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REVIEWS

Recomendaciones para el diseño de juegos de salud digital para adultos mayores: una revisión del alcance

Recommendations for designing digital health games for older adults: a scoping review

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ABSTRACT:

Introduction: The design and development of digital games for health education should be planned on a scientific basis and adapted to the context of application. The aging process involves motor, cognitive, and sensory changes that influence older adults' interaction with technologies. **Objective:** To identify the available evidence on recommendations to support the design process of digital games intended for older adults. **Method:** A scoping review was conducted with the following guiding question: *What are the design recommendations for the development of digital games intended for older adults?* The search was carried out in June 2025 in the following databases: Excerpta Medica dataBASE, IEEE Xplore, MEDLINE, Scopus Elsevier, Web of Science, Science Direct, the Catalog of Theses and Dissertations of the Coordination for the Improvement of Higher Education Personnel, and through backward reference searching of selected publications. Study selection was performed by two independent reviewers, and the tools EndNote and Rayyan were used to support this process. **Results:** Data were extracted from 26 publications related to older adults, 11 (52.4%) focused on design recommendations for tools and 10 (47.6%) on the description of the tool development process. Fifteen categories of recommendations were identified, taking into account changes associated with the aging process. **Conclusion:** Recommendations for the design of digital games for older adults can support the development of accessible health education tools that encourage interest in health topics in a fun and interactive way.
Keywords: Health Education; Health Promotion; Older adult; Gamification; Software Design.

RESUMEN:

Introducción: El diseño y desarrollo de juegos digitales para la educación en salud deben planificarse con base científica y adecuados al contexto de aplicación. El proceso de envejecimiento implica cambios motores, cognitivos y sensoriales que influyen en la interacción de las personas mayores con las

tecnologías. **Objetivo**: Identificar la evidencia disponible sobre recomendaciones para respaldar el proceso de diseño de juegos digitales destinados a personas mayores. **Método**: Revisión de alcance con la siguiente pregunta orientadora: ¿cuáles son las recomendaciones de diseño para el desarrollo de juegos digitales destinados a personas mayores? La búsqueda se realizó en junio de 2025 en las bases de datos: Excerpta Medica dataBASE, IEEE Xplore, MEDLINE, Scopus Elsevier, Web of Science, Science Direct, Catálogo de Tesis y Disertaciones de la Coordinación de Perfeccionamiento del Personal de Nivel Superior y búsqueda inversa en las publicaciones seleccionadas. La selección de los estudios fue realizada por dos revisores independientes y se utilizaron herramientas las Endnote y Rayyan para respaldar este proceso. **Resultados:** Se extrajeron datos de 26 publicaciones relacionadas con las personas mayores, 11 (52,4 %) destinadas a recomendaciones de diseño de herramientas y 10 (47,6 %) a la descripción del proceso de desarrollo de herramientas. Se identificaron 15 categorías con recomendaciones que tienen en cuenta los cambios del proceso de envejecimiento. **Conclusión**: Las recomendaciones para el diseño de juegos digitales para personas mayores pueden favorecer el desarrollo de herramientas de educación sanitaria accesibles y que despierten el interés por temas de salud de forma divertida e interactiva.
Palabras clave: Educación en la Salud; Promoción de la Salud; Anciano; Gamificación; Diseño de Software.

INTRODUCTION

Health education is a continuous goal and the core of the interventions that professionals must carry out at all levels of healthcare. Meanwhile, nursing can benefit from combining scientific knowledge and educational technologies in its search for innovative strategies to provide quality care [1–2].

The development of skills that enable individuals to manage their own health goes beyond the simple transmission of information. It involves making sound decisions regarding preventive care and self-care. Nurses, in their role as educators, play an important part in guiding patients and communities, helping to reduce health disparities and improve quality of life. Recent studies highlight the use of digital technologies, such as online learning platforms, health applications, and educational games, which make this process dynamic and accessible [3–6].

The articulation between scientific knowledge and technological media can support the health education process in various contexts. This association is considered necessary due to the increased access to technological media, which has reconfigured teaching-learning processes and has implications for knowledge construction. This reality imposes changes in the relationship between healthcare professionals and patients, taking into account its technological and digital dimensions in both the provision and the search for care, with possible repercussions for health promotion, treatments, and even disease processes [7–9].

Educational technologies in health align with the concept of digital health, as they are useful tools employed in the teaching process and serve as facilitating and supportive means for providing knowledge and promoting health among the population. Among health education strategies, some incorporate the playful and motivational characteristics of games into specific content [7, 10].

The planning of a digital game's design and its development must be detailed and scientifically grounded, adapted to the reality in which it will be applied, in order to ensure that its pedagogical potential is achieved. Its design consists of four elements known as the "elemental tetrad," namely: story (script development), mechanics (challenge planning), aesthetics (environment modeling), and technology (technological approach). Therefore, the purpose and specific conceptual aspects of the digital game must

permeate these four elements to allow players to experience and practice the expected competencies [11–13].

Digital games are widely used among young people and adults; however, there are also potential users among older adults. This group represents a significant portion of the population, with specific knowledge needs regarding health promotion and disease prevention. Moreover, it is an age group that is increasingly using technological devices, whose members may benefit from health education tools delivered through digital games [11].

The human aging process is accompanied by motor, cognitive, and sensory changes that may affect how this target audience interacts with technological media. However, many digital games are not designed with consideration for changes resulting from the aging process, which can hinder interaction and contribute to a lack of interest due to frustration [14–17].

When identifying recommendations for designing digital games for older adults, it is important that researchers and game designers develop health education tools using digital games aligned with the interests, abilities, and needs of this target audience in order to ensure the effectiveness and usability of educational technology. The objective of this study was to identify recommendations to support the design process of digital games intended for older adults.

MATERIALS AND METHODS

Type of study

An exploratory review was conducted following the stages of the Joanna Briggs Institute (JBI) Review Manual: 1 - development of the objectives and research question; 2 - determination of inclusion and exclusion criteria; 3 - planning of the search, selection, extraction, and presentation of evidence; 4 - search for evidence; 5 - selection of evidence; 6 - extraction of evidence; and 7 - analysis, presentation, and synthesis of results. In addition, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist was followed [18-19]. The guiding question was: What are the design recommendations for the development of digital games for older adults?

Protocol and registration

The exploratory review protocol is registered on the Open Science Framework (OSF) platform using the DOI (10.17605/OSF.IO/ENQYU) and can be accessed at the following link: https://osf.io/enqyu/

Eligibility criteria

The inclusion criteria were: publications in academic journals, book chapters, conference proceedings, theses, and dissertations, without language restrictions, that addressed the study's main research question. Editorials and letters to the editor were excluded.

Sources of information

The initial search was conducted in June 2025 using an online search of the following primary databases of scientific publications: Excerpta Medica database (EMBASE), IEEE Xplore, Medical Literature Analysis and Retrieval System Online (MEDLINE), Scopus Elsevier (SCOPUS), Web of Science, and ScienceDirect. The grey literature search was conducted in the Catalog of Theses and Dissertations of the Coordination for the Professional Development of Higher Education Personnel (CAPES). The Medical Subject Headings (MeSH) and Emtree used were: «video games», «games for health», «computer games», «serious game», «game design», «mobile game design», «design recommendations», «system requirements», «aged», «elderly» and «older users».

Search strategy

The combinations of MeSH and/or keywords were performed using the Boolean operators "AND" and "OR" to meet the specifications of each database or catalog, according to Table 1.

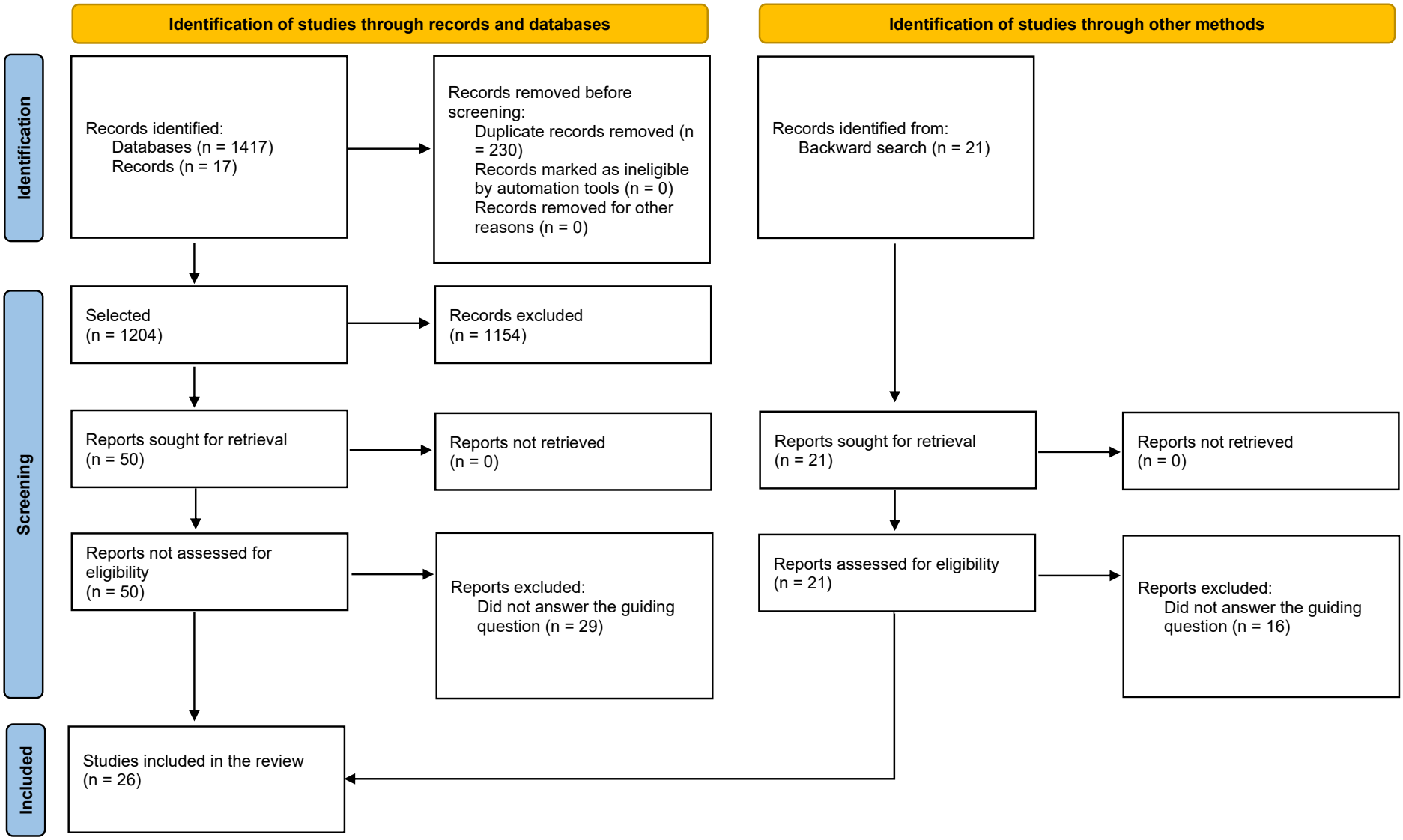
Table 1: Search expressions used in databases and catalogs.

Database/Catalog	**Search expressions**
CAPES Theses and Dissertations Catalog	*(games for health OR video games OR computer games OR serious game) AND (game design OR mobile game design OR design recommendations OR system requirements) AND (aged OR elderly OR older users)*
EMBASE	*('games for health' OR 'video games' OR 'computer games' OR 'serious game') AND ('game design' OR 'mobile game design' OR 'design recommendations' OR 'system requirements') AND (aged OR elderly OR 'older users')*
IEEE Xplore	*(games for health OR video games OR computer games OR serious game) AND (game design OR mobile game design OR design recommendations OR system requirements) AND (aged OR elderly OR older users)*
MEDLINE Complete	*(games for health OR video games OR computer games OR serious game) AND (game design OR mobile game design OR design recommendations OR system requirements) AND (aged OR elderly OR older users)*
Science Direct	*("games for health" OR "video games" OR "serious game") AND ("game design" OR "design recommendations") AND (aged OR elderly)*
SCOPUS	*(TITLE-ABS-KEY (games for health OR video games OR computer games OR serious game) AND TITLE-ABS-KEY (game design OR mobile game design OR design recommendations OR system requirements) AND TITLE-ABS-KEY (aged OR elderly OR older users))*
WEB OF SCIENCE	TÓPICO: *(games for health OR video games OR computer games OR serious game) AND* TÓPICO: *(game design OR mobile game design OR design recommendations OR system requirements) AND* TÓPICO: *(aged OR elderly OR older users)*

Selection of publications

The EndNote® electronic reference manager was used to identify duplicates across databases. The file containing the remaining publications was then exported to the Rayyan QCRE® tool to identify further duplicates and support the selection process. This selection was carried out by two independent reviewers in phase 1 (reading titles and abstracts) and phase 2 (reading the full text). A reverse reference search was also performed on the selected publications to identify additional recommendations for refining the results. Figure 1 presents the Prisma flowchart illustrating the process of identifying, selecting, and including publications.

Figure 1: Study selection diagram, according to the PRISMA flowchart



Data extraction

Information from the included publications was recorded in a spreadsheet created by the authors, containing the following elements: publication title; authors; language; year of publication; journal; objective; design recommendations; and conclusion. The data were presented in figures and tables summarizing the publication information, allowing for a descriptive analysis of the findings.

RESULTS

Data were extracted from 26 publications, published between 2009 and 2024. The studies were primarily conducted in Brazil (n = 6; 27.3%), followed by Germany, Portugal, and Canada, with three publications each (n = 3; 13.6%). The Netherlands and Switzerland each contributed two publications (n = 2; 9.1%), while the remaining countries contributed one publication each (n = 1; 4.5%). Table 2 characterizes the publications in terms of location, objective, method, and sample.

Table 2: Characterization of the studies included in this scope review.

Publication Identification/ Country	Study objective	Study type/Sample
Amaral LD[20]/Brazil	To investigate the potential of serious games to assess older adults with age-related cognitive decline.	Methodological study/40 older adults.
Barros AC[21]/Portugal	To describe the design and evaluation process of the interface for a smartphone application intended to promote exercise and prevent falls in older people.	Methodological study/25 older adults.
Carvalho RNS[22]/Brazil	To identify the functionalities that serious games for mobile phones should have, so that older people can enjoy and want to use them.	Case study/12 older adults.
Chou WH[23] /Taiwan	To develop an interactive digital game that improves domestic interactions for older people.	Methodological study/5 specialists in older adult care.
Costa LV[24]/Portugal	To identify best practices on how to involve older people in the design of a digital game for active aging.	Validation and action research study/33 participants (mean age = 67 years).
Cota TT[25]/Brazil	To understand the needs, preferences, and motivations of older people in relation to smartphone games.	Cross-sectional descriptive study/10 older adults.
Deacon M[26]/ Canada	To develop a gamified system to evaluate response time during foot strike as a measure of balance control.	Methodological study/104 participants (mean age = 72 years).
Fernandez-Cervantes V[27]/Canada	To describe an exergame in which a trainer avatar guides personalized training sessions.	Cross-sectional descriptive study/10 older adults.
Gerling KM [28]/ Germany	To discuss the design of safe and suitable games for older people.	Focus group methodological study/9 older adults.

Publication Identification/ Country	Study objective	Study type/Sample
Gerling KM[29] /Germany	To provide information on age-related changes and game design considerations for older adults.	Review study/not applicable.
Korn O[30] /Germany	To show a user- and context-centered approach using motion recognition.	Review study/not applicable.
Lau SJ[31] /England	Developing a game for older adults with mild cognitive impairment.	Methodological study/31 nursing home residents.
Lee S[32]/South Korea	Suggesting design guidelines for mobile games for adults and older adults.	Longitudinal study/40 people (mean age = 66 years).
Machado CM[33] /Brazil	To present a set of heuristics and recommendations for the design of serious mobile games for older adults.	Methodological study/30 older adults.
Manser P[34]/Switzerland	To determine the abilities, treatment preferences, and motivations for training older adults.	Qualitative study with focus groups/10 specialists and eight older adults.
Mantell R[35] /Australia	To understand the design preferences of older adults for game-based cognitive assessment.	Qualitative study with focus groups/20 older adults.
Nap HH[36] /the Netherlands	To compile information about older gamers to ensure future games are useful, engaging, and enjoyable for this population.	Cross-sectional descriptive study with focus groups/10 older adults.
Radhakrishnan K[37]/United States of America	To identify the perceptions and expectations of older adults regarding a digital game for self-management of heart failure.	Validation study/15 older adults with heart failure.
Ringgenberg N[38]/Switzerland	To develop an exergame training device for older adults.	Cross-sectional descriptive study with focus groups/24 older adults.
Santos LGNO[39]/Brazil	To present a mobile game developed specifically for older adults.	Methodological study/55 older adults.
Sjölinder M[40]/Sweden	To identify key features and design recommendations for exergames that utilize sensor technology.	Review study/not applicable.
Souza G[41]/Brazil	To investigate which elements might encourage older adults to engage with digital games and offer game developers ideas for motivating this target audience.	Cross-sectional descriptive study with focus groups/5 women aged 60-77.
Vasconcelos A[42]/Portugal	To describe and analyze the design of a tablet-based gaming platform for older adults that promotes their quality of life and well-being through cognitive training.	Review study.
Vette F[43]/ the Netherlands	To provide information on an approach to developing e-Health games for older adults.	Methodological study/168 older adults.

Publication Identification/ Country	Study objective	Study type/Sample
Yang YC[44]/Japan	To develop the design of a role-playing game for older adults.	Methodological study/6 people aged 65-70 years
Zhang BY[45]/China	To investigate the relationship between serious games and user preferences, and design serious games that meet the preferences of older adults.	Methodological study/six older adults

The publications aimed to identify design recommendations for tools intended for older adults in 15 (57.7%) studies and to describe the development process of tools intended for older adults in 11 (42.3%) publications. The identified methods were predominantly methodological studies (n = 11; 42.3%), followed by cross-sectional studies (n = 5; 19.2%) and literature reviews (n = 4; 15.4%). Validation studies and qualitative studies with focus groups were also found (n = 2; 7.7% each), in addition to one longitudinal study and one case study (n = 1; 3.8% each).

Regarding the specific characteristics of the tools addressed: nine considered tools to be used on mobile devices; seven involved the need for accessories to detect the player's movements (exergames); six sought to identify the preferences of older adults but did not specify a device or strategy; three focused on digital games for health assessment; and one consisted of a Role-Playing Game (RPG), in which participants assume the roles of fictional characters in an imaginary setting.

Fifteen design features were identified, each accompanied by recommendations related to the development of digital health games for older adults. Table 3 presents a summary of the design recommendations for gamified tools developed based on the findings of the included studies.

Table 3: Summary of recommendations for the design of digital games aimed at health education for older adults

Design feature	Design recommendations	Identification of publications
Objective	Simple and easy to understand.	Chou WH[23], Machado CM[33], Mantell R[35], Nap HH[36], Santos LGNO[39], Sjölinder M[40], Souza G[41], Vasconcelos A[42], Vette F[43], Zhang BY[45].
	Explicit connection to the content.	Amaral LD[20], Carvalho RNS[22], Costa LV[24], Cota TT[25], Gerling KM[28], Radhakrishnan K[37].
Game genre	Casual.	Amaral LD[20], Santos LGNO[39], Souza G[41], Vette F[43], Zhang BY[45].
	To avoid strategies involving violence.	Cota TT[25], Nap HH[36], Santos LGNO[39], Sjölinder M[40], Vette F[43].
Device	Mobile.	Machado CM[33], Vette F[43].
	Preference for tablets.	Amaral LD[20], Lee S[32], Vasconcelos A[42].
Interaction resource	Touchscreen.	Cota TT[25], Santos LGNO[39], Zhang BY[45].

Design feature	Design recommendations	Identification of publications
	To avoid keyboards.	Barros AC[21].
Theme of the narrative	Everyday scenarios.	Costa LV[24], Gerling KM[28], Lau SJ[31], Ringgenberg N[38], Sjölinder M[40], Vasconcelos A[42], Vette F[43].
	To associate with cultural elements.	Machado CM3[3].
	To avoid infantilizing the game.	Mantell R[35], Sjölinder M[40].
Task characteristics	To provide enjoyment and a sense of well-being.	Gerling KM[28], Machado CM[33], Manser P[34], Souza G[41].
	Do not include a time limit for tasks.	Cota TT[25], Gerling KM[29], Lee S[32], Nap HH[36], Santos LGNO[39], Vette F[43].
	Option to disable the time limit for tasks.	Carvalho RNS[22], Lee S[32].
	Low speed/slow pace.	Sjölinder M[40], Souza G[41].
	To avoid long play sessions.	Yang YC44.
Feedback	Clear/objective.	Machado CM[33], Korn O[30], Lee S[32], Nap HH[36], Vette F[43], Zhang BY[45].
	Immediate.	Cota TT[25], Deacon M[26], Korn O[30], Ringgenberg N[38], Vasconcelos A[42].
	At the end of each task.	Fernandez-Cervantes V[27], Manser P[34], Sjölinder M[40].
	Motivational/constructive messages.	Carvalho RNS[22], Chou WH[23], Gerling KM[28], Korn O[30], Lau SJ[31], Lee S[32], Sjölinder M[40], Zhang BY[45].
	Varied messages.	Deacon M[26].
	Audiovisual resources.	Amaral LD[20], Carvalho RNS[22], Chou WH[23], Fernandez-Cervantes V[27], Lau SJ[31], Manser P[34], Sjölinder M[40], Zhang BY[45].
Rewards	Frequent and motivating.	Lau SJ[31], Radhakrishnan K[37], Vasconcelos A[42], Yang YC[44].
	After completing the level.	Cota TT[25], Ringgenberg N[38], Sjölinder M[40].
Difficulty level	Gradual.	Cota TT[25], Deacon M[26], Lee S[32], Machado CM[33].
	Adjustable.	Carvalho RNS[22], Chou WH[23], Gerling KM[28], Gerling KM[29], Korn O[30], Lau SJ[31], Mantell R[35], Radhakrishnan K[37], Ringgenberg N[38], Sjölinder M[40].
	Balanced	Carvalho RNS[22], Cota TT[25], Korn O[30], Manser P[34], Mantell R[35], Santos LGNO[39], Vasconcelos A[42], Vette F[43].
Instructional resources	Simple tutorial.	Chou WH[23], Lee S[32], Nap HH[36], Manser P[34], Vette F[43], Yang YC[44].

Design feature	Design recommendations	Identification of publications
	Use audiovisual resources.	Fernandez-Cervantes V[27], Gerling KM[29], Souza G[41].
	External help from others.	Barros AC[21], Yang YC[44].
	Home screen with all elements and hierarchy.	Barros AC[21].
Graphic resources	Intuitive interface.	Amaral LD[20], Chou WH[23], Cota TT[25], Deacon M[26], Fernandez-Cervantes V[27], Manser P[34], Santos LGNO[39], Sjölinder M[40], Yang YC[44].
	To avoid small elements.	Chou WH[23], Cota TT[25], Gerling KM[29], Lee S[32], Sjölinder M40, Souza G[41], Vasconcelos A[42].
	Highlight the touch area.	Lee S[32]; Zhang BY[45].
	To avoid excessive elements on the screen.	Cota TT[25], Fernandez-Cervantes V[27], Lee S[32], Machado CM[33].
	Highlight important information.	Fernandez-Cervantes V[27], Santos LGNO[39].
	To separate elements.	Amaral LD[20], Barros AC[21], Cota TT[25].
	To place important elements in the center of the screen.	Amaral LD[20], Fernandez-Cervantes V[27].
	Use simple, high-contrast colors.	Carvalho RNS[22], Chou WH[23], Santos LGNO[39], Zhang BY[45].
	Images accompanied by text.	Barros AC[21], Chou WH[23], Santos LGNO[39].
	To avoid elements on the device edges.	Barros AC[21].
	Human avatars.	Fernandez-Cervantes V[27], Mantell R[35], Radhakrishnan K[37].
Textual resources	Large font size and high contrast.	Amaral LD[20], Carvalho RNS[22], Gerling KM[29], Nap HH[36].
	Short sentences.	Carvalho RNS[22].
	Subtitles appear before audio.	Amaral LD[20].
	Familiar vocabulary for older adults.	Barros AC[21], Santos LGNO[39], Vasconcelos AHU[42].
Auditory resources	Familiar soundtrack.	Yang YC[44].
	Dubbing of character conversations.	Amaral LD[20].
	To avoid distracting sounds.	Sjölinder M[40].
Economic factor	Low cost or free.	Amaral LD[20], Machado CM[33], Santos LGNO[39].
Engagement Strategies	Alerts throughout the day.	Radhakrishnan K[37], Sjölinder M[40].
	Family support.	Amaral LD[20], Manser P[34], Radhakrishnan K[37].
	Support or recommendations from professionals.	Amaral LD[20], Radhakrishnan K[37], Sjölinder M[40].

Design feature	Design recommendations	Identification of publications
	Recommendations from other older adults.	Amaral LD[20].
	Multiple players.	Chou WH[23], Lee S[32], Sjölinder M[40], Souza G[41], Yang YC[44], Zhang BY[45].

DISCUSSION

The search of databases and repositories made it possible to identify recommendations for the design of digital games intended for older adults. The main recommendation regarding the objective of the digital game is that it should be easy to understand, both in terms of carrying out the required tasks and the final goal in relation to health benefits [29, 33, 36, 40–41].

The planning of this type of educational intervention should be aligned with user-centered design principles, taking into account the sensory, cognitive, and functional limitations associated with aging. These measures promote the understanding of health information [46]. Inclusive design elements, such as appropriate typography, color contrast, the use of meaningful images, and intuitive interaction, contribute to making the educational process more accessible and engaging for older adults [20–23, 25, 32]. Therefore, integrating design principles into health education not only broadens the reach of health messages but also enhances autonomy, engagement, and informed decision-making among older adults.

Among the aspects identified, it is noteworthy that older adults' interest can be strengthened by establishing an explicit connection with the content addressed. In addition, the association between the pleasure of playing, learning, and improved knowledge promotes immersion and continuous learning [33].

A preference for casual games has been identified, that is, those with simple rules and easy interaction. These games follow patterns compatible with those already known outside the virtual environment and are familiar to older adults, such as bingo, billiards, puzzles, chess, and quiz games, among others [20, 28, 37, 41, 43].

It has also been highlighted that genres involving violent contexts do not attract older adults' interest; therefore, action games are generally not appealing to this audience [25, 36, 40, 43]. In this sense, storylines that portray real-life or everyday situations are preferred, as they facilitate the connection with the objective and the teaching-learning process [25, 29, 31, 40].

Regarding the level of difficulty, attention should be paid to the criteria established for changing levels, earning scores, or receiving rewards. In this respect, it has been indicated that extremes in terms of demands should be avoided. In other words, developing very easy games may generate disinterest in continuing to play, while games with a high level of difficulty can cause frustration and demotivation to progress [25, 33].

Additionally, a gradual increase in the level of difficulty can be considered, as it allows the player to remain motivated and increases the variety of challenges as they use the application. The absence of changes in the degree of difficulty may lead to stagnation and make the strategy repetitive and monotonous, resulting in a lack of interest [25–26].

Regarding time limits for completing tasks, the authors did not recommend including this feature, as it may cause stress among older adults [20, 36]. Other possibilities include providing longer intervals to complete tasks [40–41] or offering the option to disable the timer [22, 32]. This characteristic is related to cognitive and motor factors associated with senescence, which increase response time for actions [20].

Competition is a controversial element: for some players it is motivating, but for others it can be discouraging, as they may feel inhibited or fear failing in front of others [25].

Feedback on performance is important so that the player knows whether they are meeting the task criteria. It can be provided immediately at the end of a task or level. Comparisons with previous performance serve as additional incentives for the player to strive to surpass their best execution times [26]. Varied motivational phrases combined with sound and visual resources encourage the player to continue making efforts [26–29, 40].

Considering limitations related to the aging process, it is important to highlight that the field of vision is often restricted, especially peripheral vision. Therefore, visual resources should be arranged on the screen to facilitate interaction with large graphic elements, highlighted with contrasting colors and positioned at the center of the screen [20, 26–27, 32, 39–40, 44].

The association of audiovisual resources is particularly important for the inclusion of individuals with low educational levels, as it enables interaction and task completion without the need to read text [20]. When texts are included, they should be brief, use vocabulary familiar to older adults [21, 39, 42], and be written in large, high-contrast fonts [20, 22, 29, 36].

Regarding the device used for interaction, tools developed for smartphones are common due to their increasing use by older adults, even if the screen is small [33]. On these devices, it is preferable that applications be free of charge due to financial constraints and distrust of online purchases [20].

Participation resources were recommended, including notifications at predefined times throughout the day, recommendations from healthcare professionals, family members, and other older adults [20, 37, 40].

In this sense, the sensory, motor, and cognitive limitations associated with the aging process must be considered in the design of digital games, prioritizing simplicity of language, visual clarity, logical organization of content, multimodal communication, and positive and contextualized feedback, while avoiding cognitive overload. Following the identified recommendations enhances usability, autonomy, and engagement. The limitation of the study relates to the guiding question itself, which does not consider the specific contexts in which digital games are applied, which may require adaptations for hospitalized and institutionalized older adults.

CONCLUSIONS

Health education tools that utilize digital games are relevant due to their potential to provide interaction, enjoyment, and motivation for acquiring new knowledge. The needs

of the target audience in the process of interacting with technology must be considered in order to foster participation, entertainment, accessibility, and healthcare awareness.

Fifteen categories of design recommendations for digital games aimed at older adults were identified. These considered the motor, sensory, and cognitive limitations related to the aging process and the topics of interest to this age group. Interfaces should prioritize simplicity, visual clarity, multimodal communication, and positive and contextualized feedback, avoiding cognitive overload. Game mechanics should be adaptable, with a gradual progression of difficulty, the use of metaphors for activities of daily living, the encouragement of autonomy, and the guarantee of physical safety.

It is hoped that these recommendations will be taken into account in the development process of games for older adults. Thus, by considering the particularities of this audience, the scope of the expected objectives with digital games is enhanced based on the greater interest of the target audience and better accessibility conditions, which contributes to older adults being able to benefit from digital games for health education.

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