



Assistive technology and stress reduction in caregivers of older adults: an integrative review

Tecnologia assistiva e a redução do estresse em cuidadores de idosos: revisão integrativa

Tecnología asistiva y la reducción del estrés de cuidadores de mayores: revisión integrativa

Gerarlene Ponte Guimarães Santos 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil
Piauí State University (*Universidade Estadual do Piauí*) - Parnaíba (PI) - Brazil

Cleidiane Maria Sales de Brito 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil
Piauí State University (*Universidade Estadual do Piauí*) - Parnaíba (PI) - Brazil

Rayla Maria Pontes Guimarães Costa 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil
Piauí State University (*Universidade Estadual do Piauí*) - Parnaíba (PI) - Brazil

Herla Maria Furtado Jorge 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil

Maria do Livramento Fortes Figueiredo 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil

Márcia Teles de Oliveira Gouveia 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil

Márcia Astrês Fernandes 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil

Ana Roberta Vilarouca da Silva 

Federal University of Piauí (*Universidade Federal do Piauí*) - Teresina (PI) - Brazil

ABSTRACT

Objective: To synthesize the scientific evidence on the use of assistive technology as a strategy to reduce stress in caregivers of older adults. **Methods:** This is an integrative review, with no time frame, conducted from April to May 2020 in the databases: Medline/PubMed, Web of Science, Cinahl, Scopus and Lilacs/VHL, based on the research question: what is the evidence on the use of assistive technologies in reducing stress in caregivers of older adults? For the search, controlled descriptors "aged, anciano, idoso, caregivers, cuidadores, self-help device, dispositivos de autoayuda, equipamentos de autoajuda, occupational stress, estrés laboral and estresse ocupacional" and uncontrolled descriptors and keywords were used. For data extraction, a validated instrument and descriptive analysis were used. **Results:** Searches yielded 138 articles, five of which were included in this study. The selected articles address the use of assistive technology by dependent older adults to reduce the stress of their caregivers. Two types of assistive technologies are used, simple and complex ones, namely canes, walkers, wheelchairs, support rails, raised toilet seats, bath seats, robots, safe home program, memory aids, tracking devices and autonomous surveillance software. **Conclusion:** Assistive technologies improve stress associated with the work overload of caregivers of older adults, enabling improvement in quality of life, reducing tensions, stress and frustration.

Descriptors: Self-Help Devices; Occupational Stress; Caregivers; Aged.



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RESUMO

Objetivo: Sintetizar as evidências científicas acerca do uso de tecnologia assistiva como estratégia para a redução do estresse em cuidadores de idosos. **Métodos:** Trata-se de uma revisão integrativa, sem recortes temporal, realizada no período de abril a maio de 2020 nas bases de dados: Medline/PubMed, Web of Science, Cinahl, Scopus e Lilacs/BVS, a partir da pergunta norteadora: quais as evidências do uso da tecnologia assistiva na redução do estresse em cuidadores de idosos? Para a busca, se recorreu aos descritores controlados: “aged, anciano, idoso, caregivers, cuidadores, self-help device, dispositivos de autoayuda, equipamentos de autoajuda, occupational stress, estrés laboral e estresse ocupacional”, assim como os descritores não controlados e palavras-chave. Já para a extração dos dados, utilizou-se um instrumento validado e a análise descritiva. **Resultados:** Encontraram-se 138 artigos, sendo inclusos cinco no presente estudo. Os artigos selecionados abordam o uso das tecnologias assistivas por idosos dependentes, como redução do estresse dos seus cuidadores. São utilizados dois tipos de tecnologias assistiva, simples e complexas, a saber: bengalas, andadores, cadeiras de rodas, barras de apoio, assentos sanitários elevados, bancos de banho, robôs, programa safe home, auxiliares de memória, dispositivos de rastreamento e software de vigilância autônoma. **Conclusão:** As tecnologias assistivas melhoram o estresse associado à sobrecarga dos cuidadores de idosos, possibilitam melhoria para a qualidade de vida, a redução das tensões, do estresse e das frustrações.

Descritores: Equipamentos de Autoajuda; Estresse Ocupacional; Cuidadores; Idoso.

RESUMEN

Objetivo: Sintetizar las evidencias científicas sobre el uso de la tecnología asistiva como estrategia para la reducción del estrés de cuidadores de mayores. **Métodos:** Se trata de una revisión integrativa, sin recortes temporales realizada en el periodo entre abril y mayo de 2020 en las bases de datos Medline/PubMed, Web of Science, Cinahl, Scopus y Lilacs/BVS, a partir de la pregunta norteadora: ¿Cuáles son las evidencias del uso de la tecnología asistiva para la reducción del estrés de cuidadores de mayores? Se ha utilizado los descriptores controlados “aged, anciano, idoso, caregivers, cuidadores, self-help device, dispositivos de autoayuda, equipamentos de autoajuda, occupational stress, estrés laboral e estresse ocupacional” para la búsqueda, así como los descriptores no controlados y palabras-clave. Para la extracción de los datos se ha utilizado un instrumento validado y el análisis descriptivo. **Resultados:** Se ha encontrado 138 artículos y se ha incluido cinco de ellos en ese estudio. Los artículos elegidos tratan del uso de la tecnología asistiva por mayores dependientes como de la reducción del estrés de sus cuidadores. Se utiliza dos tipos de tecnologías asistivas, simple y complejas que son: bastón, andadores ortopédicos, sillas de ruedas, barras de apoyo, asientos de baño elevados, banquillos para baño, robots, programa safe home, auxiliares de memoria, dispositivos de rastreo y software de vigilancia autónoma. **Conclusión:** Las tecnologías asistivas mejoran el estrés asociado con la sobrecarga de los cuidadores de mayores, posibilitan la mejoría de la calidad de vida, la reducción de las tensiones, del estrés y de las frustraciones.

Descriptores: Dispositivos de Autoayuda; Estrés Laboral; Cuidadores; Anciano.

INTRODUCTION

The population aging process is one of the most relevant events observed in Brazil, especially since the 1990s, as a result of a demographic shift that has taken place in the country and worldwide. In developed countries, this process occurred gradually for over more than a century, whereas in developing countries, and Brazil, it has been occurring at a fast pace⁽¹⁾.

In that regard, people over 60 years old accounted for 15.4% of the total population in Brazil in 2018, and it is estimated that by the year 2060 this population figure will reach 30%, thus showing the phenomenon of aging⁽²⁾.

Undoubtedly, the number of older adults grows every year, that is, people are living longer, and these additional years of life can lead to declines in physical and mental capacity, loss of muscle and bone mass, decreased elasticity of tendons and joint wear, thereby resulting in physiological changes that limit or prevent full performance on activities of daily living and hence compromising self-care^(3,4).

Therefore, the older person who experiences these changes needs the aid of caregivers. In that regard, a caregiver is understood as a person who takes on responsibility for the care of the older person or another human being with some degree of disability or dependence, and may or may not be a family member. In most cases, caregivers do their work without training focused on the care of dependent older adults and are unpaid⁽⁵⁾.

Caregivers experience stress related to the exhausting work that is carried out with older adults. Such stress is often translated into depression, anxiety, physical and mental fatigue and poor quality of life⁽⁶⁾. Certainly, the

caregiver's stress results from the work overload when dealing with the responsibility of providing care to dependent older adults who need continuous care⁽⁷⁾.

In this context, to help the caregiver in this task, one can resort to Assistive Technology (AT) resources. Assistive technologies refer to devices, equipment and processes used to improve the functional capacity and quality of life of older adults, providing positive results not only for the older person, but also for caregivers^(8,9).

The use of AT resources can help caregivers of older adults reduce work-related stress. If used correctly and continuously, they contribute to the recovery of skills and functions compromised as a result of the aging process, allowing the older person to enjoy a more active aging and reducing the caregiver's workload and promoting the health of the dyad (older person and caregiver)⁽¹⁰⁾.

Caregivers may also face difficulties accepting the use of AT as an aid to taking care of others. In an international survey of caregivers that addressed the use of AT as an aid in care activities, 71% of the respondents said they were interested in using an AT, with 59% of these saying they could use it if it was available to them and only 7% saying they currently use it or had already used it in daily activities⁽¹¹⁾. It is suggested, therefore, that it is necessary to train caregivers through individualized strategies so that there is greater adherence to and, consequently, greater promotion of the caregiver's health. Thus, as there is a variety of AT, training, skills and adherence to use are necessary⁽¹¹⁾.

In a study carried out in Brazil with older adults and their caregivers, the use of an AT improved the therapeutic communication between the dyad, enabling modernization and availability of care and promoting the caregiver's health⁽¹²⁾. Thus, the present study is necessary given the importance of the use of assistive technology resources by older adults to help with daily tasks, which contributes to the promotion of physical and mental health, quality of life and social inclusion, and, consequently, decrease the workload of caregivers.

Given the context described above, this study aimed to synthesize the scientific evidence on the use of assistive technology as a strategy to reduce stress in caregivers of older adults.

METHODS

An integrative review (IR) was carried out to gather information from several studies on a topic in an orderly and systematic way. Six steps were taken to conduct the study: formulation of the research question, search for primary studies in the literature, data extraction, evaluation of primary studies included in the review, analysis and synthesis of results, and presentation of the review⁽¹³⁾. To ensure the methodological rigor of the study, the recommendations set forth in the Prisma Checklist – Preferred Reporting Items for Systematic Reviews and Meta Analyses were observed⁽¹⁴⁾.

The problem was defined using the PICO (Participants, Phenomenon of Interest and Study Context)⁽¹⁵⁾ strategy, in which the Participant (P) refers to “caregiver of older adults”; the Phenomenon of Interest (I) refers to “assistive technology”; and Context (C), refers to “stress”. Thus, the following research question was formulated: what is the evidence of the use of assistive technology in reducing stress in caregivers of older adults?

The study search strategy followed the criteria established by the manuals of each database. Thus, the controlled descriptors were selected from MeSH (Medical Subject Headings), Emtree (CINAHL Terminology), and DeCs (Health Science Descriptors) and defined according to the keywords combining each other with the Boolean operators “AND” and “OR”. The search in the databases took place between April and May 2020.

The following databases were searched: Medical Literature Analysis and Retrieval System on-line (MEDLINE via PubMed®), Web of Science™, Cumulative Index to Nursing and Allied Health Literature (CINAHL-Ebsco), SciVerse Scopus (SCOPUS) and Virtual Health Library (VHL). The databases were accessed through an accredited institution and authorized by the Ministry of Education using controlled and uncontrolled descriptors and keywords, as shown in Chart 1:

Chart 1 - Controlled descriptors, uncontrolled descriptors and keywords selected from the databases according to the PICO acronym.

PICo	Controlled Descriptors	Uncontrolled Descriptors	Keywords
P	Aged <i>Anciano</i> <i>Idoso</i>	Elderly	<i>idosos</i> <i>pessoa idosa</i> <i>pessoa de idade</i> <i>peçoas idosas</i> <i>peçoas de idade</i> <i>população idosa</i>
	Caregivers <i>Cuidadores</i>	Caregiver carers carer caregivers spouse caregivers family caregivers	<i>cuidador</i> <i>cuidador familiar</i> <i>cuidador de família</i> <i>cuidadores cônjuges</i> <i>cuidadores familiares</i> <i>cuidadores de família</i> <i>cônjuges cuidadores</i> <i>familiar cuidador</i> <i>familiares cuidadores</i> <i>outro apoiador</i>
I	self-help device <i>dispositivos de autoayuda</i> <i>equipamentos de autoajuda</i>	device, self-help self help device assistive technology technology, assistive assistive device device, assistive	<i>dispositivos assistivos</i> <i>dispositivos de autoajuda</i> <i>equipamentos assistivos</i> <i>tecnologia assistiva</i>
Co	occupational stress <i>estrés laboral</i> <i>estresse ocupacional</i>	stress, occupational job stress stress, job work-related stress stress, work-related work related stress workplace stress stress, workplace workplace stress stress, workplace professional stress stresses, professional job-related stress jobrelated stress	<i>estresse laboral</i> <i>estresse profissional</i> <i>estresse relacionado ao ambiente de trabalho</i> <i>estresse relacionado ao trabalho</i> <i>estresse relacionado à profissão</i> <i>estresse do ambiente de trabalho</i> <i>estresses laborais</i> <i>estresses ocupacionais</i> <i>estresses profissionais</i> <i>estresses relacionados ao ambiente de trabalho</i> <i>estresses relacionados à profissão</i> <i>estresses do ambiente de trabalho</i>

Studies eligible for the review were primary studies that answered the research question and that were available online in the databases without restrictions as to language and time frame until the completion of the search in May 2020. These studies constituted the corpus of the review and were used for synthesizing evidence. Review studies, documentaries, case control studies, theses, dissertations, undergraduate research papers, reflection studies, memorials, documentaries, editorials, reviews, letters to the editor and articles without a free full text available were excluded.

EndNote reference manager was used for all databases. Therefore, the articles were filtered by reading titles and abstracts, excluding duplicates and studies that did not meet the inclusion criteria. For the extraction and synthesis of information from the selected studies, an instrument adapted from the form of the *Red de Enfermería en Salud Ocupacional (RedENSO Internacional)*⁽¹⁶⁾ was applied. Finally, the following information was extracted: database, authors, title, year, journal, country where the study was conducted, type of study, sample, level of evidence, objectives, main results and assistive technology. A primary study selection flowchart was used, as shown in Figure 1.

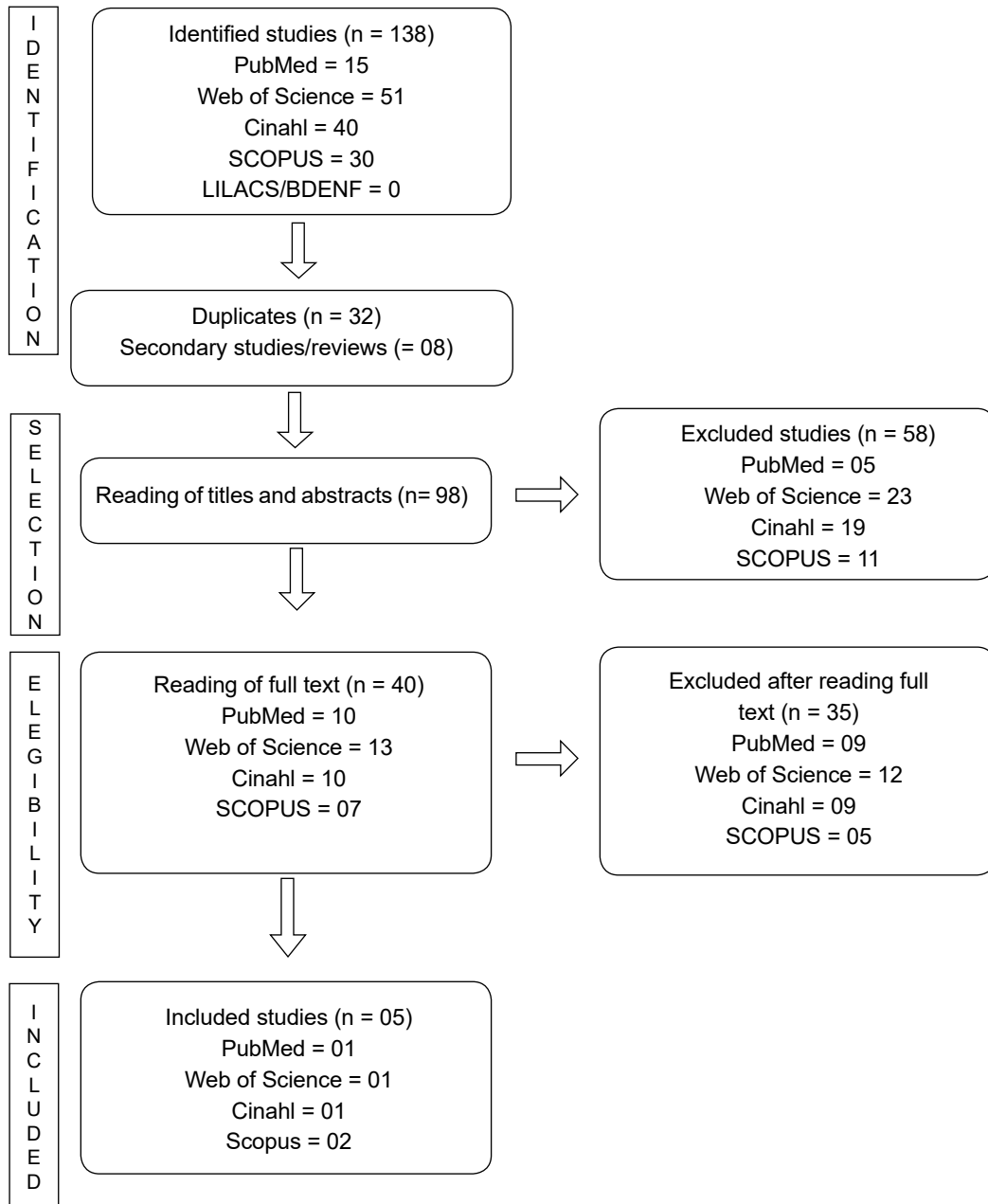


Figure 1 - Primary study selection flowchart.

RESULTS

With regard to the data analysis step, after identifying the articles listed by letters and alphanumeric numerals “A_n”, the articles were analyzed by independent reviewers and, in case of disagreement, by a reviewing rater.

The evaluation of the studies was based on the pyramid of evidence levels ranging from I to VII, as follows: level I – meta-analyses or systematic reviews; level II – randomized controlled trials; level III – non-randomized controlled trials; level IV – cohort and case-control studies; level V – systematic reviews of descriptive and qualitative studies; level VI – descriptive or qualitative studies; and level VII – expert opinion⁽¹⁷⁾.

Therefore, of the 138 selected articles, only five studies mentioned the use of assistive technology in the reduction of stress for caregivers of older adults, as shown in Chart 2. Chart 3 shows authorship, year of publication, objective, main results and assistive technology device used.

Chart 2 - Selected studies per database, author, title, year, journal, country where the study was conducted, type of study, sample and level of evidence.

Study	Database	Authors	Title	Year/ Journal/ Country	Type of study/sample/ Level of evidence
A ₁	WEB OF SCIENCE	LAU WM, CHANTY, SZETO SL ⁽¹⁸⁾	Effectiveness of a home-based missing incident prevention program for community-dwelling elderly patients with dementia	2019 International Psychogeriatrics China	Pre-post study n=44 (older adults) and their informal caregivers Level 6
A ₂	SCOPUS	MORTENSONWB, et al. ⁽¹⁹⁾	Caregivers' experiences with the selection and use of assistive technology	2018 Disability and Rehabilitation: Assistive Technology Canada	Randomized controlled trial n=45 (n=23 experimental; n= 22/comparison group) Level 4
A ₃	PUBMED	WANG RH, et al. ⁽²⁰⁾	Robots to assist daily activities: views of older adults with Alzheimer's disease and their caregivers	2017 Int Psychogeriatr Canada	Mixed-methods descriptive study. n= 10(older adults) n= 10(Caregivers) Level 6
A ₄	SCOPUS	HATTINK BJJ, et al. ⁽²¹⁾	The electronic, personalizable Rosetta system for dementia care: exploring the user-friendliness, usefulness, and impact	2016 Disability and Rehabilitation: Assistive Technology. The Netherlands, Germany and Belgium	Explorative evaluation study n= 42 (19 in The Netherlands, 11 in Germany and 12 in Belgium) and n=32 informal caregivers. Level 6
A ₅	CINAHL	McKENZIE B, et al. ⁽²²⁾	Safe Home Program: A Suite of Technologies to Support Extended Home Care of persons with dementia	2013 American Journal of Alzheimer's Disease & Other Dementias United States	Cross-sectional n=60 Level 6

Chart 3 - Primary studies selected according to assistive technologies used to reduce stress in caregivers of older adults.

Study	Authors / Year	Objective	Main Results	Assistive Technology
A ₁	LAU WM, CHAN TY, SZETO SL, 2019 ⁽¹⁸⁾	To investigate the effectiveness of a home-based missing incident prevention program in reducing the number of missing patients, missing incidents, time of searching, and caregivers' stress in community-dwelling older adults with dementia	The total number of missing patients and incidents, caregiver's stress and mean time of searching were significantly reduced. There were six service components in this home-based program and most items were tailored according to the needs of the patients and the knowledge of the caregivers. The study demonstrated that a personalized, in-home multidimensional intervention provided by an occupational therapist can reduce missing incidents and caregiver's stress among patients with dementia.	Memory Aids and Tracking Devices.
A ₂	MORTENSON, WB, et al. 2018 ⁽¹⁹⁾	To examine the effects of an inclusive caregiver for 6 weeks.	The assistive technology user's functional autonomy decreased, while the caregiver's burden was reduced. These findings occurred despite the experimental intervention targeting more problematic activities, providing more AT, and including more visits from occupational therapists.	Canes, walkers, wheelchairs, grab rails, raised toilet seats and bath seats.
A ₃	WANG RH, et al. 2017 ⁽²⁰⁾	To enable older adults with dementia to perform daily activities with greater independence and provide support for caregivers.	Caregivers identified several opportunities and were receptive to assistive robots, obtaining positive results in care settings. Thus, there was a decrease in frustration, stress and tension in the relationship and an increase in social interaction through the robot. As a negative consequence, there was a decrease in the interaction between the older adults and caregivers.	Assistance Alert Robot (movement, communication and stimulation).
A ₄	HATTINK BJJ, et al. 2016 ⁽²¹⁾	Integrate three assistive technology (AT) systems developed into a modular and multifunctional system that will be able to support people with dementia and caregivers during the course of the pathology.	The system used had an impact on users' lives. They felt safe and comfortable, especially with the subsystem with a fall detection function and memory support via touch screen and mobile device. System users rated its ease of use as low. People with dementia and their informal caregivers found the system useful in helping to maintain independence, reminding people with dementia of commitments that informal caregivers may forget. People with dementia and caregivers reported that AT can help promote safety and reduce burden and stress.	Software - Rosetta System - Three Subsystems: Elderly Day Navigator, Early Detection System Software and Autonomous Surveillance System – Advanced Awareness and Prevention
A ₅	MCKENZIE B, et al. 2013 ⁽²²⁾	Report on the implementation/adoption of the Safe Home Program to support caregivers of people with dementia in ongoing surveillance, providing care, preventing injuries and improving home safety.	Technologies delivered by the program increased the sense of security and decreased the amount of stress associated with caring for people with dementia and helped ensure that the person with dementia remained safe at home..	Safe Home Program.

The five primary studies selected are in English (100%), and the countries of origin are: Canada, two (40%); United States, one (20%); and China, one (20%). In addition, the review included another study carried out concurrently across three countries: The Netherlands, Germany and Belgium, one (20%). As for the year of publication, four (80%) studies had been published between the years 2016 and 2019 and one (20%) was published in 2013. As for the level of evidence, four (80%) level VI and one (20%) level IV studies were found.

The selected studies show that the use of assistive technologies can facilitate the work performed by caregivers of dependent older adults and/or those with senility. Thus, we identified assistive technologies of different types, such as computer programs (software), use of robots and home programs.

DISCUSSION

The use of Assisted Technology (AT) has changed the way of life of dependent older adults and their caregivers, as they improve the physical and emotional well-being of the dyad, bringing greater independence to the older person and caregivers⁽¹⁸⁻¹⁹⁾.

Benefits for caregivers of older adults have been highlighted, mostly for caregivers of older adults with senile dementia. In that regard, studies^(18,20-22) have shown that assistive technologies can alleviate the workload of caregivers through home programs, thus resulting in improvement in quality of life by promoting safety and trust.

This finding is in agreement with another study that shows the applicability of AT to improving the quality of life of older adults with dementia and their caregivers, as they help caregivers to perform care actions in a more promising way⁽²³⁾.

Other studies reached the same conclusion regarding the potential of assistive technologies to support the care of older adults with some pathology related to the nervous system, such as senile dementia and Alzheimer's disease. As to that, it has been found that informal caregivers benefit from a reduction in work overload^(18-22,24,25).

It has been found that associating the use of AT in the promotion of care for dependent older adults can be seen as a need to prevent health problems for the caregiver, as it is known that the caregiver, in most cases, is a close family member who needs reconciling other tasks to this new role, which is almost always performed without rest, that is, 24/7, depending on the degree of dependence of the older person. This can lead to a feeling of frustration and stress in the caregiver. Assistive technologies are innovative tools that may be able to promote the quality of life of older adults and formal or informal caregivers. They can be classified into simple technologies (walkers, canes, sticks, toilet seat riser) and complex technologies (fall sensors, bed occupancy sensors, lighting sensors, monitored house, alarms). The differentiation between the types is based on the need or not for an advanced technological apparatus; simple assistive technologies do not require these devices, while complex ones do⁽²⁶⁾.

Although assistive technologies are mostly used by dependent older adults or for their benefit due to limitations resulting from various factors associated with advanced age, caregivers are allowed, directly or indirectly, to obtain benefits while helping to provide care to the dependent older person. In this review, different types of assistive technologies were identified, such as computer programs (software), use of robots and home care programs that had simple specific tools (canes, walkers, wheelchairs, handrails, toilet seat risers, bath seats) and complex tools (tracking devices, motion sensors, security cameras, home alert systems, among others)⁽¹⁸⁻²²⁾.

Thus, the analysis of studies⁽¹⁸⁻²²⁾ showed that there was a reduction in stress as the primary benefit of using AT. In addition, other benefits were also identified, such as a reduction in the workload, a reduction in the "burden" on the informal caregiver and the generation of feelings of security, both in informal caregivers and in dependent older adults.

Another benefit of the use of AT found was the promotion of the health of older adults and caregivers. For older adults, there was maintenance of autonomy, promotion of comfort and optimization of time spent on daily activities. For the caregiver, there was a reduction in frustration in relation to the care provided to the older person. Thus, it can be considered that the use of AT in home care for dependent older adults is of paramount importance as it promotes the health of the dyad^(18-22,27). AT resources can support and facilitate the work of the care team and family caregivers if the devices feature sufficient utility and usability, such as easy commissioning, maintenance and customization to the specific usability needs of the user⁽²⁸⁾.

In this review, a study pointed out that Assistive Technology resources can reduce the interaction between the older person and the caregiver, especially when these technologies are complex, as is the case of using robots⁽²⁰⁾. Therefore, an attempt should be made to maintain a balance between the insertion of technological machinery and the humanization of care. Indeed, hard technologies must be implemented with soft technologies, envisioning humanized care and the integrality of the older person being cared for as a strategy for health promotion⁽²⁹⁾ and stress reduction in caregivers of older adults.

It is understood that complex AT have features that can facilitate or hinder its use, both by the older adults and their caregivers. However, there should be guidance, training, monitoring, supervision, accessibility and determination for its use. One of the studies found that complex assistive technologies for the care of dependent older adults with dementia used tracking devices through internet softwares, GPS services and cell phone devices. These devices located lost objects inside the home and tracked missing older adults. As a result, there was a reduction in wasted time and an improvement in the dyad's quality of life, as the assistive technologies used helped caregivers to develop preventive strategies in dealing with diseases in their daily lives. In addition, another study demonstrated that a personalized intervention program reduced caregiver stress⁽¹⁸⁾.

However, it is important to point out that the effects of dementia and other diseases that affect older adults can compromise physical, mental and social health, and, above all, their independence for self-care. Furthermore, another factor to be pointed out is the possibility that the caregiver's health and well-being may also be compromised, as caring for someone requires special physical and mental attention and dedication⁽³⁰⁾.

It could be observed that studies involving AT resources are present mainly in developed countries, and so is accessibility to such technologies by the older adults and their caregivers. However, the use of technology can help the older person to develop their daily activities with some independence, thus contributing to the dyad's well-being and quality of life. It is confirmed that AT resources work as an aid to promote the development of compromised skills, enabling the desired functionality that has been compromised due to disability or aging⁽¹⁰⁾.

Certainly, AT is one of the tools that have been used successfully to maintain the independence of older adults. It provides information about which AT is needed in their daily lives, thus contributing to increase the effectiveness of AT provision for this population. However, new policies need to be developed to advocate for increased health coverage of low-tech AT devices that can thus provide benefits for older adults and their caregivers⁽³¹⁾.

Technologies are still far from the reality of most of the population, given the socioeconomic profile of the Brazilian population⁽¹²⁾. Thus, it is understood that a policy aimed at accessibility, training in health education and supervised monitoring could contribute to enhancing the quality of life of caregivers of dependent older adults. The contributions of this study are important to fill a gap in the health promotion of caregivers of dependent older adults, but there is a need for other studies that can show more evidence on the reduction of stress in the caregiver with the use of AT in order to improve the caregiver's health care and reduce the toll on their mental health.

Finally, limitations of the present study include the scarcity of publications that answered the research question, the methodological weakness and the low level of evidence of the articles available in the literature.

CONCLUSION

The articles selected for this review showed that assistive technologies improve the stress associated with the burden on caregivers of older adults, enabling an improvement in their quality of life, with a reduction in tension, stress and frustration. However, assistive technologies need to be accessible to be used so as to provide effective changes in promoting the caregiver's health.

CONFLICTS OF INTEREST

The authors state that there were no conflicts of interest in carrying out this study.

CONTRIBUTIONS

Gerarlene Ponte Guimarães Santos, Cleidiane Maria Sales de Brito, Rayla Maria Pontes Guimarães Costa contributed to the study conception and design; the acquisition, analysis and interpretation of data; and the writing and/or revision of the manuscript. **Herla Maria Furtado Jorge, Ana Roberta Vilarouca da Silva, Maria do Livramento Fortes Figueiredo, Márcia Teles de Oliveira Gouveia, Márcia Astrês Fernandes** contributed to the writing and/or revision of the manuscript. All the authors approved the final version to be published and are responsible for its content.

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Mailing address:

Gerarlene Ponte Guimarães Santos
Avenida Nossa Senhora de Fátima, S/N
Bairro: Fátima
CEP 64202-220 - Parnaíba - PI - Brasil
E-mail: gerarleneg@gmail.com

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