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Play as an inclusive pedagogical device to prevent emerging disabilities in ageing processes: a systematic literature review

Il gioco come dispositivo pedagogico inclusivo per prevenire disabilità acquisite nei processi di invecchiamento. Una revisione sistematica della letteratura

Fuori Call

The paper investigates the role of play as a pedagogical device in counteracting the enhancement of disabilities that emerge as a result of ageing processes and in maintaining/learning skills to support Active Ageing. The aim of this paper is to verify, through scientific literature, whether and how playful practices can act as mediators for the multidimensional well-being of elderly population. The systematic review comprises contributions published between 2019 and 2025; its analysis includes first and second level studies, mainly tracing the use of exergames, digital and board games, to be used in formal and informal contexts. Evidence-based research shows that play has a positive impact on four critical areas: physical (balance and muscle strength), cognitive (speed of processing and memory), social (contrasting loneliness and better intergenerational cohesion), psychological (improving relational well-being and a sense of self-efficacy). Play is configured as a way of displaying existence that does not consider stimulation as a special or compensatory intervention, but as a structural element for an accessible everyday life. By overcoming a merely care-based conception, playfulness renegotiates physical and social barriers, enabling individuals to keep a leading role in their own actions.

Keywords: active ageing, older adults, well-being, quality of life, life project

Il contributo indaga il ruolo del gioco come dispositivo pedagogico nel contrastare l'insorgenza delle disabilità emergenti per effetto dell'invecchiamento e nel mantenimento/apprendimento di capacità di supporto all'invecchiamento attivo. L'obiettivo è verificare, attraverso la letteratura scientifica, se e come le pratiche ludiche possano fungere da mediatori per il benessere multidimensionale della popolazione anziana. La revisione sistematica seleziona contributi pubblicati tra il 2019 e il 2025; l'analisi include studi di primo e secondo livello, rintracciando prevalentemente l'uso di exergames, giochi digitali e da tavolo, da utilizzare in contesti formali e informali. Le evidenze mostrano che il gioco impatta positivamente su quattro aree critiche: fisica (equilibrio e forza muscolare), cognitiva (velocità di processamento e memoria), sociale (contrasto alla solitudine e migliore coesione intergenerazionale), psicologica (miglioramento del benessere relazionale e del senso di autoefficacia). Il gioco si configura come una modalità di progettazione dell'esistenza che non considera la stimolazione un intervento speciale o compensativo, ma un elemento strutturale di una quotidianità accessibile. Superando una visione meramente assistenziale, la dimensione ludica permette di rinegoziare le barriere fisiche e sociali, garantendo che l'individuo rimanga protagonista del proprio agire.

Parole chiave: invecchiamento attivo, anziani, benessere, qualità della vita, progetto di vita

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1. Statistics, legislative frameworks, pedagogical paradigms

The ISTAT report published in March 2026 (ISTAT, 2026) once again demonstrates a year-on-year growth in the population of individuals aged over 65, over 85, and even centenarians, both in absolute terms and as a percentage: these individuals constitute more than a quarter of the total Italian population. The ageing process affects the entire European Union, albeit to a significantly varying degree from country to country: Italy, for instance, records an average age nearly 10 years higher than that of Ireland and it is the country with the highest percentage of elderly residents.

Even within this effective comparison with the rest of Europe, the progression of life expectancy prompts a re-examination of the age threshold to be considered the onset of seniority: nowadays, individuals in high- and middle-income countries lead different lifestyles compared to the past, and this influences their physical and mental capacities, as well as, consequently, their socio-economic conditions at an equivalent chronological age (De Santis, 2022; SIGG, 2018). Although widely accepted, the concept of population ageing that refers to the mere count of people exceeding 65 years of age represents a simplification. As an alternative measure, a dynamic indicator based on remaining life expectancy is gaining more ground in scientific literature and institutional documents: under this condition, the population to be considered elderly in Italy, if compared to 65-year-olds in 1960, becomes those over 74 for men and over 77 for women, thereby decreasing to approximately one-eighth of the total population. Although more limited in this second interpretation, the trend remains on the rise (Figure 1).

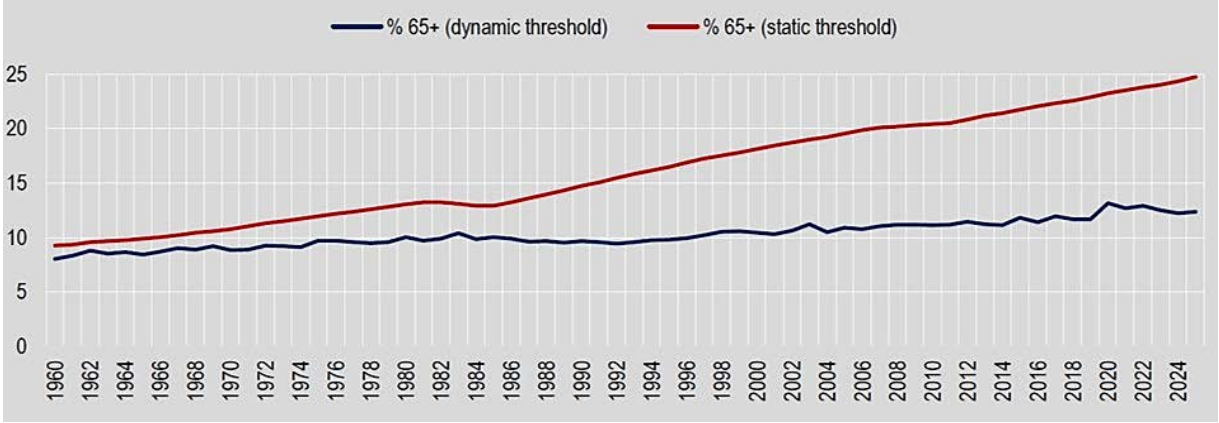

Figure 1 – Italian population aged 65 and above (static threshold) and population with residual life expectancy of 13.1 years (dynamic threshold 1960-2025). Source: ISTAT (2026)

Ageing, however, is not configured exclusively as a demographic achievement, but also as the outcome of a transition characterized by a progressive reconfiguration of functional abilities and, thereby, marked by an increasing frailty that tends to result in incident disability (Fried et al., 2001). Nevertheless, moving beyond a purely biomedical perspective, the Disability Studies model invites a reconsideration of disabilities as a consequence of interactions between an individual's impairments and a physical and social environment that is unable to adapt and be adapted, being structurally ableist and ageist (Oliver, 1990; Oliver & Barnes, 2012): the acquisition of motor, sensory, or cognitive limitations should not be interpreted as an inevitable decline, but rather as a challenge to be addressed through the design of inclusive devices capable of supporting the ontological agency of the elderly.

In this context, frailty emerges as a key target for prevention, potentially counteracted through interventions on modifiable risk factors, such as physical inactivity, the loss of self-efficacy, the erosion of social roles, and relational isolation. The challenge lies in preventing the conceptual automatism by which the elderly person becomes a burden of care; it is necessary, therefore, to transform ageing from an inescapable process of decay into a life stage that requires mediation, the renegotiation of possible autonomies,

and enabling environments. In this sense, it is desirable to repurpose certain paradigms of Special Pedagogy, shifting their scope of action from the traditional perimeter of congenital disability to that of acquired disability and functional frailty associated with advancing age.

The World Health Organization has repeatedly stated the need for supportive environments that can sustain the capacities of older people (WHO, 2002; 2015; 2017). Looking at internationally widespread frameworks, the United Nations is also particularly on point: the legitimization of the approach mentioned above finds its roots in the UN Convention on the Rights of Persons with Disabilities (UN, 2006), which, in Article 30, enshrines the fundamental right to participation in cultural and recreational life, leisure, and sports. Subsequently, the 2030 Agenda for Sustainable Development (UN, 2015) explicitly refers to ensuring healthy lives, promoting well-being for all at all ages, and reducing inequalities by advancing social inclusion. A fundamental contribution was made by the United Nations Economic Commission for Europe, which, with the publication of the Active Ageing Index (UNECE, 2019), provided a metric to assess how the potential of older persons can be enhanced through social participation and the development of autonomy. In an effort to accelerate initiatives ahead of the deadlines established by the Agenda for achieving its targets, the United Nations and the World Health Organization established the Decade of Healthy Ageing (UN, 2020; WHO, 2020) with the aim of urging governments, international agencies, professionals, universities, the media, and the private sectors to collaborate on an action plan to improve the lives of older people, their families, and local communities. Recent international documents thus transcend the biomedical model of health to embrace the bio-psycho-social model, in line with the International Classification of Functioning, Disability and Health (WHO, 2001): this latter document provides the scientific basis for understanding how acting on environmental factors can mitigate activity limitations and participation restrictions typical of neurodegenerative pathologies or physiological senescence.

At the national legislation and strategic level in Italy, policies for ageing and inclusion are supported by the 2021 National Recovery and Resilience Plan (PNRR, https://www.governo.it/sites/governo.it/files/-PNRR_0.pdf), particularly in Mission 5 (cohesion and inclusion) and Mission 6 (health), which provide actions for strengthening local services and contrasting social marginalization among elderly population: “specific lines of intervention are dedicated to people with disabilities and the elderly, starting with those who are non-self-sufficient [...] through housing solutions and innovative instrumental equipment that allow for the achievement and maintenance of maximum autonomy” (p. 212, translated by the Authors). Law 33/2023, implemented by Legislative Decree 29/2024, institutionalizes the first organic welfare system for the elderly, promoting “dignity and autonomy, social inclusion, active ageing, and the prevention of frailty in the elderly population, also through access to unified multidimensional assessment, preventive health tools and home telemedicine, fight against isolation and relational and affective deprivation, solidarity-based home cohabitation for elderly people (senior cohousing) and intergenerational cohabitation (intergenerational cohousing), the development of forms of wellness tourism and slow tourism, as well as aimed at reorganizing, simplifying, coordinating, and making social, health, and socio-health assistance activities more effective” (translated by the Authors). This law remains heavily oriented toward health prevention and support for non-self-sufficient individuals yet opening the possibility to preventing frailty and promoting “conscious and virtuous behaviours” (translated by the Authors), emphasizing “the observance of a healthy and active lifestyle at every stage of life” (translated by the Authors).

We are currently facing the necessity of teaching/learning how to manage a transition that is structural and predictable, moving beyond the biomedical model of geriatrics focused on pathology and chronicity, without activating a sort of pedagogy of emergency, while maintaining the idea that older persons remain subjects in a state of becoming (Boffo et al., 2025; Findsen, 2018). The time of the elderly is often spent, much like that of people with disabilities, in purposefully passive activities (e.g., television), either alone or with caregivers, within a single environment (e.g., personal home, or assisted residential facility), likely chosen by others and not always consistent with personal interests and aspirations (Cottini, 2021). On the other hand, cultivating leisure skills and fostering or introducing a ludic dimension in everyday life could support everyone’s ability to keep a leading role in one’s own actions, regardless of their level of

ability or chronological age, becoming a tool for empowerment and restoring meaningfulness in the elderly.

The present study, therefore, focuses on play in older age and pursues the following research question: "in what ways and with what effects can play support the development and maintenance of active ageing?"

2. Method

2.1 Research design

In order to address the research question, a systematic literature review was conducted following a consolidated methodological approach (Higgins et al., 2022). The research objects were interconnected within a single programmatic framework, specifically the impact of the ludic experience on physiological, social, political-cultural, and psychological processes related to ageing. The current state of literature was investigated within interdisciplinary studies on longevity, quiescence, and late adulthood from an international perspective, prioritizing evidence-based practices. The PRISMA 2020 guidelines (Moher et al., 2009; Page et al., 2021) were adopted to mitigate the risk of biases, potentially inherent in the researcher's subjective gaze, while a systematic approach was preferred as it ensures a higher level of quality and impartiality, as well as cohesion and consistency with the research question and objectives: indeed, transparent procedures were employed to locate, evaluate, and synthesize relevant research findings, which are explicitly defined to ensure replicability. Furthermore, a peer review was conducted among the three Authors, who performed cross-checking throughout the stages of research, to prevent the implicit intrusion of personal preferences or prejudicial perceptions in the selection of resources, the interpretation of data, and the discussion of results.

Formulating the query, the PICO (Population, Intervention, Comparison, and Outcomes) model (Eriksen & Frandsen, 2018) was adopted to guarantee the consistency with the research question, as illustrated in Figure 2.

P		**Population**	No keywords used
I		**Intervention**	(game OR games OR gaming OR play OR playing OR playful OR playfulness)
C		**Comparison**	No keywords used
O		**Outcomes**	("active ageing" OR "active aging" OR "healthy ageing" OR "healthy aging" OR "positive ageing" OR "successful ageing")

Figure 2 – Query composition adopting the PICO model (Eriksen & Frandsen, 2018)

Regarding the *Population* and *Comparison* factors, it was unanimously decided not to specify any terms (e.g., for *Population*, terms such as "older people," "elders," or "elderly population" could have been included, whilst for *Comparison*, "effectiveness," "efficacy," or "evidence," etc.); instead, these elements were identified during the subsequent screening phases, following the inclusion and exclusion criteria, in order to retrieve the highest number of studies conducted in the field. The formulated query, which integrated the Boolean operators AND and OR, was operationalized as follows: ("active ageing" OR "active aging" OR "healthy ageing" OR "healthy aging" OR "positive ageing" OR "successful ageing") AND (game OR games OR gaming OR play OR playing OR playful OR playfulness).

For the selection of relevant resources, the following inclusion and exclusion criteria were established:

- *Publication type*: articles published in peer-reviewed scientific journals were included, while conference proceedings, books, book chapters, and dissertations were excluded;
- *Publication year*: resources published between 2019 and 2025 were included, even if they referred to research completed in previous years;
- *Language*: resources published in English, Italian, Russian, French, and Spanish were included;
- *Access*: resources published in open access or available through authentication via the University of Florence credentials were included;
- *Type of study*: resources referring to both primary and secondary research, with both theoretical and empirical approaches (conducted with qualitative, quantitative, or mixed methods), were included;
- *Participants*: resources focusing on a sample aged 55 or older were included, without limitations regarding sex, gender, ethnicity, socio-economic status, sample size, or other factors;
- *Context*: no limitations were placed on the research setting or geographical area of application.

Specifically, choosing the publication period (2019-2025) was dictated by the release of *2018 Active Ageing Index*, an analytical report compiled by the European Commission and the United Nations Economic Commission for Europe (UNECE) and officially published in October 2019. This report constitutes one of the most significant documents on active ageing advancements at the European level, as it represents a theoretical-empirical reference framework for updates and current states of European and national policies, socio-cultural practices, and future challenges related to policymaking and evidence-based scientific research for the development of active ageing among elderly populations.

Regarding participants' age, a minimum threshold of 55 years was established, as active ageing is frequently the outcome of life habits and social relationships developed prior to the chronological age of 65, which is, by contrast, widely recognized as the conventional lower boundary of older adulthood.

The inclusion and exclusion criteria were applied following the repository queries, specifically during the screening and selection phases of relevant studies.

2.2 Extraction and analysis of resources

The database search was conducted entirely online from December 2024 to January 2025, while the extraction of resources took place on a single day (1st February 2025) after authentication with the system credentials of the University of Florence. EBSCOhost, ERIC, Scopus, and Web of Science were the four databases queried. The metadata (including abstracts) of the results obtained from the queries were exported in RIS format and imported into Zotero to proceed with the removal of duplicates. Subsequently, the remaining resources were converted into CSV format and imported into Excel to begin screening phase 1, based on title and abstract, and screening phase 2, based on the full-text reading of the article. The studies that passed this dual selection were analysed in depth and categorized independently by the Authors to finally extract the key information pertaining to the research question.

3. Results

3.1 Database query outputs

The process of querying the four databases according to the PRISMA model, illustrated in Figure 3, yielded a total of 4,783 records. Prior to the screening phases, 3,387 resources were removed: 1,908 were duplicates and 1,479 were deemed ineligible based on inclusion and exclusion criteria, including resources published before 2019 (n = 1,274) and those not categorized as "Journal Article" (n = 205). Consequently, 1,396 articles were subjected to analysis. In screening phase 1, conducted by reviewing titles and ab-

stracts, 1,351 articles were excluded in accordance with the previously defined inclusion and exclusion criteria. Specifically, the reasons for exclusion are:

- Topic (No Play): a total of 1,288 resources were excluded because the research topic was not related to play[1];
- Topic (No Ageing): a total of 5 resources were excluded because the research topic was related to play but not to ageing processes;
- Topic (Designing Games): a total of 27 resources were excluded because, while addressing both play and ageing, the research topic focused on evaluation, or implementation of one or more games for an elderly target audience (e.g., usability study, feasibility study, pre-test, pilot study and so on);
- Topic (Gamification): a total of 5 resources were excluded as the research topic pertained to gamification instead of play;
- Type (Conference Paper): 1 resource was excluded as it was identified as a conference proceeding, despite being meta-catalogued as "Journal Article";
- Type (Multiple Proceedings): a total of 8 resources were excluded because they referred to a collection of conference proceedings, despite being meta-catalogued as "Journal Article";
- Type (News): a total of 10 resources were excluded as they were advertisements or news items, despite being meta-catalogued as "Journal Article";
- No abstract: a total of 7 resources were excluded because the abstract was missing from the meta-cataloguing.

The other resources (n = 45), considered eligible to undergo screening phase 2 through a full-text reading of the articles, were searched for online. During the full-text download phase, 28 articles were obtained as open access and 7 articles were downloaded as they were accessible via authentication with the University of Florence credentials. 10 articles were excluded because they were not retrievable through the preliminarily defined methods. The full-text reading of the 35 downloaded articles led to the exclusion of 15 studies as they were not relevant to the topic and 2 studies because they were published in non-eligible languages (specifically, Turkish and Portuguese). The 18 remaining articles were definitively included in the research and subjected to a further analytical phase in order to carry out the categorization of results. To ensure the replicability of the analysis and selection process, the reasons for the exclusion and inclusion of resources were made explicit at every stage (Figure 3), while any doubt or uncertainty was thoroughly discussed and clarified by the Authors.

1 The resources that were excluded at this stage primarily focused to health promotion, genetics and/or immunogenetics, age-related diseases, nutrition or immunonutrition, specific diets, brain activity assessment, neurodegeneration, cognitive frailty management, computer-based cognitive training, elderly care, the design of sustainable living spaces for the elderly, co-housing, social participation, social isolation, general life satisfaction, depression, religious belief, active ageing in workplace contexts, the promotion of cultural heritage, digital tourism, technology-supported well-being, the use of mobile phones and ICTs, physical activity, the visitation and use of public parks.

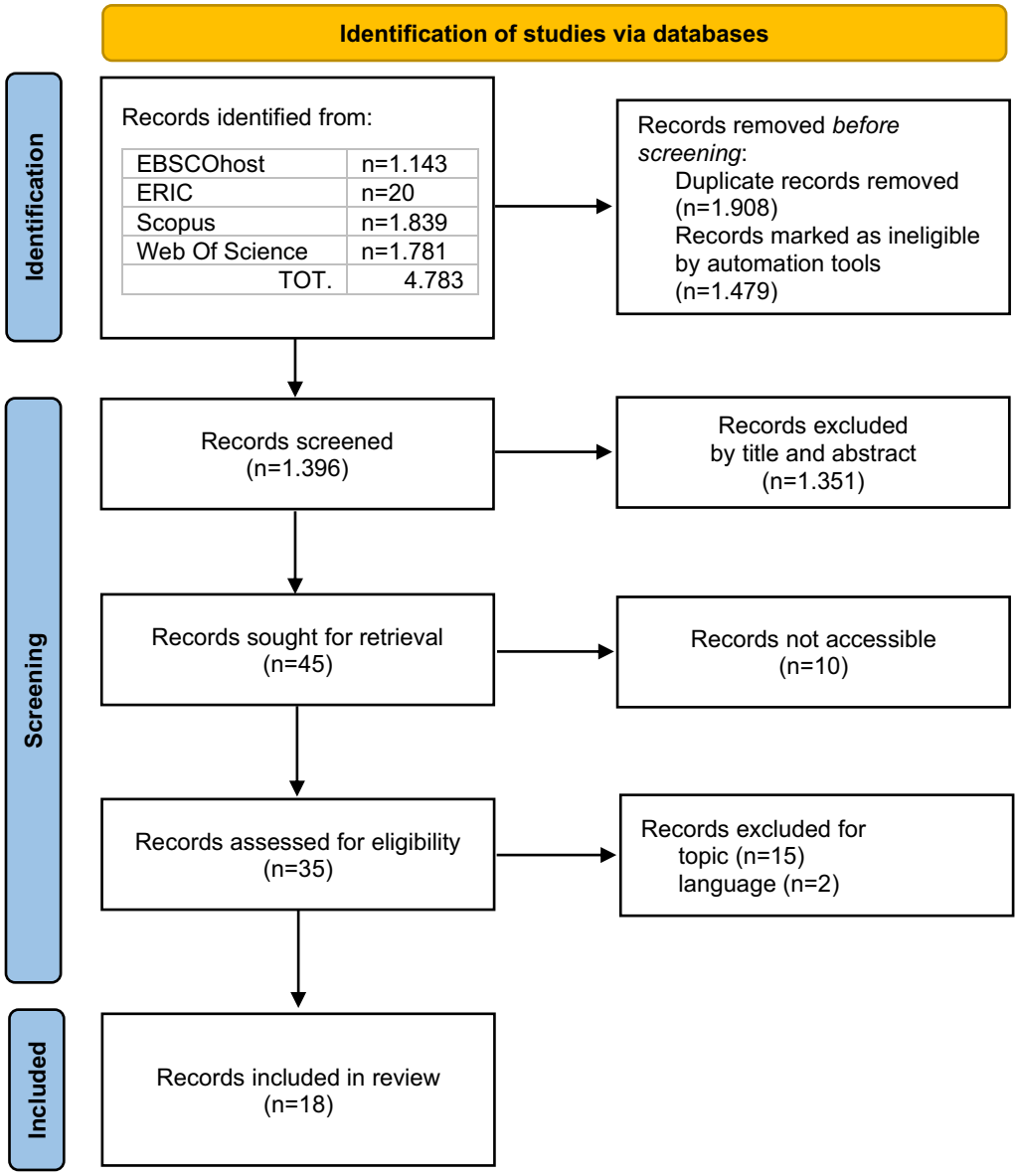

Figure 3 – PRISMA flowchart (Page et al., 2021)

3.2 Research findings

The 18 articles included in the present study were mostly primary research (n = 12; 67%) and, to a lesser extent (n = 6; 33%), secondary research (i.e., literature reviews or meta-analyses). Comparing the types of conducted research in absolute terms, it can be observed that systematic reviews are the most frequently adopted methodology for studying this field (n = 5; 28%), followed by quantitative studies and mixed-methods studies (n = 4; 22% each), qualitative and theoretical studies (n = 2; 11% each) and meta-analyses (n = 1; 6%) (Figure 4).

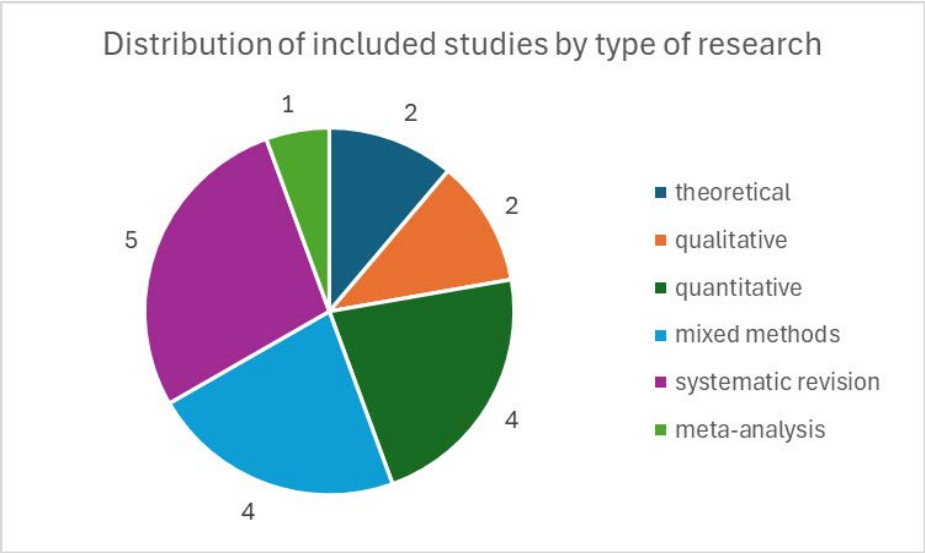

Figure 4 – Distribution of included studies by type of research

Considering the chronological distribution of the included studies, during 2020, i.e., the year immediately after the dissemination of the *2018 Active Ageing Index* (UNECE, 2019), the highest peak of scientific publications produced on the subject was recorded (n = 5; 28%), while the following two-year period was characterized by a growing decline. Subsequently, the scientific interest resumed, as shown in Figure 5.

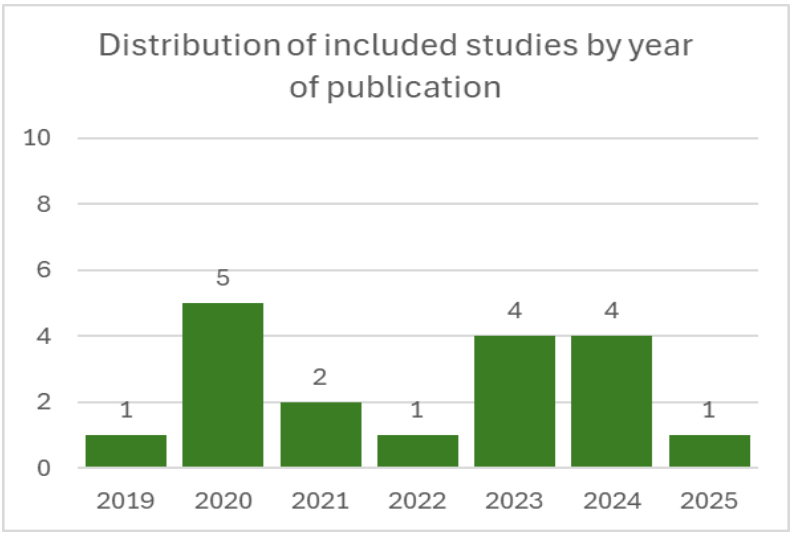

Figure 5 – Distribution of included studies by year of publication

Scientific interest in the topic appears geographically widespread, albeit with some significant differences related to the context, culture, and traditions of the various regions. The highest number of studies was recorded in Europe (n = 12), followed by Asia (n = 8), while North America (n = 3) and Australia (n = 1) differ substantially (Figure 6). The countries recording the highest number of studies on the topic are Italy and Portugal (n = 3 each), similarly to China and the United States (n = 2 each), all of which are countries where the elderly population rate is particularly increasing.

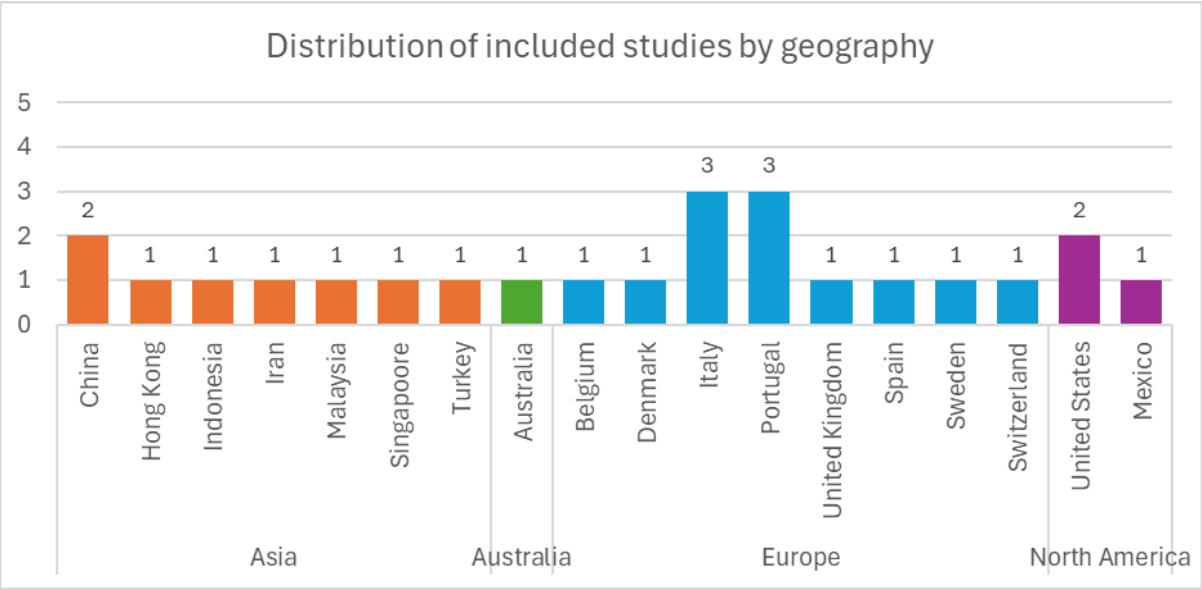

Figure 6 – Distribution of included studies by geography[2]

The heterogeneity in the distribution of studies suggests a further point of interest regarding the theme and scope of research: the 18 studies included were published in 18 different journals, also varying by disciplinary area, ranging from the medico-scientific and psychological fields to the technological and educational ones (Figure 7).

Journal	Number of articles
Applied Sciences	1
Behavioural Brain Research	1
Computers in Human Behavior	1
Frontiers in Medicine	1
Frontiers in Psychology	1
Game Studies	1
Geriatrics and Gerontology International	1
Health and Social Care in the Community	1
Italian Journal of Educational Technology	1
Journal of Ambient Intelligence and Humanized Computing	1
Journal of Education & Research in Nursing	1
Journal of Global Health	1
Journal of Population Ageing	1
Journal of Prevention of Alzheimer's Disease	1
Media and Communication	1
Multimodal Technologies and Interaction	1
Nature Medicine	1
Scientific Reports	1

Figure 7. Distribution of included studies by publishing journal

2 Please note that the total number of articles exceed a maximum of 18 because some studies referred to two or more geographical areas.

Regardless of the disciplinary field to which the study belongs, most research focuses on the motor sphere (n = 7; 28%), aiming to encourage physical activity among participants or to generally improve their physical conditions (e.g., working on balance or strength to prevent falls), followed by the development of cognitive functions (n = 7; 28%), specifically the improvement of memory and attention, and by the promotion of social well-being (n = 6; 24%), namely the construction, whether in-person or remotely, of a social network and/or community and civic engagement. To a lesser extent, research also focuses on psychological well-being (n = 3; 13%), and more specifically on the promotion of a positive personal emotional state (Figure 8).

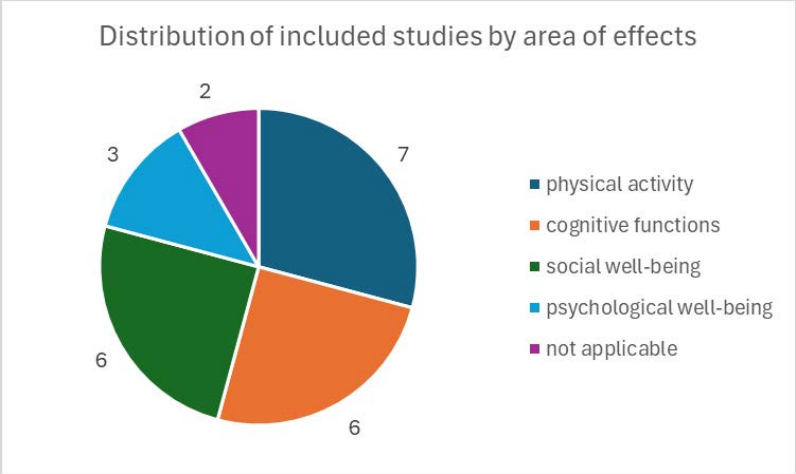

Figure 8 – Distribution of included studies by area of effects

All field research involved individuals aged 55 or older in good health, or at least without certified disabilities or serious sensory impairments (visual or auditory), who could live autonomously and independently.

Not considering when the research context was not specified (n = 7; 39%) and theoretical articles (n = 2; 11%), the majority of the studies was conducted within senior centres (n = 7; 39%); a small number of trials took place in the private homes of participants (n = 2; 11%), one of which in relation to strict restrictions during the pandemic period.

Analysing in more detail, the most frequently proposed type of play is exergame (n = 7; 39%), a video game that promotes and stimulates physical activity through, for example, exercises or motor games inspired by Tai Chi or dance (Adcock et al., 2020). In significantly smaller numbers, there are: digital games (n = 3; 17%), such as Super Mario Bros, Solitaire, or Angry Birds (Clemenson et al., 2020); board games (n = 2; 11%), such as mahjong[3] (Tse et al., 2024); cognitive games (n = 2; 11%), encompassing both traditional and modern cognitive games (Jamei et al., 2024); virtual games (n = 1; 6%), involving games mediated by virtual reality; and serious games (n = 1; 6%) (Figure 9).

3 Mahjong is a board game of Chinese origins, in which the four players aim to find various possible combinations (pairs, triplets, and sequences) of their tiles.

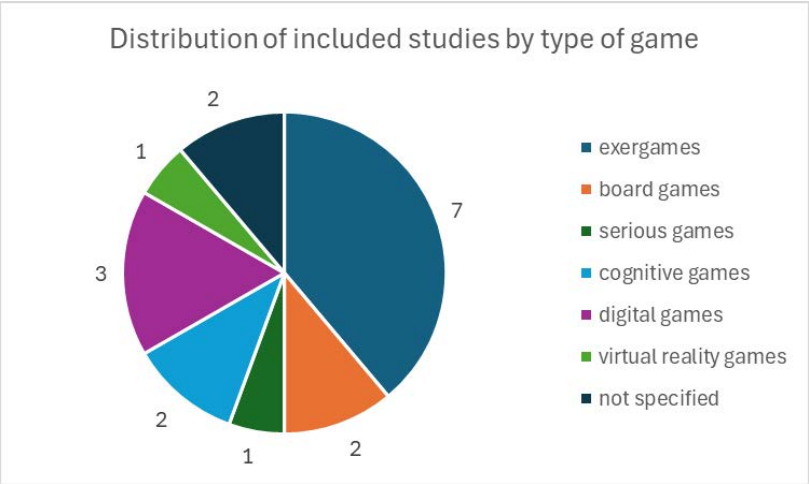

Figure 9 – Distribution of included studies by type of game

Regarding exergames, the most used gaming consoles are the Nintendo Wii, Microsoft Xbox, and Microsoft Kinect; for virtual games, the most frequently mentioned technologies are Oculus VR, VR headsets and controllers, or other wearable active tracker devices.

Although a large amount of included studies does not directly specify the intended gameplay modes (n = 7; 39%), research involving individual game consumption (n = 5; 28%) is predominantly aimed at promoting physical activity, developing cognitive skills, or enhancing personal well-being; conversely, research involving group gameplay modes, whether collaborative or competitive (n = 4; 22%), is more focused on the social and psychological well-being of target audience.

The articles were analysed at a further level through a categorization aimed at retrieving and framing the most relevant elements regarding the research question. Based on the scope and aims of the study, the Authors initially hypothesized a categorization system, which was subsequently revised and refined considering the results of a preliminary test conducted independently on 5 articles. After agreeing upon the final categorization system, two Authors categorized independently the 18 articles seeking consultation with the third Author, an expert figure, in cases of doubt or discrepancy. The most significant information for each article is reported in Figure 10.

	Authors (year)	**Country**	**Type of research**	**Focus**	**Type of game**	**Modality**	**Specific games and/or technologies**	**Findings**
1	Song, Ali, Mhd Salim & Rezaldi (2025)	Malaysia, Indonesia	systematic review	cognitive, physical, social	exergames	n.s. n.s. online, face-to-face	Meta Quest, Oculus VR, HTC Vive and Vive Pro, Valve Index, VR headsets and controllers	Virtual reality sport games have the potential to improve physical fitness (especially balance), cognitive abilities (cognitive stimulation), and social well-being (reducing loneliness)
2	Guardabassi, Manoni, Di Massimo, Cirilli, Maranesi & Nicolini (2024)	Italy	qualitative	social, psychological	board games	in center in group face-to-face	n.s.	Level of well-being recorded after gaming sessions increased significantly, especially with games of low or medium difficulty

3	Jamei, Saleh Moghadam, Mazlom, Namazinia, Asghari Nekah & Mohajer (2024)	Iran	quantitative	social	cognitive games	in center in group face-to-face	traditional and modern games (i.e. "Mime", "20 questions", "Making sentences" "Name and family game", etc.)	Statistically significant decrease in the sense of loneliness among elderly people in the intervention group compared to the control group, and among the same individuals from the start of the study to the follow-up
4	Sturnieks, Hicks, Smith, Ratanapongleka, Menant, Turner, Lo, Chaplin, … & Lord (2024)	Australia	quantitative	physical	exergames	in center individual online	computer, touchpad, videogames	Statistically significant difference in the reduction of the risk of falls for people trained with exergames compared to the control group, no significant difference for people trained with computerized cognitive games compared to the control group
5	Tse, Cao, Chau, Yeung, Leung & Shum (2024)	Hong Kong	systematic review	cognitive, psychological	board games	n.s. in group face-to-face	mahjong	Improvement in general cognitive abilities and short-term memory, reduction in depressive symptoms
6	Greco, Poli, Clemente, Fischetti & Cataldi (2023)	Italy, Portugal	systematic review	physical	virtual games	n.s. n.s. online	wearable active tracker device	Technologies can promote physical activity by enabling even healthy people to overcome certain barriers, reducing the level of sedentary lifestyles (at least in the short term)
7	López-Nava, Rodriguez, García-Vázquez, Perez-Sanpablo, Quiñones-Urióstegui, Meneses-Peñaloza, Castillo, … & Favela (2023)	Mexico	systematic review	physical, cognitive	exergames	n.s. n.s. n.s.	Nintendo Wii, Positive Gaming, Silverfit 3D, Kinect, Oculis Rift, Microsoft Xbox, Play Station	No statistically significant difference in balance improvement was observed in treatments involving fewer than six sessions (programs of at least ten sessions). No statistically significant difference in gait in short sessions (less than or equal to 30 min). In both cases, the results for balance and gait are consistent with those for cognition. Statistically significant results in cognitive functions are accompanied by statistically significant results in gait
8	Regalado, Ortet, Costa, Santos & Veloso (2023)	Portugal	mixed methods	social	digital games	in center mix face-to-face	computer, mouse, keyboard	Digital games can promote (1) active and healthy ageing in terms of participation, social interaction, psychological well-being, and social welfare, (2) the development of digital competence in information and data literacy, communication and collaboration, and safety

9	Yang, Wang, Liu, Liu, Zhang & Luo (2023)	China	systematic review	cognitive	exergames	n.s. n.s. n.s.	racing games, dance, Tai-Chi, Ski Sensation Games, Positive Gaming, Tai Chi Kinect	Exergames have the power to improve cognitive functions by activating various neural mechanisms. However, they require a specific assessment of the target audience's conditions (compliance with specific physiological conditions)
10	Palermo (2022)	Italy	theoretical	n.a.	serious games	n.a. n.a. n.a.	Nintendo Wii	Serious games are recognized as useful tool for promoting (1) healthier lifestyle, rehabilitation therapies or treatments in general, (2) cognitive development and neurorehabilitation, (3) social inclusion (even if at a distance), and (4) diagnosis and diseases monitoring
11	Campo-Prieto, Rodríguez-Fuentes & Cancela-Carral (2021)	Spain	qualitative	physical	exergames	in center individual face-to-face	HTC VIVE Pro, Nvidia VR Fun House	High levels of satisfaction among participants (no motion sickness and confidence in using the technology), good opportunity to exercise for people who tend to be sedentary and in relation to the COVID-19 pandemic. On the other hand, the costs and technology equipment are not accessible to everyone
12	Çakar & Kadıoğlu (2021)	Turkey	theoretical	n.a.	n.a.	n.a. n.a. n.a.	n.s.	Play promotes creativity, supports biopsychosocial health, and develops communication skills. It also allows for better adaptation to the environment, reducing levels of mental absence and the risk of developing Alzheimer's (by 30%)
13	Adcock, Fankhauser, Post, Lutz, Zizlsperger, Luft, Guimarães, Schättin & de Bruin (2020)	Switzerland, Portugal, Sweden	quantitative	cognitive, physical	exergames	domestic individual n.s.	inertial measurement Units, wearable Physiolog 5	Inhibition (ability to inhibit irrelevant information) and working memory improved significantly in the intervention group, improvements in attention span in favor of the control group, no significant effects on physical functions and brain volume (both groups showed a reduction in gray matter in the frontal areas and hippocampus), positive influence of exergames on executive functions
14	Bonnechère, Langley & Sahakian (2020)	United Kingdom, Belgium	meta-analysis	cognitive	cognitive games	n.s. n.s. online	computerised cognitive games	Statistically significant improvements in processing speed, executive functions, and verbal memory, but not in attention and visuospatial abilities

15	Clemenson, Stark, Rutledge & Stark (2020)	United States	mixed methods	cognitive	digital games	domestic individual face-to-face	Super Mario, Angry Birds, Solitaire	The 3D game applied for 4 weeks enriches and strengthens memory, maintaining results even after 4 weeks. The 2D game, on the other hand, does not have the same persistence over time, although it has positive results on memory (possible interaction with the game console). The well-known game (Solitaire), on the other hand, has no beneficial effect
16	Ehrari, Larsen, Langberg & Andersen (2020)	Denmark	quantitative	physical, social	n.a.	in center in group face-to-face	Moto Tiles, tablet	No statistically significant differences in balance-related gains (sample too small), modest gains in balance, especially for people at risk of frailty, joyful atmosphere and social sharing with positive effects on motivation to engage in physical activity
17	Zheng, Li, Salmon & Theng (2020)	Singapore, China	mixed methods	psychological	exergames	in center mix face-to-face	Microsoft Kinect	Playing exergames has positive effects and reduces negative effects (especially when played individually, compared to playing with peers or young people)
18	Lee (2019)	United States	mixed methods	social	digital games	n.s. individual online	n.s.	There is no negative correlation between playing alone and social connectedness or social capital, but interacting with local or distant people is linked to the formation of bonds. Playing is associated with greater civic and political engagement: playing alone or with local friends is associated with a higher frequency of civic engagement, while playing with online friends is associated with a higher frequency of political involvement

Figure 10 – Summary of the main findings from the categorization and analysis of the 18 articles included (in decreasing, chronological order)[4]

4 The play modality is expressed through three indicators: (1) the first relates to the setting; (2) the second relates to the potential sharing of the practice with others (e.g., individual, group, mixed mode); (c) the third relates to play's enjoyment (e.g., online, face-to-face, mixed model).
n.a. = not available
n.s. = not specified

4. Discussion

The present systematic review identifies the effects that different types of play have in fostering healthy, positive and active ageing. The analysis of the 18 articles revealed, in a rather consistent and generalized manner, that playing activity create beneficial effects primarily in four areas: (i) play as an incentive for physical activity; (ii) play as a stimulus for cognitive functions; (iii) play as a tool for social well-being; (iv) play as a device for psychological well-being. The results obtained from the investigation regarding these four points are discussed below.

4.1 Play as an incentive for physical activity

As previously highlighted in section 3.2, the motor sphere is among the main focuses in the included studies (7 occurrences out of a total of 25). Advancing age, in fact, brings a gradual deterioration of motor skills that can lead to falls and/or a worsening of general health conditions. For this reason, the promotion of active ageing frequently begins precisely with the proposal of activities (here, through a ludic approach) aimed at fostering balance or strength and, more generally, stimulating physical exercise.

The analysed research indicates that exergames are essentially the main play category proposed for this purpose (Adcock et al., 2020; Campo-Prieto et al., 2021; Greco et al., 2020; López-Nava et al., 2023; Song et al., 2025; Sturnieks et al., 2024). These virtual motor or sports-based games, inspired for instance by dance or Tai-Chi (Adcock et al., 2020), offer the advantage of stimulating physical activity while reducing, albeit in the short term, the impact of certain barriers that predispose individuals to a sedentary lifestyle[5] (Campo-Prieto et al., 2021; Greco et al., 2020). While exergames, by their very nature, may create other barriers, even significant ones, related to the purchase and maintenance of the necessary technological equipment, often accessible only in specialized centres, the ease of use of these devices does not seem to have created excessive resistance from participants (Campo-Prieto et al., 2021). Furthermore, exergames open to the improvement of physical conditions, with special regard to gait and balance, significantly reducing the risk of falling (López-Nava et al., 2023; Song et al., 2025; Sturnieks et al., 2024). However, such benefits are achievable only if frequent practice is provided, sustained both in the temporal duration of each session (equal to or greater than 30 minutes each) and in the extent of the sessions themselves (structured programs of at least ten sessions) (López-Nava et al., 2023).

4.2 Play as a stimulus for cognitive functions

The development of cognitive functions, likewise motor practice, is a frequently investigated area of application for play. The analysed research suggests that exergames can be proposed for this purpose, since their potential for neurological and mental stimulation has been more recently recognized (Adcock et al., 2020; López-Nava et al., 2023; Song et al., 2025; Yang et al., 2024). However, for exergames to ensure the achievement of the best results in this sphere, a specific assessment of the target group's baseline conditions is necessary to carefully evaluate the objectives to be reached and, consequently, the types of play to be proposed (Yang et al., 2024). In any case, the configuration of exergames stimulates, in relation to the desired goals, working memory and the inhibition of irrelevant information.

Other types of play also can have positive effects on the improvement of general cognitive skills. Board games, for instance, sustain short-term memory training (Tse et al., 2024), while digital games, both those specifically cognitive in nature and those that are not (such as Super Mario or Angry Birds), improve pro-

5 The reference here is, for example, to weather conditions (rain, excessive cold or heat, etc.) or to the lack of offerings within the local community (absence of gyms or other spaces for motor practice, lack of dedicated or suitable courses for the elderly, etc.).

cessing speed, verbal memory, and general executive functions (Bonnechère et al., 2020; Clemenson et al., 2020). Conversely, it must be noted that these playing activities have occasionally been shown to have counterproductive effects on attention span and visuospatial skills (Adcock et al., 2020; Bonnechère et al., 2020).

4.3 Play as a tool for social well-being

All types of play examined, from board games to exergames, detain the power to generate social connections and enhance relational well-being, not only among peers but also across different generations.

While board games instinctively offer the advantage of bringing people together, as they lend themselves almost exclusively to group participation, whether collaborative or competitive, in a face-to-face modality, research by Guardabassi and colleagues (2024) found out that levels of well-being were most significantly increased by low-to-medium difficulty games; specifically, those with simple rule sets based partly on chance, requiring at most attention to various elements (symbols, words, etc.) to make deductions. Cognitive games, such as "Name and family game", "Mime", "20 questions", and "Making sentences", have also been shown to reduce the sense of loneliness compared to both those who practice no activity and the participants themselves from the start of the study to the follow-up (Jamei et al., 2024).

Contrary to what is commonly assumed, digital games function in a similar way. In an online study investigating the relationships between digital games, social capital, social connectedness, and civic participation, it emerged that playing with either close or distant ties is an indicator of greater social capital (i.e., the quality of interpersonal networks experienced within one's community), but is not correlated with social connectedness (i.e., the ability to continuously meet one's interpersonal connection needs); playing alone or with individuals with whom there is an affective bond (e.g., close friends or relatives) is associated with a higher frequency of political involvement and engagement in the local community (Lee, 2019). According to Regalado et al. (2023), this is driven not only by the dimension of social participation, but also by the continuous interaction with technological tools, which stimulates the development of digital competence, which is an essential element in certain contemporary societies, and consequently fosters digital inclusion.

In general, exergames, even when practiced individually, have the capacity to broaden experiences and topics of conversation among peers and across different generations (such as other family members, grandchildren, youth, etc.) (Zheng et al., 2020), and to create a joyful atmosphere of social sharing that can have positive outcomes on motivation for physical practice (Ehrari et al., 2020; Song et al., 2025).

4.4 Play as a device for psychological well-being

Considering the factors that emerged so far, it is noticeable how the practice of play can significantly contribute to fostering a more general state of psychological and emotional well-being and to nurturing a sense of personal satisfaction. Such benefits are often achieved in parallel with, or as a consequence of, the effects of play in aforementioned dimensions.

The research conducted by Guardabassi and colleagues (2024) shows that playing low-to-medium difficulty board games in groups brings improvements in personal and emotional well-being, as well as social well-being. On the other hand, the study by Tse and colleagues (2024), which tests the cognitive potential of mahjong, also records a reduction in the sense of loneliness and depressive symptoms among participants.

However, there are other playful activities that, just like board games, work in this direction. The study by Zheng and colleagues (2020) investigates the effects that exergames can have on the psychological and intrapersonal dimension, standing as the only research included in this systematic review to exclus-

ively analyse these elements. Exergames corroborate their potential for this task as well, highlighting, over the long term, an increase in positive effects and a decrease in negative effects within the emotional and personal sphere of the participants (Zheng et al., 2020). By comparing different groups of participants, just as individual players, players in peer groups, and players in groups with young people, this study reveals a significant and counter-intuitive finding: although no difference in positive effects were recorded between the three groups, a greater and statistically significant decrease in negative effects (i.e., the risk of developing emotional uneasiness, depressive states, etc.) was observed specifically in the group of individual players. This outcome, probably linked to the particular condition of the reference sample (in this specific case, more exposed to the risk of social isolation and thus more inclined to find social withdrawal pleasant) calls for attention to the specific characteristics of the target audience (Palermo, 2022; Yang et al., 2023), as well as the context of the intervention and the modalities of play practice (Çakar & Kadıoğlu, 2021; Lee, 2019).

5. Conclusions

The steady increase of average age among European populations and the ageing rates currently characterizing many middle- and high-income countries, including Italy, requires a widespread shift from care management of elderly individuals to the proactive promotion of their well-being, to be understood in its multiple dimensions. A transdisciplinary reflection on longevity and on frailties as precursors to disability, and thus as areas for early intervention, can direct a better quality of life (Shalock & Verdugo Alonso, 2002) throughout the course of existence, with positive consequences for the entire society.

The articles that were included in this systematic review show that, since the publication of the *2018 Active Ageing Index* (UNECE, 2019), a vibrant debate has emerged within the field of evidence-based research: researchers in the health, psycho-pedagogical, and technological fields have applied different types of play and investigated their effects on multiple levels of intervention. In general, play can assume the function of a privileged facilitator in the process of optimizing opportunities for health, participation, and security: it's no longer a peripheral activity, often confined to developmental age, but rather a pedagogical and inclusive device of fundamental relevance throughout the life span. To play, in older age, is to reactivate cognitive, emotional, and relational circuits that counteract social isolation and functional decline, promoting a form of inclusion that is not merely a remedy for frailty, but a clear affirmation of the right to active citizenship and personal dignity.

Among the most frequently addressed playful activities in the studies under review, exergames emerge as a prominent tool, frequently used to incentivize physical activity and improve general health status, starting with balance and muscular strength, but also to develop attention and memory. Their use may sometimes require expensive technological equipment that evolves rapidly in the market, yet remains intuitive and engaging to use; the benefits need constant and prolonged practice over time, thus implying either the purchase of such instruments or regular attendance at environments that provide them, to the extent that in some countries their presence can even be observed within public parks, replacing or complementing traditional fitness trails.

Transversally, all considered types of play contribute to a more general (personal, emotional, and psychological) well-being. Playful activities that involve group participation, whether in-person or remote, yield evident advantages for social inclusion and interpersonal relationships with peers or across generations, reducing the sense of loneliness that often characterizes the lived experience of elderly people and, on the other hand, improving their sense of self-efficacy. Some digital games, if used too intensively, may reduce attention spans, but they also act positively on information processing speed, while board games generally function as an important stimulus for short-term memory.

Some limitations of the present study open avenues for future developments:

- *Database selection*: the adoption of a holistic view of well-being suggests that the selection of databases, while exhaustive for the educational and social research fields, may have partially excluded bioengineering contributions, whose systematic integration could foster a better multidimensional understanding of senescence;
- *Data granularity*: the inclusion of secondary studies, while ensuring statistical robustness, entails a physiological loss of detail regarding contextual variables, which could instead prove useful for personalized pedagogical design;
- *Epistemological approach*: many studies treat play as an independent variable, regulated by the research teams, sometimes even within *ad hoc* designed scenarios; on one hand, this broadens the research landscape into previously unexplored areas, but on the other, it limits the understanding of spontaneously chosen ludic modalities, their intensity, and their outcomes;
- *Sampling*: the prevalent involvement of research subjects in good health ensures sample homogeneity but precludes the generalizability of results to individuals with severe impairments, thereby excluding a significant segment of the population from the potential benefits that have been identified.

From the analysis of included studies, play emerges as a dense pedagogical device capable of operating within a logic of Universal Design, where cognitive, sensory, and motor stimulation transcend the meaning of special therapeutic or compensatory interventions, and propose themselves as structural elements for the acquisition of new capacities or the enhancement of residual ones. Ludic activity is configured as the meeting point between the right to well-being and the need to counteract the barriers (physical, cognitive, and social) that the potential onset of acquired age-related disabilities may generate. Special pedagogy offers the methods for educational dialogue and the tools for the co-design of experience through activities that are non-frustrating, yet still challenging, respecting the dignity of the adult by avoiding infantilizing approaches. This proceeds according to the subject's own pace in moving beyond an emergency-based logic, essentially supporting a life project that does not come to an end with old age, but evolves progressively through intergenerational ludic contexts.

References

*Adcock, M., Fankhauser, M., Post, J., Lutz, K., Zizlsperger, L., Luft, A. R., Guimarães, V., Schättin, A., & De Bruin, E. D. (2020). Effects of an In-home Multicomponent Exergame Training on Physical Functions, Cognition, and Brain Volume of Older Adults: A Randomized Controlled Trial. *Frontiers in Medicine*, *6*, 321. https://doi.org/10.3389/fmed.2019.00321

Boffo, V., Bertani, M., Bramanti, D., Chattat, R., & Formenti, L. (eds.), (2025). *Accompagnare la longevità. Buone pratiche educative e formative per l'invecchiamento attivo*. Firenze University Press.

*Bonnechère, B., Langley, C., & Sahakian, B. J. (2020). The use of commercial computerised cognitive games in older adults: A meta-analysis. *Scientific Reports*, *10*(1), 15276. https://doi.org/10.1038/s41598-020-72281-3

*Çakar, M., & Kadıoğlu, H. (2021). Active Ageing and Game. *Journal of Education and Research In Nursing*, *18*(4), 457–461. https://doi.org/10.5152/jern.2021.64290

*Campo-Prieto, P., Rodríguez-Fuentes, G., & Cancela-Carral, J. M. (2021). Immersive Virtual Reality Exergame Promotes the Practice of Physical Activity in Older People: An Opportunity during COVID-19. *Multimodal Technologies and Interaction*, *5*(9), 52. https://doi.org/10.3390/mti5090052

*Clemenson, G. D., Stark, S. M., Rutledge, S. M., & Stark, C. E. L. (2020). Enriching hippocampal memory function in older adults through video games. *Behavioural Brain Research*, *390*, 112667. https://doi.org/10.1016/j.bbr.2020.112667

Cottini, L. (2021). *Didattica speciale per l'educatore socio-pedagogico*. Cottini.

De Santis, G. (2022). Pensioni e demografia in Italia: alcune considerazioni e una proposta. *Rivista del Diritto della Sicurezza Sociale, 3*, 389–422.

*Ehrari, H., Larsen, R. T., Langberg, H., & Andersen, H. B. (2020). Effects of Playful Exercise of Older Adults on Balance and Physical Activity: A Randomized Controlled Trial. *Journal of Population Ageing*, *13*(2), 207–222. https://doi.org/10.1007/s12062-020-09273-8

Eriksen, M., & Frandsen, T. (2018). The Impact of Patient, Intervention, Comparison, Outcome (PICO) as a Search Strategy Tool on Literature Search Quality: A Systematic Review. *Journal of the Medical Library Association, 106*(4), 420–431. https://doi.org/10.5195/jmla.2018.345

Fried, L. P., Tangen, C. M., Walston, J., Newman, A. B., Hirsch, C., Gottdiener, J., ... & McBurnie, M. A. (2001). Frailty in older adults: Evidence for a phenotype. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *56*(3), M146–M157.

Findsen, B. (2018). Learning in Later Adulthood: A Critical Perspective. In M. Milana, S. Webb, J. Holford, R. Waller, & P. Jarvis (eds.) *The Palgrave International Handbook on Adult and Lifelong Education and Learning,* (pp. 839-855. Palgrave.

Grant, M. J., & Booth, A. (2009). A Typology of Reviews: An Analysis of 14 Review Types and Associated Methodologies. *Health Information and Libraries Journal*, *26*, 91–108.

*Greco, G., Poli, L., Clemente, F. M., Francesco, F., & Cataldi, S. (2023). The Effectiveness of New Digital Technologies in Increasing Physical Activity Levels and Promoting Active and Healthy Ageing: A Narrative Review. *Health & Social Care in the Community*, *2023*, 1–11. https://doi.org/10.1155/2023/2803620

*Guardabassi, V., Manoni, E., Di Massimo, M., Cirilli, E., Maranesi, A., & Nicolini, P. (2024). Aging with board games: Fostering well-being in the older population. *Frontiers in Psychology*, *15*, 1501111. https://doi.org/10.3389/fpsyg.2024.1501111

Higgins, J. P. T., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M. J., & Welch, V. A. (2022). *Cochrane Handbook for Systematic Reviews of Interventions* (6.3). Cochrane.

ISTAT. Istituto nazionale di statistica (2026). *Report indicatori demografici. Anno 2025*. https://www.istat.it/wp-content/uploads/2026/03/Report_Indicatori-demografici_Anno-2025.pdf

*Jamei, F., Saleh Moghadam, A. R., Mazlom, S. R., Namazinia, M., Asghari Nekah, S. M., & Mohajer, S. (2024). Effect of group play therapy as holistic geriatric interventional modality on feelings of loneliness among older people: A randomized control trial. *Geriatrics & Gerontology International*, ggi.14972. https://doi.org/10.1111/ggi.14972

*Lee, Y.-H. (s.d.). Older adults' digital gameplay, social capital, social connectedness, and civic participation. *Game Studies*.

*López-Nava, I. H., Rodriguez, M. D., García-Vázquez, J. P., Perez-Sanpablo, A. I., Quiñones-Urióstegui, I., Meneses-Peñaloza, A., Castillo, V., Cuaya-Simbro, G., …, & Favela, J. (2023). Current state and trends of the research in exergames for the elderly and their impact on health outcomes: A scoping review. *Journal of Ambient Intelligence and Humanized Computing*, *14*(8), 10977–11009. https://doi.org/10.1007/s12652-022-04364-0

Oliver, M. (1990). *The politics of disablement*. Macmillan Education.

Oliver, M., & Barnes, C. (2012). *The new politics of disablement*. Bloomsbury Publishing.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., …, & Moher, D. (2021). The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. *International Journal of Surgery, 88*, 105906.

*Palermo, S. (2022). Serious games for promoting active and healthy ageing and monitoring frailty in the elderly. *Italian Journal of Educational Technology,* 30(3), 64–77. doi: 10.17471/2499-4324/127330(3).

*Regalado, F., Ortet, C. P., Costa, L. V., Santos, C., & Veloso, A. I. (2023). Assessing Older Adults' Perspectives on Digital Game-Related Strategies to Foster Active and Healthy Ageing. *Media and Communication*, *11*(3), 88–100. https://doi.org/10.17645/mac.v11i3.6796

Schalock, R. L., & Verdugo Alonso, M. A. (2002). *Handbook on Quality of Life for Human Service Practitioners*. American Association on Mental Retardation.

SIGG. Società Italiana di Gerontologia e Geriatria (2018). https://www.sigg.it/news-geriatria/quando-si-diventa-anziani/

* Song, X., Ali, N. M., Mhd Salim, M. H., & Rezaldi, M. Y. (2025). A Literature Review of Virtual Reality Exergames for Older Adults: Enhancing Physical, Cognitive, and Social Health. *Applied Sciences*, *15*, 351. https://doi.org/10.3390/app15010351

*Sturnieks, D. L., Hicks, C., Smith, N., Ratanapongleka, M., Menant, J., Turner, J., Lo, J., Chaplin, C., …, & Lord, S. R. (2024). Exergame and cognitive training for preventing falls in community-dwelling older people: A randomized controlled trial. *Nature Medicine*, *30*(1), 98–105. https://doi.org/10.1038/s41591-023-02739-0

*Tse, Z. C. K., Cao, Y., Chau, B. K. H., Yeung, M. K., Leung, C., & Shum, D. H. K. (2024). Does Playing Mahjong Benefit Older Individuals? A Scoping Review. *The Journal of Prevention of Alzheimer's Disease*, *11*(5), 1363–1377. https://doi.org/10.14283/jpad.2024.102

UN. United Nations (2006). *Convention on the Rights of Persons with Disabilities* United Nations General Assembly.

UN. United Nations (2015). 2*030 Agenda for Sustainable Development*. United Nations.

UN. United Nations (2020). *United Nations Decade of Healthy Ageing (2021–2030).* United Nations General Assembly.

UNECE. United Nations Economic Commission for Europe (2019). *2018 Active Ageing Index. Analytical Report.* UN. https://unece.org/DAM/pau/age/Active_Ageing_Index/ECE-WG-33.pdf

*Yang, Y., Wang, K., Liu, S., Liu, H., Zhang, T., & Luo, J. (2023). Exergames improve cognitive function in older adults and their possible mechanisms: A systematic review. *Journal of Global Health*, *13*, 04177. https://doi.org/10.7189/jogh.13.04177

WHO. World Health Organization (2002). *Active ageing: a policy framework*. World Health Organization. https://iris.who.int/bitstreams/0418705f-1c82-4fe2-82d6-d4faee89dfa0/download

WHO. World Health Organization (2015). *World report on ageing and health*. World Health Organization. https://iris.who.int/bitstreams/5174879e-b0dc-43fc-b3a8-b1db31c51d4c/download

WHO. World Health Organization (2017). *Global strategy and action plan on ageing and health*. World Health Organization. https://iris.who.int/bitstreams/dde7be07-eb76-4642-800c-4258ecd42e59/download

WHO. World Health Organization (2020). *Plan of Action*. World Health Organization. https://cdn.who.int/media/docs/default-source/decade-of-healthy-ageing/decade-proposal-final-apr2020-en.pdf?sfvrsn=b4b75ebc_28&download=true

*Zheng, H., Li, J., Salmon, C. T., & Theng, Y.-L. (2020). The effects of exergames on emotional well-being of older adults. *Computers in Human Behavior*, *110*, 106383. https://doi.org/10.1016/j.chb.2020.106383