal CCB, Arakawa-Belaunde AM. A percepção do idoso sobre a comunicação no processo de envelhecimento. Audiol - Commun Res [Internet]. 2019;24.

9. Costa DES, Rodrigues S de A, Alves R de CL, Silva MRF da, Bezerra ADC, Santos DC dos, et al. A influência das tecnologias na saúde mental dos idosos em tempos de pandemia: uma revisão integrativa. Res Soc Dev [Internet]. 2021;10(2):e8210212198.

10. Hammerschmidt KS de A, Bonatelli LCS, Carvalho AA de. The path of hope in relationships involving older adults: the perspective from the complexity of the covid-19 pandemic. Texto context - enferm [internet]. 2020;29.

11. Da Cunha Lima AM, Piagge CSLD, Silva ALO, Robazzi MLDCC, Mélo CB, Vasconcelos SC. Tecnologias educacionais na promoção da saúde do idoso. Enferm em Foco [Internet]. 2021;11(4).

12. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". J Psychiatr Res [Internet]. 1975;12(3):189–98.

13. Snowball Sampling. In: SAGE Research Methods Foundations. 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom : SAGE Publications Ltd; 2020.

14. IBGE - Instituto Brasileiro de Geografia e Estatística. Questionário da amostra - Censo 2020 [Internet]. 2020

15. Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, et al. Development and validation of a geriatric depression screening scale: A preliminary report. J Psychiatr Res [Internet]. 1982;17(1):37–49.

16. Paradela EMP, Lourenço RA, Veras RP. Validação da escala de depressão geriátrica em um ambulatório geral. Rev Saude Publica [Internet]. 2005;39(6):918–23.

17. Fleck MP, Chachamovich E, Trentini C. Development and validation of the Portuguese version of the WHOQOL-OLD module. Rev Saude Publica [Internet]. 2006;40(5):785–91.

18. Fleck MP de A. O instrumento de avaliação de qualidade de vida da Organização Mundial da Saúde (WHOQOL-100): características e perspectivas. Cien Saude Colet [Internet]. 2000;5(1):33–8.

19. Castelo M, Filho J, Neto J, Noleto J, Lima J. Geriatric Depression Scale (GDS): a valid tool to screen for depression in older primary care patients in Brazil. Geriatr Gerontol Aging [Internet]. 2007; 1:26–31.

20. Haukoos JS. Advanced Statistics: Bootstrapping Confidence Intervals for Statistics with "Difficult" Distributions. Acad Emerg Med [Internet]. 2005;12(4):360–5.

21. Cohen J. Statistical Power Analysis. Curr Dir Psychol Sci [Internet]. 1992;1(3):98–101.

22. Cotten SR, Anderson WA, McCullough BM. Impact of Internet Use on Loneliness and Contact with Others Among Older Adults: Cross-Sectional Analysis. J Med Internet Res [Internet]. 2013;15(2):e39.

23. Casanova G, Zaccaria D, Rolandi E, Guaita A. The Effect of Information and Communication Technology and Social Networking Site Use on Older People's Well-Being in Relation to Loneliness: Review of Experimental Studies. J Med Internet Res [Internet]. 2021;23(3):e23588.

24. Chen Y-RR, Schulz PJ. The Effect of Information Communication Technology Interventions on Reducing Social Isolation in the Elderly: A Systematic Review. J Med Internet Res [Internet]. 2016;18(1):e18.

25. Gobbens RJJ, Remmen R. The effects of sociodemographic factors on quality of life among people aged 50 years or older are not unequivocal: comparing SF-12, WHOQOL-BREF, and WHOQOL-OLD. Clin Interv Aging [Internet]. 2019; 14:231–9.

26. Bilgili N, Arpacı F. Quality of life of older adults in Turkey. Arch Gerontol Geriatr [Internet]. 2014;59(2):415–21.

27. Lee TW, Ko IS, Lee KJ. Health promotion behaviors and quality of life among community-dwelling elderly in Korea: A cross-sectional survey. Int J Nurs Stud [Internet]. 2006;43(3):293–300.