GREEN SPACES AND NATURAL ELEMENTS IN THE ARCHITECTURAL CONFIGURATION OF LONG-TERM CARE FACILITIES FOR OLDER ADULTS: A SYSTEMATIC LITERATURE REVIEW

ESPAÇOS VERDES E ELEMENTOS NATURAIS NA CONFIGURAÇÃO ARQUITETÔNICA DE INSTITUIÇÕES DE LONGA PERMANÊNCIA PARA IDOSOS: UMA REVISÃO SISTEMÁTICA DE LITERATURA

ESPACIOS VERDES Y ELEMENTOS NATURALES EN LA CONFIGURACIÓN ARQUITECTÓNICA DE INSTITUCIONES DE LARGA PERMANENCIA PARA ANCIANOS: UNA REVISIÓN SISTEMÁTICA DE LITERATURA

NATHALIA BORSATTO D'AGOSTIN, MSc. | UFSC – Universidade Federal de Santa Catarina, Brasil
VANESSA CASARIN, Dra. | UFSC – Universidade Federal de Santa Catarina, Brasil

ABSTRACT

The aging process entails changes that require attention to ensure the well-being of older people. The difficulty of families in offering support in the face of daily demands often leads them to search for care facilities. Although the rights to housing and well-being are legally guaranteed, the effective implementation of these rights is hampered by inadequate approaches by facilities, which often disregard the cognitive needs of older people. Given the influence of built spaces on quality of life, it is crucial to ensure that Long-Term Care facilities for Older Adults provide facilities conducive to successful aging. Although studies recognize the benefits of green spaces for older adults, integrating these elements in built environments can be better explored. This Systematic Literature Review (SLR) seeks to identify the preferences of older people regarding green spaces and natural elements in the architecture of Long-Term Care facilities. The research covers articles in the Science Direct, Scopus, and Web of Science databases. Results indicate a preference for comfortable, safe, accessible, familiar environments with vegetation and natural views. It is concluded that contact with nature is essential in the institutionalized experience of older people, thus reinforcing the importance of architectural adaptations sensitive to their preferences.

KEYWORDS

Elderly, Long-term Care Facilities for Older Adults; Green spaces; Natural elements.

RESUMO

O processo de envelhecimento acarreta mudanças que exigem atenção para assegurar o bem-estar das pessoas idosas. A dificuldade das famílias em oferecer apoio diante das demandas diárias muitas vezes leva à busca por instituições de acolhimento. Apesar de os direitos à habitação e ao bem-estar serem legalmente garantidos, a implementação efetiva desses direitos é prejudicada por abordagens inadequadas das instituições, que muitas vezes desconsideram as necessidades cognitivas das pessoas idosas. Dada a influência dos espaços construídos na qualidade de vida, é crucial garantir que as Instituições de Longa Permanência para Idosos proporcionem instalações propícias ao envelhecimento bem-sucedido. Embora estudos reconheçam os benefícios dos espaços verdes para as pessoas idosas, a integração desses

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elementos em ambientes construídos é pouco explorada. Esta Revisão Sistemática de Literatura (RSL) busca identificar as preferências das pessoas idosas quanto aos espaços verdes e elementos naturais na arquitetura de Instituições de Longa Permanência. A pesquisa abrange artigos nas bases Science Direct, Scopus e Web of Science. Resultados indicam a preferência por ambientes confortáveis, seguros, acessíveis, familiares, com vegetação e vistas naturais. Conclui-se que o contato com a natureza é essencial na vivência institucionalizada de pessoas idosas, reforçando a importância de adaptações arquitetônicas sensíveis às suas preferências.

PALAVRAS-CHAVE

Pessoas idosas, Instituições de Longa Permanência para Idosos; Espaços verdes; Elementos naturais.

RESUMEN

El proceso de envejecimiento conlleva cambios que exigen atención para garantizar el bienestar de las personas mayores. La dificultad de las familias para ofrecer apoyo ante las demandas diarias a menudo lleva a buscar instituciones de acogida. Aunque los derechos a la vivienda y al bienestar están legalmente garantizados, su implementación efectiva se ve perjudicada por enfoques inadecuados de las instituciones, que frecuentemente ignoran las necesidades cognitivas de las personas mayores. Dada la influencia de los espacios construidos en la calidad de vida, es crucial asegurar que las Instituciones de Larga Permanencia para Ancianos proporcionen instalaciones propicias para un envejecimiento exitoso. Si bien estudios reconocen los beneficios de los espacios verdes para las personas mayores, la integración de estos elementos en entornos construidos está poco explorada. Esta Revisión Sistemática de Literatura (RSL) busca identificar las preferencias de las personas mayores respecto a espacios verdes y elementos naturales en la arquitectura de Instituciones de Larga Permanencia. La investigación abarca artículos en las bases Science Direct, Scopus y Web of Science. Los resultados indican una preferencia por entornos cómodos, seguros, accesibles, familiares, con vegetación y vistas naturales. Se concluye que el contacto con la naturaleza es esencial en la vivencia institucionalizada de las personas mayores, reforzando la importancia de adaptaciones arquitectónicas sensibles a sus preferencias.

PALABRAS CLAVE

Personas mayores; Instituciones de Larga Permanencia para Ancianos; Espacios verdes; Elementos naturales.

1. INTRODUCTION

The aging process carries several transformations related to the biological, psychological, and social spheres. They demand attention (ARAÚJO, 2007) since the quality of life of older people is closely linked to the ability to overcome these changes that accompany aging, either autonomously or with the support of family members (LIMA; LIMA; RIBEIRO, 2010). This issue plays a crucial role in promoting the well-being of older people since, due to daily demands and professional obligations, families often face difficulties in providing the necessary support, sometimes resulting in the search for care facilities.

The right to housing for older adults is guaranteed by instruments such as the 1988 Constitution and the 2003 Statute of the Elderly, which stand out for ensuring decent housing for this population, whether within the family or in public or private facilities. Among the facilities that provide this housing support are the Long-Term Care Facilities for Older Adults (LTCFs), characterized by Anvisa's Collegiate Board Resolution No. 502 as a modality of care that aims to guarantee, in addition to a welcoming environment, the respect and preservation of the identity and autonomy of the older person (Anvisa, 2021).

Even though they are guaranteed from a legal perspective, the effective implementation of the rights to housing and well-being of older adults remains inadequate due to factors such as negligence in the treatment of this population segment (FERNANDES; SOARES, 2012), as well as issues related to the facilities themselves that sometimes adopt an approach focused exclusively on the provision of care services, relegating the cognitive needs of the older person (JÚNIOR *et al.*, 2019). Because it is historically marked by these negative reports about care for older people, the institutional modality is not yet entirely accepted as adequate social support (DEZAN, 2015).

The guarantee of a healthy and autonomous old age depends on how the older person can interact with the spaces they attend. Thus, the concern with the relationship of the older person with the environment is of paramount importance since the planning of the built environment is what will ensure the quality of life in the aging process (JÚNIOR; ARÊAS; ARÊAS; BARBOSA, 2013). Hence, it is essential to ensure that LTCFs are supported by facilities that preserve health and guarantee the comfort and safety of this group, aiming at successful aging (CAMARANO; KANSO, 2010).

When exploring the interaction between individuals and the environment, several investigations seek to examine the connection between green areas and the quality of human life. Among them, the analyses by Maas, Verheij, Vries, Spreeuwenberg, Schellevis, and Groenewegen (2009) about medical reports from hospitals in the Netherlands stand out, revealing that people who live near green spaces are less likely to contract diseases. These findings are supported by studies conducted in Japan, the Netherlands, and the United Kingdom, indicating that vegetation exposure is associated with reduced blood pressure and a greater production of white blood cells (BRASIL, 2016). These data are fostered by research by Gitlin (2003) and Leith (2006) that reinforces the importance of nature to ensure a healthy and independent old age.

Although several studies highlight the universally recognized positive impacts of green spaces for humans, especially for older adults, studies investigating the integration of these environmental elements in built environments, such as LTCFs, are scarce. Therefore, this Systematic Literature Review (SLR) aims to identify older people's preferences regarding green spaces and natural elements in the architectural configuration of LTCFs, helping to verify the biopsychosocial aspects of older people in the context of the relationship between aging, green spaces, and quality of life.

2. METHODOLOGY

This SLR aims to answer the following research question: What do older people prefer concerning green spaces and natural elements in the architectural configuration of Long-Term Care Facilities for Older Adults?

The inclusion criterion adopted for selecting the articles was to consider studies that address the relationship between older people, institutionalized or not, and vegetation and/or natural elements in architecture, and of these, articles in journals and with institutional signature. Notably, to collect references on aspects related to the aging process and the benefits that nature may bring to older people, some studies that were not conducted with institutionalized older people were also considered in this review.

As exclusion criteria, the following topics were considered: a) articles addressing the relationship between older people and animals (assisted therapy), b) sustainability and accessibility in long-term care facilities, c) relationship of

the older person with the community, d) articles addressing "aging in place"; e) the benefits of physical activity for older people, f) articles that did not have the older person as a group to be studied, g) the housing market for older people, and h) literature review articles.

The search was performed without any temporal limitation through the Science Direct, Scopus, and Web of Science databases in August 2023 from the following search string: ("homes for the aged" OR "old age home" OR "old age homes" OR "residential aged care facility" OR "long-term care facilities" OR "senior housing") AND ("biophilia" OR "green space" OR "natural elements in architecture").

Zotero Software was used as a support tool for filtering and extracting content from the selected articles. The selection process of the articles took place in two phases, initially with the analysis of the titles and abstracts of the collected articles, followed by their full reading. The articles were included or excluded in the preliminary stage based on the eligibility criteria adopted. After this screening, the articles that met the inclusion criteria were examined fully for a comprehensive analysis of their contents. Then, the articles selected in the second phase had their content tabulated in order to extract essential information for a better understanding of the selected studies, such as a) year of publication, b) article title, c) authors, d) test population, e) place of research application, f) research gap, g) objective, h) methodology, i) results found, and j) discussion.

3. RESULTS

The Science Direct, Scopus, and Web of Science databases search string found 403 articles. After reading the titles and abstracts of each of the articles found, 33 articles with potential for inclusion were accepted. In the second round of evaluation, after reading the articles in full, 17 articles met all the inclusion criteria. The filtration process presented can be observed through the following flowchart:

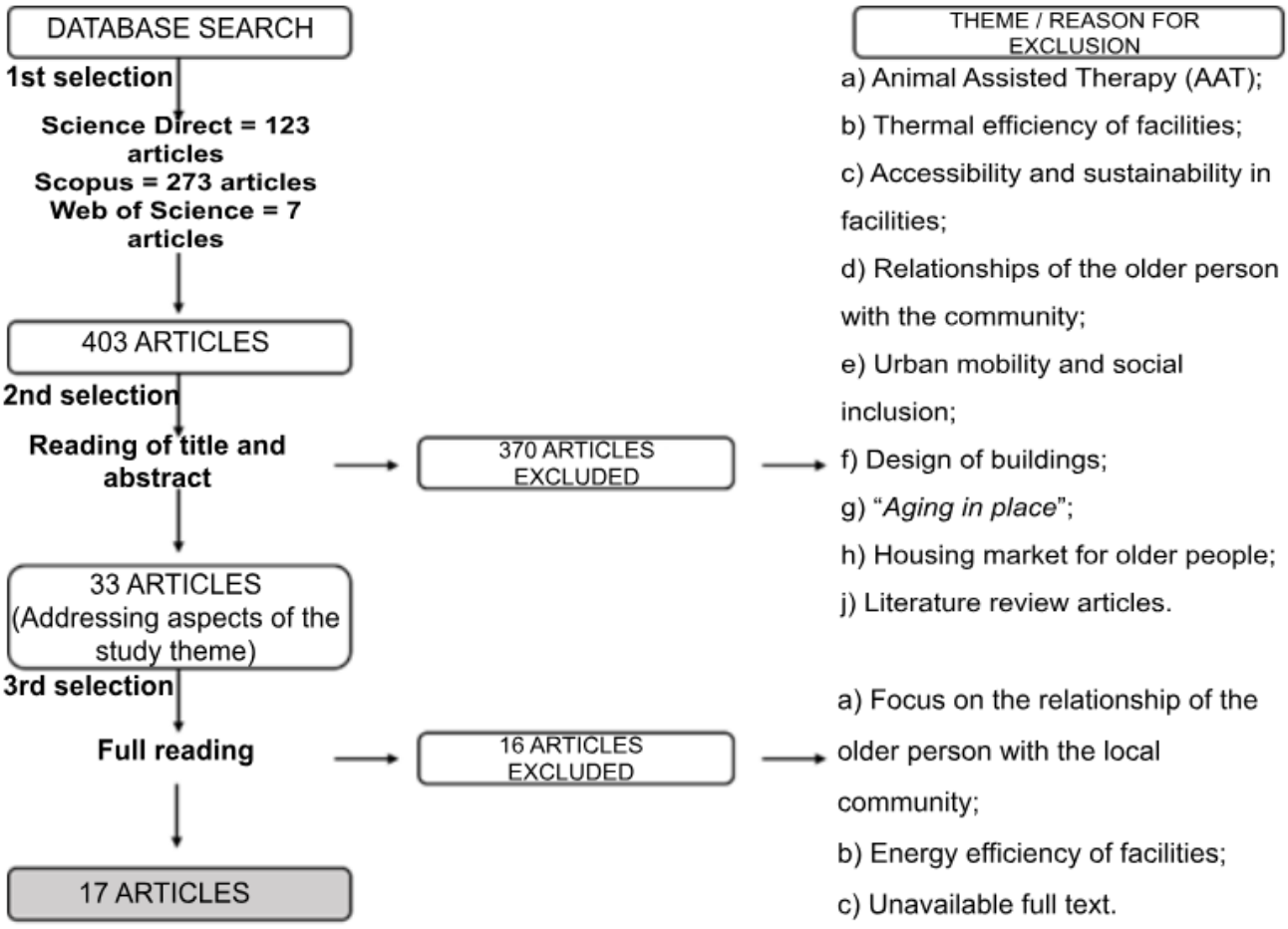

Figure 01 – Flowchart of the SLR stages.
Source: Authors.

The articles not included in a general analysis involve studies that mainly address: Animal Assisted Therapy (AAT), observing the relationship of the older person with animals; issues related to thermal efficiency, sustainability, accessibility, and design of facilities to support the older person; the relationship of the older person with the local community and their ways of appropriating urban green spaces, relating issues about urban mobility and social inclusion in the community; research aimed at "aging in place," a term that can be defined as "[...] ability to age in a stable environment and aims to enable older adults to maintain independent living circumstances in their own home." (TISSOT, 2022); benefits of physical activity for older people, involving the relationship with the urban environment; real estate market, focusing on the social inclusion of the older person; literature review articles; articles with unavailable full text. Articles that passed the third selection stage were read in full and evaluated using a data extraction form. Table 01 summarizes the 17 selected articles with their main contents tabulated.

Authors	Location / Year	Objective	Methods	Sample	Main results
A. R. Kearney; D.I Winterbottom	United States (2005)	To investigate how nature is related to the psychological well-being and quality of life of residents in Long-Term Care Facilities.	Interview	40 older adults from 3 different facilities	Residents value access to green spaces and derive benefits from those spaces, but they spend relatively little time in those environments.
S. D. Rodiek; J. T. Fried	United States (2005)	To investigate the visual preferences of images that portray different environmental conditions of Long-Term Care Facilities.	Visual preferences	133 older adults from 14 different facilities	Residents preferred the characteristics of the modified images with the prevalence of plant elements, such as viewing for nature and garden furniture.
A. Bengtsson; C. Hägerhäll; J.Englund; P. Grahn	Sweden (2015)	To discover the ideal composition of outdoor environmental factors in homes for older people.	Semantic description of the environment	26 older adults and 26 staff from 3 different facilities	The environment that came closest to the ideal environment was a park environment, larger and with greater vegetation variation than the other environments.
L. Reynolds	United States (2016)	To examine how older people value nature, how they use the outdoor spaces of the garden, and what personal factors influence their use of the gardens.	Interview, focus group, and behavior mapping	32 older adults from 2 different facilities	The views of nature are of fundamental importance for the well-being of the older residents; in addition, access to nature influences the choice of facilities.
V. Cerina; F. Fornara; S. Manca	Italy (2017)	To analyze the effects of the design characteristics of residential facilities on the psychosocial responses of older people.	Visual preferences and questionnaire	192 non-institutionalized older adults	Equipment characterized by a certain architectural style and surrounded by green spaces can increase older people's comfort and satisfaction levels.

Authors	Location / Year	Objective	Methods	Sample	Main results
K. Strout; J.Jemison; L. O'Brien; D. Wihry; T. Waterman	United States (2017)	To evaluate the feasibility of installing gardens in homes for low-income older people and assess the effects of gardening on nutrition and cognitive outcomes.	Focus group and application of the "Mini-Mental State Examination (MMSE)" and "Mini Nutritional Assessment (MNA)"	10 older adults living in a private housing project	Participants increased their protein, vegetables, and water intake, demonstrating improvements in health and cognition. They expressed a desire to expand the study to include indoor gardening during the winter months.
C. K.Y. Lai; R. Y.C. Kwan; S. K.L. Lo; C. Y.Y. Fung; J.n K.H. Lau; M. M.Y. Tse	China (2018)	To examine the effects of horticultural therapy on the psychosocial well-being of nursing home residents.	Behavioral And Comparative Observation	111 older adults from 4 different facilities	Horticultural therapy has been shown to be effective in promoting subjective happiness for older people. Its favorable effect suggests that horticultural therapy should be used to promote psychosocial well-being.
X. Wang; S. Rodiek	China (2019)	To explore common landscape and "hardscape" features to learn which ones users prefer.	Visual Preferences	283 non-institutionalized older adults	Small gender differences in visual preferences and increased preference for seat access with advancing age were found.
C. Freeman; D. L. Waters; Y. Buttery; Y. Van Heezik	New Zealand (2019)	To explore the impacts of age-related health conditions of older people on connection with nature and identify the types of connections with nature and green spaces.	Photographic voice and Geographic Information System	72 older adults, with only 13 living in *facilities *Unspecified Quantity	Older people valued the ability to engage with nature and, even when limited by health, still valued contact through the care of small gardens and potted plants. The loss or reduced contact with nature can be deeply felt by them.
M.H. E. M. Browning; K. Lee; K. L. Wolf	United States (2019)	To examine the relationship between green space coverage and depressive symptoms in older people living in care facilities	Tree cover mapping and mental health data collection	30 facilities *Unspecified number of older people	An inverse relationship between tree canopy cover and depressive symptoms was observed. Homes for older people should invest in nature-based therapy to improve the mental health of residents.

Authors	Location / Year	Objective	Methods	Sample	Main results
M. Elsadek; Y. Shao; B. Liu	China (2021)	To investigate the impacts of physiological relaxation from the visualization of bamboo images.	Visual stimuli and questionnaire	34 non-institutionalized older adults	Visual stimulation with a bamboo image significantly decreased the heart rate of older people. Indirect contact with nature enhances physiological and psychological conditions.
W. Peng; H. Shi; Mengying Li; Xinghui Li; T. Liu; Y. Wang	Shanghai (2021)	To explore the associations between exposure to green areas and geriatric depression among older people.	Interview	1.066 non-institutionalized older adults	Higher residential exposure to vegetation is significantly associated with a lower prevalence of geriatric depression.
C. H.Hsieh; C. M. Chen; J. Y. Yang; Y. J. Lin; M. L. Liao; K. H. Chueh	Taiwan (2021)	To explore the physiological and psychological benefits of immersive garden experiences.	Virtual reality device, interview, and use of physiological data sensor	14 older adults living in *facilities *Unspecified quantity	Continuous trend of decreasing heart rate throughout the experiment, meaning participants felt calmer after the experience, which brought short-term cardiovascular and psychological benefits and helped relieve stress.
W. Noor Anira W. A. Yaacob; N. H. M. Hussain; N. M. Nayan; M. Abdullah; M. Z. Teh	Malaysia (2022)	To investigate the care requirements of older people with green gardens to support their active aging and green garden design preferences.	Interview and use of the observation tool entitled "Senior Outdoor Survey (SOS)"	16 older adults and 4 staff from 1 facility	Landscaping design considerations in green gardens were identified as prominent in the preferences of older people in homes intended for this population.
T.Sugiyama; A. Carver; M.Sugiyama; A. Lorenzon; T. E. Davison	Australia (2022)	To examine associations of views of vegetation in residential facilities for older people with changes in multiple measures of psychological well-being.	Interview and behavioral observation	52 older adults from 13 different facilities	The results revealed changes in depression, stress, anxiety, and quality of life of older people. The visible vegetation of the common areas beyond the perimeter of the equipment contributed favorably to the residents' stress and quality of life.

Authors	Location / Year	Objective	Methods	Sample	Main results
V. S. Klemenci; V. Ž. Leskovar	Slovenia (2022)	To analyze the importance of green areas in creating an inclusive living environment for older people during COVID-19, in addition to detecting a possible correlation between outdoor areas and the risk of infection.	Use of the "Secure and Connected" tool	259 older adults from 3 different facilities	Accessibility to outdoor space plays a key role in physical health and well-being. The presence of rooms with balconies and terraces, eye contact with outdoor areas, and more open spaces and green areas are associated with fewer infections.
J. Guo; S. Yanai; T.Kodama	Tokyo (2022)	To examine the effects of the characteristics and perceptions of community gardens on the frequency of gardening activities, the absence of leisure activities, and the attitudes of facility managers towards gardening activities.	Questionnaire	44 managers of *facilities *Unspecified quantity	The use of vegetable gardens was positively associated with the number of equipment and the absence of barriers. The availability of support affected residents' ability to use the gardens. The most important benefits were the pleasure of cultivating and harvesting and promoting interaction and health.

Table 01: Synthesis of the selected articles
Source: Authors.

From tabulating the selected articles, one can perceive that the issues about the preferences and behaviors of older adults concerning contact with green spaces and natural elements in facilities, in their own homes, or even through community gardens were addressed with greater emphasis from 2019, and 10 out of the 17 articles were published in the last five years (2019 to 2023). It highlights the relevance of this field of research, in addition to the limited exploration of the subject in Brazil in articles indexed in these databases covered, given the lack of articles produced in the country addressing this theme.

3.1 Location of the studies

Seven studies from this group were conducted in Asia, four of them, in particular, in China; five in North America, all of them in USA; three in Europe and two in Oceania. South America did not appear in studies from databases selected.

3.2 Analysis of objectives

When verifying the objectives of each study, it was possible to divide them into 3 groups with different focuses and directions. The first group, composed of 4 articles, addresses visual, environmental and design preferences of older adults about the built spaces and the landscapes. The second group, composed of 10 articles, is formed by studies that seek to relate nature to the quality of life and health, investigating how older people value green spaces and what benefits come from this contact with nature. Finally, the third group, composed of 3 articles, presents studies exploring the indirect contact that can be established with nature and how this strategy can benefit older people.

In the first group are located the studies by Rodiek e Fried (2005); Bengtsson, Hägerhäll, Englund, and Grahn (2015); Cerina, Fornara, and Manca (2017); Wang and Rodiek (2019), which propose to investigate the visual preferences and composition of environmental factors of older people in LTCFs, in the outdoor environments of

these facilities, in the design of buildings, and common landscapes and "hardscapes," respectively.

In the second group, we highlight the studies by Kearney and Winterbottom (2005), Reynolds (2016), Strout, Jemison, O'Brien, and Waterman (2017), Lai, Kwan, Lo, Fung, Lau, and Tse (2018), Freeman, Waters, Buttery, and Heezik (2019), Browning, Lee, and Wolf (2019), Peng, Shi, Li, Li, Liu, and Wang (2021), Yaacob, Hussain, Nayan, Abdullah, and Teh (2022), Klemencic and Leskovar (2022), and Guo, Yanai, and Kodama (2022), which have, in general, objectives to examine how nature relates to psychological well-being, quality of life, health, and active aging of older people, how older people value nature, what are the effects of gardening, community gardens, and horticultural therapy on nutrition, cognition, and well-being of older people and to examine the relationship between vegetable covers, green areas, depressive symptoms.

In the third group are located the studies by Elsadek, Shao, and Liu (2021); Hsieh, Chen, Yang, Lin, Liao, and Chueh (2021); Sugiyama, Carver, Sugiyama, Lorenzon, and Davison (2022), which investigate the impacts of psychological well-being from the visualization of bamboo images, explore the physiological and psychological benefits of immersive experiences in gardens, and analyze the impact of views of outdoor vegetation in residential facilities for older people, respectively, investigating the indirect contact of the older person with nature.

3.3 Means of publication and methodological strategies

Regarding the means of publication, journals related to the fields of housing for older adults and for aging, landscaping and urbanism, environmental science and pollution, medicine, environmental research and public health, design of health environments, community health nursing, and city planning stand out, with no great uniformity in journals. Among the methodological strategies, it was possible to identify a predominance of interviews (n=5), followed by the visual preferences method (n=3), questionnaire (n=3), behavioral observation (n=2), focus group (n=2), visual stimuli (n=2), mapping of tree cover or vegetation (n=2), comparative observation (n=1), behavior mapping (n=1), photographic voice (n=1), geographic information system (n=1), psychological examinations (n=1), semantic description of the environment (n=1), "Senior Outdoor Survey (SOS)" tool (n=1), "Secure and Connected" tool (n=1), "Mini-Mental State" tool (n=1), and "Mini Nutritional Assessment (MNA)" tool (n=1). Among the 17 articles, 6 applied a single methodology, 9 applied two methodologies, and only 2 studies applied three methodological strategies.

3.4 Research subjects

Among the 17 articles analyzed, 16 had older adults as their target group, and only one dealt with the perspective of managers of the facilities on the behavior of the older residents. Regarding these 16 studies, 11 worked with institutionalized older people, and, of these, only 2 also considered the employees of said facilities for data collection.

Among the 5 articles that did not consider institutionalized older adults, the following studies stand out: Cerina, Fornara, and Manca (2017), which analyzed the psychosocial responses of the older population on the design characteristics of facilities, having interviewed 192 older adults who were recruited voluntarily in places such as urban parks, shopping malls, and squares, located in different places in the city of Sardinia, Italy; Strout, Jemison, O'Brien, Wihry, and Waterman (2017), who evaluated the feasibility of installing gardens in a private housing complex; Xinxin Wang, and Susan Rodiek (2019), who evaluated the landscape preferences of 283 older adults who walked through urban parks in the city of Nanjing, China; Mohamed Elsadek, Yuhan Shao, and Binyi Liu (2021), who measured the impact of indirect natural stimuli on the physiological and psychological states of 34 older volunteers; and Peng, Shi, Li, Li, Liu, and Wang (2021), who conducted a cross-sectional survey among people older adults living in urban areas of Shanghai city.

3.5 Main results found

Analyzing the articles again in 3 different groups, the first group is characterized by addressing the visual preferences of older people, the second is formed by studies that seek to relate nature to the quality of life and health, and the third group is characterized by articles that explore the indirect contact between nature and older people, it is possible to highlight the main results found by these 3 dimensions of studies.

3.5.1 Visual preferences

Among the articles that form the first group is the photographic comparison study by Rodiek and Fried (2005), which demonstrated that institutionalized older adults prefer photographs that represent conditions that have been identified as encouraging outdoor use, such as abundance of paths, comfort, abundance of vegetation, access to views beyond the limits of the facility, presence of windows, and preview of outdoor spaces. The fact that the least preferred images in the study portray the real conditions of the facilities suggests that facilities could be designed more efficiently to support the behavioral needs of older people for outdoor access.

The study by Bengtsson, Hägerhäll, Englund, and Grahn (2015), on the other hand, showed that both older adults and the employees of the facilities prefer outdoor environments that are not very open and not very closed in order to generate a certain level of security and privacy, but at the same time, to guarantee the visualization beyond the limits of the facility, in order not to create the feeling of enclosure. In this study, the authors concluded that the outdoor environments in facilities for older people should offer a uniform balance, without extremes in the forms and content of their elements, ensuring recognition and familiarity by the resident older person. In contrast, originality must also be present, characterizing a stimulating environment.

Also, about the group characterized by addressing visual preferences, there is the study by Cerina, Fornara, and Manca (2017), who demonstrated that older people expressed more positive evaluations for residential facilities with an architectural style similar to a house that provides a feeling of "being at home" and continuity with their own place identity. Regarding green spaces, it was possible to identify a preference for places with vegetation, noting a more positive attitude towards short-term relocation and a decreased feeling of broken attachment to home.

Finally, the study by Wang and Rodiek (2019) found that when comparing digitally modified photographs of the same park environment, which represented 7 different environmental conditions, the research participants especially preferred "ground cover plants," suggesting a preference for observing continuous vegetation along the paths instead of barren lands, followed by "bench with back and arm support" and "colored flowers." The "available seats" feature was preferred over features that include "plant diversity," followed by "visual accessibility" and "canopied trees." Regarding the images that portrayed "visual accessibility," the participants preferred the views of water elements more than those that allowed viewing of grassy areas. All 7 environmental conditions that depicted natural elements and urban furniture were significantly preferred by participants over images that did not feature any of these features.

3.5.2 Nature and quality of life

Among the articles that form the second group, characterized by relating nature to the quality of life and health, is the Kearney and Winterbottom (2005) study, which collected data about the daily lives of 40 institutionalized older people, who indicated that the outdoors makes them feel mentally and physically better. Other benefits mentioned were the fact that they felt invigorated, the possibility of moving away from the facilities, the possibility of meeting people, the change in attitude or perspective, the feeling of longing, exposure to the sun, and the healing effect. Regarding the views from the windows, residents stated that they like to view gardens, plants, birds, people, and landscapes, in addition to viewing the climate, wild and pet animals, and the sky. The authors also suggest guidelines for designing gardens in facilities for older people, such as providing easy access to nature, ensuring the diversity of vegetation, maximizing opportunities for passive interactions with nature, optimizing window views, and taking advantage of nearby green spaces.

Emphasizing the intrinsic relationship between older people and nature, in the study by Reynolds (2016), the value that participants reported having for nature was described as an affinity with life, and plants were perceived almost as people. According to the author, it seemed comforting for older adults to care for plants, a role very similar to the family routine of caring for children and grandchildren, as if they were affirming their self-identity and competence from significant activities, such as gardening. From the results, it was possible to perceive that although a well-designed and planned garden is ideal for promoting the active involvement of older people, ensuring an outdoor environment that provides a connection with the natural processes of life, such as growing plants, animals interacting with nature, seasonal changes in plants, and blooming flowers, can also be critical.

Regarding plant care and examining the effects of the characteristics and perceptions of community gardens on the frequency of gardening activities, the absence of leisure activities, and the attitudes of facility managers toward gardening activities, Guo, Yanai, and Kodama (2022) found that the most important benefits of this practice were the improvement of health, the promotion of social interaction, and the pleasure of cultivating and harvesting. The study also showed that the tendency to attend and perform activities in community gardens is directly associated with barrier-free design elements, the variety of types of equipment, the area occupied by the garden, interaction, community aesthetics, and a sufficient number of participating members. Moreover, the study pointed out that the availability of support from employees, volunteers, and family members affected the ability of older people to access and use the community garden. This issue is aggravated by the fact that, many times, these spaces are the only means that residents have to be in contact with nature.

Following the theme of activities conducted with nature, Strout, Jemison, O'Brien, and Waterman (2017) assessed the effects of gardening on the nutrition and cognition of older people. They found that the study participants increased their protein intake and consumption of vegetables and water, in addition to demonstrating improvement in self-assessment of health and nutritional status. The scores of participants on the Mini-Mental State Examination (MMSE) tool improved over the 17-week intervention. This was followed by a significant improvement in social interactions through joint garden care and sharing surplus vegetables with others. Finally, the older adults participating in the intervention also found a desire to expand the study to include indoor gardening during the winter months, which demonstrates the need to adapt indoor spaces to accommodate activities and elements that may be connected with nature.

Presenting different data, the research by Lai, Kwan, Lo, Fung, Lau, and Tse (2018) with institutionalized older adults who performed horticultural activities shows that only the score of the "Subjective Happiness Scale" had a significant interaction effect and that there was a downward trend in the mean score of the "Geriatric Depression Scale." The authors state that the findings provide preliminary support for the biophilia hypothesis and that horticulture should be used to promote the psychosocial well-being of the most frail older people, but that although previous studies report that horticulture can improve many psychosocial problems, health parameters, and quality of life in frail older people, the results of the present study did not show such positive effects, except for the report of participants on subjective happiness.

Regarding the importance of nature for older people, Freeman, Waters Buttery, and Heezik (2019), in their survey of 72 older adults in New Zealand, found that 90% rated nature as 4 or 5 on a scale of 1 to 5. All participants who experienced a certain fragility in their health reported actively seeking natural experiences, even if only through a window view. Older people especially valued this element and reported having their favorite windows. Therefore, the authors point out that homes for older adults should be designed with a view to green spaces and/or natural resources since these views can be the main or only way to engage with nature. These data corroborate the results of Kearney and Winterbottom (2005). Additionally, it should be noted that when a change in health resulted in the loss of access to the garden and the ability to practice gardening, this was felt in a deeply negative way since, for many, socialization and green space are closely linked.

In line with the theme of proximity to vegetation, the study by Browning, Lee, and Wolf (2019), who examined the relationship between green space coverage and depressive symptoms in institutionalized older people, obtained results that demonstrated inverse associations between the percentage of tree canopy coverage in the vicinity of facilities and the percentage of residents who were depressed. According to the analyses, this association becomes weaker as the vegetation is further away from the facility. Combined with previous work, this study provides early evidence that homes for older people should invest in nature-based therapy to improve the mental health of residents.

Related to these results is the research by Yaacob, Hussain, Nayan, Abdullah, and Teh (2022) that confirmed that going to the green space was perceived as good for the mind and self-satisfaction of employees and older people, who consider it essential to see plants and observe nature. Participants exposed to outdoor garden space also had lower scores for feelings of anger and fear. It was possible to conclude that the most necessary items for the for the garden in the care facility were the abundance of vegetation since older adults showed a significant correlation between vegetation and safety, as well as easily accessible or elevated plants and seats with a pleasant view.

Peng, Shi, Li, Li, Liu, and Wang (2021) explored the associations between exposure to green areas and geriatric depression, obtaining results that suggest that greater residential exposure to vegetation is significantly associated with a lower prevalence of depression.

In the study on the importance of green areas during the COVID-19 period, Klemenci and Leskovar (2022) presented different situations for the 3 facilities analyzed since only two had generous green areas that allowed a variety of passive and active uses by older people. These two facilities also stood out for having more rooms with balconies and terraces, eye contact with outdoor areas, and, mainly, for being associated with fewer infections. The facility with the worst situation in terms of outdoor space was the one with the highest degree of infections among residents. In this sense, the authors confirmed that, among many other factors, accessibility to outdoor space plays a key role in the physical health and well-being of residents of homes aimed at older adults.

3.5.3 Indirect contact with nature

Regarding the research that forms the third group, characterized by articles that explore the indirect contact between nature and older people, there is the study by Elsadek, Shao, and Liu (2021), who demonstrated that after viewing bamboo images, older people presented higher scores for the feeling of comfort, relaxation, and joy. The results also showed that participants were more alert and focused when viewing bamboo images than urban images. Bamboo images resulted in a slight decrease in sympathetic nerve activity, thus relieving stress and promoting well-being. The study provides scientific evidence of the benefits of indirect contact with nature, and it is possible to conclude that people who cannot have direct contact with green spaces can obtain similar benefits by making contact indirectly.

Corroborating the findings, the research by Hsieh, Chen, Yang, Lin, Liao, and Chueh (2021), which sought to explore the physiological and psychological benefits of immersive garden experiences, found that there was a continuous trend of decreasing heart rate throughout the experiment, meaning the emotions of the 14 participating older people changed from a state of excitement, in the pre-test phase, to a calmer state. The authors state that after summarizing the interviews, it was found that the videos watched by the participants recalled their past and allowed them to relive happy moments, in addition to relieving stress. The results prove that the virtual reality device provided an alternative outdoor experience for older people who could not leave the nursing home due to COVID-19, bringing positive emotions even for residents with dementia, who became calmer and more stable.

In contrast to these studies, there is the study by Sugiyama, Carver, Sugiyama, Lorenzon, and Davison (2022) that sought to examine the relationship between the visualization of vegetation from dormitories and common areas and the levels of depression, stress, anxiety, and quality of life of recently admitted older people in care facilities. The results indicate that the amount of vegetation within the limits of the facilities, visible from common areas, was not associated with depressive symptoms or anxiety, but was adversely associated with stress and quality of life. The presence of vegetation in the participant's dormitory was not associated with any result, which may be related to the small presence of visible vegetation in this location.

According to the authors, possible explanations for the unexpected discoveries relate to the fact that residents may feel frustrated if they are not allowed to access the garden areas. In addition, vegetation quality plays a key role since some facilities have neglected or very dark gardens shaded by adjacent buildings. However, viewing vegetation beyond the perimeter of the facilities was associated with a lower increase in stress levels, a decrease in anxiety, and an improvement in quality of life. The results suggest, therefore, that viewing vegetation outside the limits of the facilities can protect against the decline of the psychological well-being of the residents.

4. DISCUSSION

From a comparative analysis, it was possible to observe that research related to visual preferences indicates a predilection of older people for comfortable, safe, (physically and visually) accessible, familiar environments that offer a uniform balance between their forms and content of their components and with the presence of vegetation and windows that offer the visualization of these elements. Rodiek and Fried (2005) found that older adults prefer images of encouraging outdoor spaces, while Bengtsson, Hägerhäll, Englund, and Grahn (2015) preferred moderately open outdoor environments, offering security and views beyond the facilities. Cerina, Fornara, and Manca (2017) revealed a preference for residential facilities with an architectural style similar to

a house, providing a sense of familiarity, while Wang and Rodiek (2019), by focusing on aspects related to parks, found that older people prefer continuous vegetation, benches, and colorful flowers in outdoor environments, also valuing natural elements and urban furniture.

Regarding research that seeks to relate nature and quality of life, the physical and mental well-being aspects that contact with green spaces can bring stand out. All studies reported great satisfaction from older people when in contact with nature, even from visualizing vegetation through windows, emphasizing the innate connection between humans and the natural environment, even from indirect contact. Kearney and Winterbottom (2005) revealed that the outdoors brings mental and physical benefits, while Reynolds (2016) highlighted the affinity of older people with nature, especially through gardening. Regarding horticultural therapies, Guo, Yanai, and Kodama (2022) identified the benefits of gardening for health and social interaction, emphasizing the importance of accessible design in gardening areas. Strout, Jemison, O'Brien, and Waterman (2017) observed improved nutrition and cognition through gardening, and Lai, Kwan, Lo, Fung, Lau, and Tse (2018) associated horticulture with subjective happiness.

Fostering the theme, there is the research by Freeman, Waters Buttery, and Heezik (2019), who showed the active search for natural experiences, emphasizing the importance of window views for green spaces, in addition to Browning, Lee, and Wolf (2019) who found an inverse relationship between vegetation cover near facilities and depressive symptoms. Yaacob, Hussain, Nayan, Abdullah, and Teh (2022) highlighted the mental benefits of exposure to green areas, while Peng, Shi, Li, Li, Liu, and Wang (2021) associated green areas with improved physical and mental health, including geriatric depression, data emphasized by Klemenci and Leskovar (2022) that highlighted the importance of access to green areas during the COVID-19 pandemic for the physical health and well-being of institutionalized older adults. In general, these studies emphasize the need to design accessible and green outdoor spaces and promote activities of contact with nature to improve the quality of life and health of older people.

Among the research in the third group, which explores the indirect contact between nature and older people, Elsadek, Shao, and Liu (2021) found that viewing bamboo images resulted in greater comfort, relaxation, and joy, in addition to reducing stress and promoting well-being, suggesting that indirect contact with nature can bring similar benefits to direct contact. Hsieh, Chen, Yang, Lin, Liao, and Chueh (2021) observed a reduction in heart rate and calmer emotions in older people after immersive garden experiences through virtual reality, providing an outdoor alternative for those who could not leave due to COVID-19. However, Sugiyama, Carver, Sugiyama, Lorenzon, and Davison (2022) found that the amount of vegetation visible within the facilities was not associated with depressive symptoms or anxiety, but rather with stress and quality of life. On the other hand, the visualization of vegetation outside the facilities was linked to an improvement in the psychological well-being of the residents.

The discussions reveal the complexity of the relationships between older adults and nature, highlighting the importance of varied approaches that include both the design of outdoor spaces and residential facilities and the promotion of activities that provide direct or indirect contact with nature, given that it is not always possible to guarantee direct access to green areas, especially in contexts where the older person is frail. Ultimately, research suggests that ensuring access to nature and incorporating natural elements into residential environments can play a key role in promoting the physical, emotional, and social well-being of older people, and it is essential to consider individual preferences and the cognitive and physical capacities of this group when designing spaces and promoting activities.

5. CONCLUSION

This systematic literature review sought to identify the preferences of older adults concerning green spaces and natural elements in the architectural configuration of Long-Term Care Facilities for Older Adults. The systematization of the selected articles made it possible to reflect on the theme from 3 research axes: visual preferences, nature and quality of life, and indirect contact with nature.

In analyzing the subjects participating in the studies, it was possible to identify that 16 studies had older adults as their target group. At the same time, only one dealt with the perspective of the facilities managers. Of these 16 studies, 11 worked with the institutionalized group; of these, only two also considered the employees of said facilities for data collection. This inclusion could open other perspectives on the theme, given that it is a group closely related to the dynamics of Long-Term Care

Facilities and the experience of older people inserted in these spaces. Also, it is noteworthy to include, in future research and consider the circumstances of the sample, the family members of the institutionalized older person in order to enrich the research data by obtaining different perceptions and understandings about the facilities and the older person's well-being.

Regarding the methodological strategies, it was possible to identify a predominance of the application of interviews and the visual preferences method combined with questionnaires. The stimulus to conversation and measurement of visual preferences may be related to the greater ease of obtaining data from the referred group, which may present difficulty in participating in methods that include writing and locomotion, especially in the case of frailer older people.

The selected articles could be divided into three groups according to their different research focuses. In this sense, it was possible to point out three themes related to the objectives of each group, the first being characterized by investigating the visual preferences and composition of environmental and design factors that older people presented about built spaces and landscapes, the second formed by studies that seek to examine how nature is related to psychological well-being and quality of life, and the third group that presents studies that investigate the indirect contact of the older person with nature.

From the results presented and the proposed discussion, it is concluded that research related to visual preferences indicates a predilection for comfortable, safe, accessible, familiar environments with plenty of vegetation and views of natural elements. Among the research that seeks to relate contact with nature, directly and indirectly, and quality of life, only one does not present positive results regarding immediate proximity to vegetation. However, the other studies confirmed the aspects of physical and mental well-being that contact with green spaces can bring. It is pointed out that the divergent results may suggest specific issues regarding the particularities of the facilities that were the object of study of this research.

Notably, the contact established with nature is presented as an innate impulse to the human being, and green spaces play an essential role in the experience of the institutionalized older person, especially for the frailest, where this contact can be established through viewing outdoor spaces. Hence, it is vital to highlight that no study mentions the direct connection between built space and natural elements, either through materials, colors, shapes, or the very vegetation present inside the facilities, which could be of great value to older people who, due to health and mobility issues, sometimes spend more time inside the environments of the facilities and do not establish a direct and sufficient contact with nature to benefit from this connection. Therefore, the need to conduct more specific investigations on the subject is highlighted to foster the development of this study area and present more in-depth information on the experience of older people living in Long-Term Care Facilities.

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AUTHORS

ORCID: 0009-0005-6922-0217
NATHALIA BORSATTO D'AGOSTIN, Mestre em Arquitetura - UFSC - Universidade Federal de Santa Catarina - Programa de Pós-Graduação em Arquitetura e Urbanismo - Florianópolis, SC - Brasil. - Correspondência para: Rod. Domingos Peruchi, 48 - São Roque, Criciúma - SC, 88814-010 - e-mail: nathaliadagostin@gmail.com

ORCID: 0000-0002-4447-7869
VANESSA CASARIN, Dra. | Universidade Federal de Santa Catarina | Programa de Pós-graduação em Arquitetura e Urbanismo | Florianópolis, SC - Brasil | Correspondência para: Universidade Federal de Santa Catarina, Campus Reitor João David Ferreira Lima, CCE, Bloco A, Sala 106, CEP 88040-900 | E-mail: vanessa.casarin@ufsc.br

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