



Mix Sustentável

Biophilia in architecture: green spaces and natural materials in the architectural configuration of long-term care facilities for the elderly

A biofilia na arquitetura: espaços verdes e materiais naturais na configuração arquitetônica de instituições de longa permanência para idosos

Biofilia en la arquitectura: espacios verdes y materiales naturales en el diseño arquitectónico de centros de atención a largo plazo para personas mayores

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Abstract: The aging of the Brazilian population requires attention to biological, psychological, and social changes. Many families are unable to provide the necessary support, leading to the institutionalization of elderly individuals in Long-Term Care Facilities for the Elderly (LTCFs). The lack of integration of green spaces and natural materials in these environments compromises residents' well-being. Although studies highlight the benefits of these elements, little research has been conducted on their application in LTCFs. This study assesses the preferences of elderly individuals for green spaces and natural materials in the architectural configuration of LTCFs in Criciúma/SC. The research, with a qualitative and exploratory approach, included systematic observation of the physical environment at the institutions and in-depth interviews supported by images to evaluate visual preferences. The results indicated that older adults prefer green environments. Outdoor spaces are highly valued for providing freedom, socialization, and contemplation, whereas indoor spaces are valued for offering privacy. The presence of vegetation and natural elements is associated with emotional and physical well-being, evoking affectionate memories. Environments without connection with green spaces are considered unpleasant. Based on these findings, greater integration of green spaces and natural materials, especially wood, is suggested in the architecture of LTCFs.

Keywords: Elderly; long-term care institutions for the elderly; green spaces; natural materials.

Resumo: O envelhecimento da população brasileira exige atenção às mudanças biológicas, psíquicas e sociais. Muitas famílias não conseguem oferecer suporte necessário, levando à institucionalização da pessoa idosa em Instituições de Longa Permanência para Idosos (ILPIs). A falta de integração de espaços verdes e materiais naturais nesses ambientes compromete o bem-estar dos residentes. Embora estudos evidenciem os benefícios desses elementos, há pouca pesquisa sobre sua aplicação em ILPIs. Este estudo avalia a preferência da pessoa idosa por espaços verdes e materiais naturais na configuração arquitetônica de ILPIs em Criciúma/SC. A pesquisa, de abordagem qualitativa e exploratória, incluiu observação sistemática do ambiente físico das instituições e entrevistas amparadas por imagens para aferir preferências visuais. Os resultados indicaram que os espaços externos foram os mais valorizados pelos idosos, especialmente por proporcionarem liberdade, socialização e contemplação, enquanto os internos destacaram-se pela privacidade. A presença de vegetação e elementos naturais é associada ao bem-estar emocional e físico, evocando memórias afetivas. Ambientes em que não havia conexão com áreas vegetadas foram considerados mais desagradáveis. Diante disso, sugere-se maior integração de espaços verdes e materiais naturais à arquitetura das ILPIs.

Palavras-chave: Pessoas idosas; instituições de longa permanência para idosos; espaços verdes; materiais naturais.

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Author Contributions according to the CRediT Taxonomy

NBD: Conceptualization; investigation; methodology; visualization, formal analysis, writing –original draft and data curation.

VC: project administration, supervision; conceptualization; methodology; formal analysis; writing – review and editing.

Conflict declaration

Nothing to declare.

Resumen: El envejecimiento de la población brasileña exige atención a los cambios biológicos, psicológicos y sociales. Muchas familias no pueden brindar el apoyo necesario, lo que lleva a la institucionalización de las personas mayores en Centros de Cuidados a Largo Plazo para Personas Mayores (CPA). La falta de integración de espacios verdes y materiales naturales en estos entornos compromete el bienestar de los residentes. Si bien los estudios destacan los beneficios de estos elementos, existe poca investigación sobre su aplicación en CPA. Este estudio evalúa la preferencia de las personas mayores por los espacios verdes y los materiales naturales en el diseño arquitectónico de CPA en Criciúma, SC. La investigación, con un enfoque cualitativo y exploratorio, incluyó la observación sistemática del entorno físico de las instituciones y entrevistas con imágenes para evaluar las preferencias visuales. Los resultados indicaron que los espacios exteriores fueron los más valorados por las personas mayores, especialmente por brindar libertad, socialización y contemplación, mientras que los espacios interiores destacaron por su privacidad. La presencia de vegetación y elementos naturales se asocia con el bienestar emocional y físico, evocando recuerdos afectivos. Los entornos sin conexión con áreas con vegetación se consideraron más desagradables. Por lo tanto, se sugiere que los espacios verdes y los materiales naturales se integren mejor en la arquitectura de las instalaciones de atención a largo plazo para personas mayores.

Palabras clave: Personas mayores; centros de atención a largo plazo para personas mayores; espacios verdes; materiales naturales.

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1 INTRODUCTION

According to the Continuous National Household Sample Survey (PNADC), by the Brazilian Institute of Geography and Statistics (IBGE), the number of older people in Brazil exceeded 33 million in 2022, representing 15% of the population (IBGE, 2022b). Projections from the World Health Organization (WHO) indicate that, by 2050, this portion could reach 2 billion globally (WHO, 2017). In parallel, the IBGE estimates that, in Brazil, one in four citizens will be an older people person during this period (IBGE, 2022a). This sharp growth in the older people population brings urgent challenges and demands, especially regarding housing, quality of life, and the well-being of this population group.

Among the legal instruments created to guarantee the quality of life of older people, the Federal Constitution of 1988 and the Elderly Person Statute (formerly the Elderly Statute), established by Law No. 10,741 of October 1, 2003, stand out. This legislation guarantees the right to decent housing, whether within the family or in public or private institutions designed to accommodate this population.

Long-Term Care Facilities for the Elderly (LTCFs), regulated by Collegiate Board Resolution No. 502 of Anvisa, are spaces intended for housing people aged 60 or over, with or without family support. These institutions must guarantee respect for the rights of older people, preserve their identity and autonomy, and provide a welcoming environment (ANVISA, 2021). However, despite these guidelines, studies indicate that many of these spaces are not designed to consider the set of physical, emotional, and cognitive needs of older people, which negatively impacts their well-being (FERNANDES; SOARES, 2012; JÚNIOR et al., 2019).

The changes resulting from aging affect not only the physical body, but also the psychological and social aspects of individuals, making it essential to create environments that favor the maintenance of health and quality of life. The Decade of Healthy Ageing: Baseline Report (PAHO, 2022) emphasizes that at least 142 million older people worldwide are unable to have their basic needs met, which raises an alarm about guaranteeing the rights of this population.

The relationship between architecture and human well-being has been widely debated, with an emphasis on approaches that consider biophilia and the incorporation of natural elements into the configuration of spaces. Studies indicate that the presence of green spaces and natural materials can significantly contribute to improving the quality of life of older people, promoting psychological well-being, reducing levels of stress, anxiety, and depression, and favoring the feeling of belonging to the space (MAAS et al., 2009; BRASIL, 2016; ELSADEK; SHAO; LIU, 2021).

Research conducted with institutionalized older people reinforces these benefits. According to Kearney and Winterbottom (2005) and Freeman et al. (2019), older adults value access to green spaces and derive several benefits from these environments, despite spending relatively little time in them. Reynolds (2016) highlights that the presence of natural areas influences residents' choice of facilities, while Cerina, Fornara, and Manca (2017) point out that facilities surrounded by green spaces increase the levels of comfort and satisfaction of older people. Furthermore, Sugiyama et al. (2022) show that positive changes in depression, stress, and anxiety were observed in institutionalized older people after visual contact with vegetated areas.

Despite scientific evidence demonstrating the benefits of green spaces for older people, most research focuses on studying outdoor areas. Few studies address the integration of vegetation and natural materials

into the indoor configuration of buildings. It is noted that, due to mobility and health restrictions, indoor environments are often the places where older people spend most of their time. Thus, exploring the integration of green spaces and natural materials, as well as the architectural configuration of indoor spaces in LTCFs, can provide support to improve the quality of these spaces and promote greater well-being for their residents.

Considering this context, this article aims to evaluate the preferences of older people regarding the integration of green spaces and natural materials into the architectural configuration of LTCFs in Criciúma, SC.

The aim is to contribute with information aimed at creating more humanized, welcoming, and healthy environments for the older people population in an institutional context.

2 METHODOLOGY

The municipality of Criciúma has seven (7) LTCFs of different sizes. In total, there are 208 institutionalized older people cared for by 144 employees distributed among these institutions.

Regarding the research procedures adopted, this exploratory and qualitative research involved systematic observation techniques of the physical environment of 6 (six) of the 7 (seven) LTCFs in the municipality of Criciúma, SC, and in-depth interviews applied to 6 (six) employees of these institutions (one per institution), and to 20 (twenty) older people from the different institutions researched. The interviews with the older people were supported by images used to measure the visual preferences of this public concerning institutional environments.

2.1 Systematic observations of the physical environment

Systematic observations of the physical environment were conducted to determine the level of vegetation and natural materials available in the architecture of these six (6) institutions that participated in the research, using the following criteria: a) Vegetation integrated into the architectural configuration of the indoor areas; b) Natural materials integrated into the architectural configuration of the indoor areas; c) View of greenery through the openings of the indoor spaces; d) Access to small outdoor spaces of the institution, such as balconies, with vegetation limited to small flowerbeds or flower boxes/pots; e) Access to large green spaces in the institution, with areas for contemplation, walking, vegetable gardens, among others.

On this occasion, photographic documentation of common environments, both indoor and outdoor, was also conducted, allowing them to be photographed for use in the stages of measuring visual preferences, applied in conjunction with the interviews with the older adults institutionalized.

2.2 In-depth interviews

In-depth interviews were conducted with 2 (two) distinct groups: LTCF employees and institutionalized older adults.

2.2.1 Interviews with employees

The interviews conducted with employees responsible for caring for older people and aware of their
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routines at the institution aimed to characterize the institution and understand the dynamics of use of the different spaces within the institution by older people residents. Therefore, only one employee per institution was interviewed, totaling six interviewees in this group, in this research.

These employees were between 26 and 57 years old and had an average length of service at the institution of three and a half years. Only one interviewee was male.

The interviews with the institution's employees were conducted simultaneously with systematic observations of the physical environment of these institutions, and images were collected for use in later stages of the research.

2.2.2 Interviews with institutionalized older adults

In the second group of interviewees, that of institutionalized older adults, in which twenty (20) older people distributed among the six (6) different LTCFs were approached, the aim was essentially to identify their preferences relative to the different environments of the institution, and specifically, the integration of vegetation and natural materials into the architecture of LTCFs, the object of this study.

The older participants in the study were between 65 and 88 years old, with the majority (15 interviewees) falling between 70 and 79 years old. They had a mean of 3 years residing at the institution. Of the twenty (20) interviewees, 11 were women, and only 4 did not carry out activities independently.

Of the 208 older people institutionalized in the municipality, 77 have access to a large green leisure space within the institution. We sought to balance the sample of this research between older people who have and those who do not have access to this type of space in the institution.

Participants initially answered general questions about their preferences for the different environments within the institution to which they belonged. Subsequently, specific questions about green spaces and natural materials were addressed, allowing for the identification of a hierarchy of preferences regarding these elements in the configuration of the environments.

To deepen this analysis, visual preferences were measured at the end of the interview, allowing a comprehensive understanding of the perception of current spaces and potential architectural improvements, considering both the experienced reality and design possibilities. The measurement of visual preferences was applied in two stages.

2.2.2.1 Measuring visual preferences (Stage 1)

In the first stage of measuring visual preferences, photographs collected at LTCFs representing the outdoor and indoor environments of the different institutions were used. The objective of this stage was to discover the position that green spaces occupied in the environmental preferences of older adults institutionalized. The photographs were printed on photographic paper, randomly displayed on a table, and presented to the participants, who were asked to order them according to their preferences, classifying them from the environment they liked most to the one they liked least.

This stage only included environments where photographic records were permitted and were not being used by the older people at the time of image collection, thus preserving their identities.

The images that were part of this stage of the research are presented in the item with the research results.

2.2.2.2 Measuring visual preferences (Stage 2)

In the second stage of measuring visual preferences, the objective of which was to identify the preferences of older people regarding the integration of green spaces and natural materials into the architectural configuration of LTCFs, digitally manipulated images of 3 different environments (dorm room, living room, and dining room) were evaluated.

At this stage, images of three (3) different environments of the LTCFs were reproduced, digitally manipulated in 3D software to represent different levels of integration of vegetation and natural materials into the architectural configuration of these spaces. Among the possibilities of integrating green spaces and natural materials into the architectural configuration of LTCFs, the following intervention options were explored in each evaluated environment: a) Insertion of vegetation in the indoor environments; b) Insertion of natural materials in the indoor environments; c) Insertion of openings that promoted to see vegetation/nature from the indoor spaces; d) Insertion of direct access to green spaces from the indoor environments.

To choose the architectural configuration adopted to be digitally manipulated in each evaluated environment, the following were observed: (i) the representativeness of each of the configurations among the institutions (so that they resembled what was found in the field); (ii) the possibility of photographic recording and metric survey so that they could be reproduced digitally, and (iii) the possibility of inserting the different elements that represented the criteria above into the environment.

Following the method of application of the previous stage, each set of images of the three (3) environments was printed on photographic paper, randomly displayed on a table and the participants ordered the images of the set from the environment they liked the most to the one they liked the least according to the manipulated characteristics. This procedure enabled the identification of the most desirable configurations for an idealized environment, as well as understanding which natural elements were most valued by older people in the context of LTCFs. The stage allowed exploring possibilities of intervention in the architectural configuration of LTCFs.

To process and analyze the data collected from the measurement of visual preferences, the weighted mean preference of each image within each set presented to the interviewees for ordering was calculated. To calculate the mean, each image received a score according to its position in the order, considering the total number of images contained in each set of images presented. The image of the environment they liked the most (first position in the ordering) received the greatest weight, and the image of the environment they liked the least (last position in the ordering) received the least weight. Thus, in the case of the first stage of measuring visual preferences in which the set presented 14 (fourteen) photographs to be ordered by the interviewees, from the one they liked most to the one they liked least, the weights varied from 1 (one) to 14 (fourteen), with a weight of 14 (fourteen) being attributed to the most liked image. This methodology allowed us to calculate the mean of collective preferences and understand how residents perceive the current spaces of LTCFs, highlighting the importance attributed to natural elements.

The triangulation of the methods used enabled us to achieve more solid results regarding the

environmental preferences of institutionalized older adults.

3 RESULTS AND DISCUSSION

Results and discussion will be presented in this section according to the order in which they were applied.

3.1 Systematic observations of the physical environment

The visits made to the 6 (six) LTCFs, which agreed to take part in the research, took place between December 2023 and January 2024, when the indoor and outdoor environments of each institution were recognized, as well as the collection of photographs of some of these spaces, limited to what was allowed to be photographed.

The recognition of each LTCF allowed us to verify in the field the supply of green spaces and natural materials in the architectural configuration of each institution and, according to criteria identified in the literature as essential elements in promoting contact between older people and nature, such as: a) Vegetation integrated into the architectural configuration of the indoor areas; b) Natural materials integrated into the architectural configuration of the indoor areas; c) View of greenery through the openings of the indoor spaces; d) Access to small outdoor spaces of the institution, such as balconies, with vegetation limited to small flowerbeds or flower boxes/pots; e) Access to large green spaces in the institution, with areas for contemplation, walking, vegetable gardens.

These elements were tabulated, as shown in Table 1, and analyzed from the perspective of each institution to assess how the provision of contact with greenery and the use of natural materials are occurring in each LTCF. The symbol (✓) represents the presence and the symbol (x) the absence of each of these elements in each institution.

Table 1 – Recognition of LTCFs

Elements analyzed	LTCF 01	LTCF 02	LTCF 03	LTCF 04	LTCF 05	LTCF 06
Vegetation in the configuration of indoor areas	x	x	x	x	x	x
Natural materials in the configuration of indoor areas	x	x	x	x	x	x
Viewing greenery from indoor openings	✓	✓	x	✓	x	✓
Access to outdoor spaces (balconies) in the institution with vegetation limited to small flowerbeds, flower boxes, or pots in the outdoor space.	✓	✓	✓	✓	✓	✓
Access to free green spaces in the institution	✓	x	x	x	x	x

Source: Prepared by the authors, 2024.

The results showed that the supply of vegetation and natural materials integrated into the architecture of the indoor environments is practically non-existent, and that only one of the institutions, where 77 older adults live, has a large green space on the premises with areas for contemplation, a walking track, and a vegetable garden. Most of them allow access to balconies and small flowerbeds/pots with plants outside the buildings.

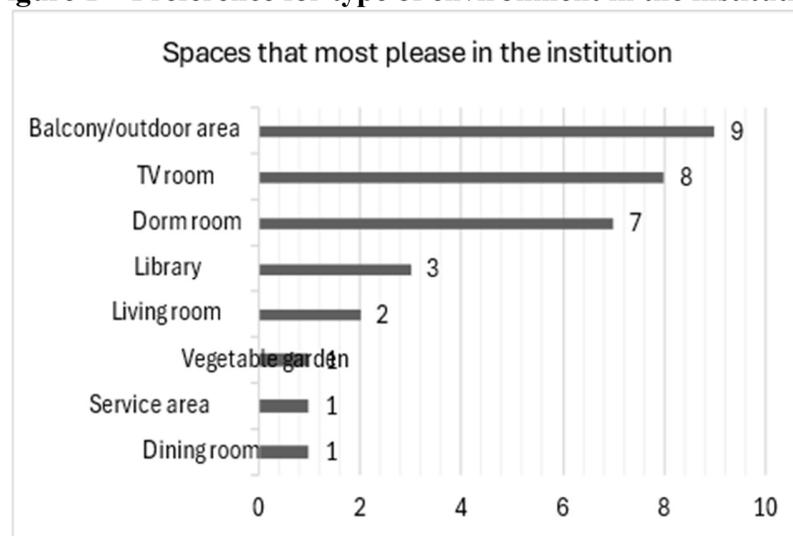
3.2 In-depth interviews

The interviews conducted with the 6 (six) employees of the institutions highlight aspects already perceptible from the on-site visit to the LTCFS, in addition to having enabled the recognition of the institutional dynamics and habits of the residents relative to the environments of the institutions.

The interviews conducted with the 20 (twenty) older people allowed us to analyze the interviewees' preference for certain institutional environments, the use of natural materials in these environments, and access to green spaces on satisfaction.

Staff reported that residents spend more time in spaces such as balconies and the TV room, which are places that encourage socialization and help prevent isolation among older people. Hence, it is worth remembering that only one of the institutions has a green leisure area; the others have only balconies and small flowerbeds or pots. This perception was confirmed by the residents themselves, who indicated balconies and the TV room (Figure 1) as the most pleasant spaces, highlighting watching TV, socializing, reading, and contemplation as notable activities. Furthermore, dorm rooms were also mentioned, being characterized as private spaces, valued mainly for rest. These observations align with the findings of Bengtsson et al. (2015), who emphasize the importance of environments that foster social interaction and connection with nature in the well-being of institutionalized older adults.

Figure 1 – Preference for type of environment in the institution



Source: Prepared by the authors, 2024.

Through the interviews, it was possible to confirm that most residents are satisfied with the spaces of the LTCFs. However, this satisfaction often reveals a conformism, with an implicit desire for better conditions, but without aspiration for major changes.

The sensations associated by older people with more pleasant spaces include tranquility, well-being, and comfort, as well as feelings such as security, freedom, and nostalgia, especially in areas close to the outdoors. These reports highlight the value of natural elements in the institutional environment, corroborating studies by Roger Ulrich (1984) and Rachel Kaplan (2001), which demonstrate the psychological benefits of green spaces and natural elements in care environments. Curiosity, linked to observing movement in the institution, and enthusiasm, related to waiting for family visits, also reinforce the importance of interaction with the surroundings.

Regarding the spaces considered less pleasant or little used, the dorm rooms and the kitchen were mentioned by employees. Although 10 (ten) of the 20 (twenty) older people resident stated that they did not identify unpleasant spaces, the interview revealed limitations in autonomy and privacy, feelings of frustration and boredom, as well as a certain resignation regarding the dynamics of the environment. These aspects align with the study by Sugiyama et al. (2022), which emphasizes the importance of promoting more stimulating environments that foster residents' autonomy.

Another relevant point was the views from outdoor spaces provided by the windows, with 6 (six) residents reporting observing for short periods (15 minutes to 2 hours) and 4 (four) dedicating longer periods, such as entire afternoons or mornings. The views most appreciated by older people include street movement, the neighborhood, and vegetation, with a particular preference for green spaces. The emotional connection with these views reflects feelings of tranquility, curiosity, and nostalgia, highlighting the importance of this indirect contact with the outdoor environment, as supported by Ulrich (1984) and Kaplan (2001). Preferences for green views from the windows were also found in previous studies from Casarin et al (2023), and D'Agostin & Casarin (2025).

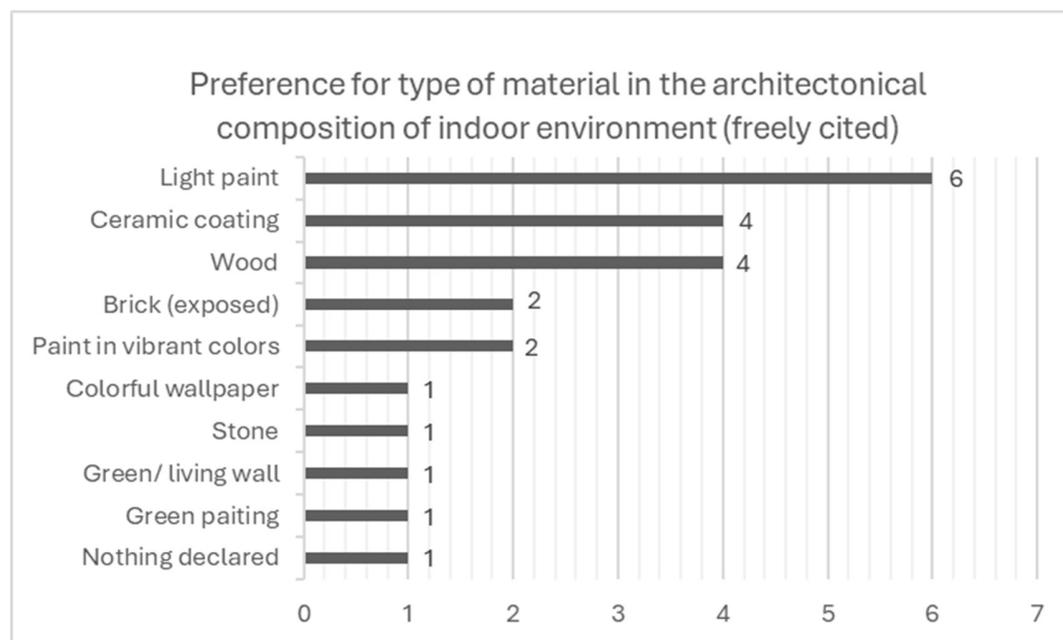
Many older people expressed concern about the possibility of not being able to access these views, associating this situation with feelings of sadness, loneliness, and even depression. This relationship with the outdoor environment is also highlighted in studies by Elsadek, Shao, and Liu (2021) and Browning, Lee, and Wolf (2019), which associate exposure to nature with improvements in emotional well-being.

Regarding time spent outdoors, staff stated that residents frequently utilize outdoor spaces, although contact with nature is not always direct. Older people emphasized the importance of these moments, associating them with a sense of freedom and overall well-being. Most reported satisfaction with outdoor activities, such as socializing, contemplation, sunbathing, and walking, but also demonstrated a desire for experiences that evoke past memories, including walks outside the institution, other leisure activities, and work-related activities. This appreciation of contact with nature and freedom is corroborated by studies by Stephen Kellert (2005) and Klemenci and Leskovar (2022), which highlight the need for outdoor environments that offer significant opportunities for interaction and stimulation for older people.

The preference for using materials such as light paint, wood, and ceramic coating, indicated by residents for indoor environments, reflects both the affective memory of older people and the functionality of these elements in institutional environments (Figure 02). In general, we had 14 (fourteen) mentions of synthetic

materials as institutionalized older adults favorite for the composition of their environments, such as paints, industrialized ceramics, and wallpapers, and 8 (eight) of natural materials such as wood, exposed brick, stone, and green/living walls.

Figure 2 – Preference for type of material in the architectural composition of the indoor environment.



Source: Prepared by the authors, 2024.

Finally, both employees and older people presented suggestions for improving indoor and outdoor spaces in institutions. Employees emphasized the need for larger green areas and private spaces, including gardens and leisure areas. Older people, on the other hand, highlighted environments that promote coexistence, such as living rooms and recreational spaces, as well as craft workshops and areas with a greater connection with nature.

In general, the interviews highlight the importance of outdoor spaces for the health and well-being of institutionalized older adults, as well as their preferences and needs in relation to the architectural configuration of LTCFs. The search for environments that promote socialization, recreation, freedom, and contact with nature proves to be the central theme in this discussion, as these elements are associated with pleasurable feelings that enhance the quality of life for residents. Studies by Stephen Kellert and Edward Wilson (1993) emphasize these benefits, highlighting the innate connection between humans and nature.

3.3 Measuring visual preferences

Results of visual preferences, which were measured in two stages, are presented as follows:

3.3.1 Visual preferences (Stage 1): Preference between the different environments available in institutions (indoor and outdoor)

The first stage of measuring visual preferences involved ordering 14 (fourteen) photographs of LTCFs to identify how green spaces were positioned in the preferences of older people among the different environments (indoor and outdoor environments). As already mentioned, these photographs were printed on photographic paper and placed on a table during the interviews, making them easier for participants to view and handle.

The older people ordered the photographs from the environment they liked most (most pleasant) to the one they liked least (least pleasant). The photographs are presented in the table below according to the order of preference of the older people (from the one they like the most to the one they like the least), according to the weighted means calculated from the group ordering, whose calculation method is described in the methodological procedures section.

Table 2 – Ordering of photographs according to visual preferences

 <p>Photo number 8 Mean = 13.50</p>	 <p>Photo number 13 Mean = 13.14</p>
 <p>Photo number 5 Mean = 12.85</p>	 <p>Photo number 11 Mean = 12.21</p>
 <p>Photo number 12 Mean = 11.92</p>	 <p>Photo number 6 Mean = 11.78</p>
 <p>Photo number 9 Mean = 11.35</p>	 <p>Photo number 10 Mean = 11.14</p>

 <p>Photo number 4 Mean = 10.85</p>	 <p>Photo number 1 Mean = 9.71</p>
 <p>Photo number 7 Mean = 9.50</p>	 <p>Photo number 3 Mean = 8.64</p>
 <p>Photo number 2 Mean = 8.28</p>	 <p>Photo number 14 Mean = 5.07</p>

*Images are sorted from highest mean preference to lowest mean preference
Source: Prepared by the authors, 2024.

When analyzing Table 2, one can see that the photographs with the highest means, therefore the most pleasant environments, which the older people like the most, represent outdoor environments, with emphasis on those that offer contact with greenery and include furniture for rest and socializing. Photographs depicting indoor environments are located at the end of the order. It is worth noting that, even for the photographs with less preference, residents presented few negative justifications. In some responses, they mentioned: “We like everything... they are all beautiful,” and “[...] they all have their meaning, their value, their importance [...]”. This indicates that although residents ranked these photographs lower in preference, they recognized positive qualities in all spaces.

Photograph number 8 (eight), which depicts a space at LTCF 01 with access to green areas, obtained the highest mean preference. This space was highlighted by residents who use it for moments of meditation, socializing with family, and as a peaceful, quiet, and pleasant place. Furthermore, vegetation and benches were noted as positive elements, creating an environment conducive to rest and socialization. One resident called the area an “eye-catching” and beautiful place, while others praised the benches, saying: “Oh, that’s really cool, isn’t it? A space to sit, to talk.” Along with photographs number 9 (nine) and 12 (twelve), photograph 8 (eight) was the most appreciated (ranked first) by 3 (three) residents each.

Photographs numbered 13 (thirteen) and 12 (twelve), which represent vegetable garden spaces, also received good evaluations. Residents expressed pleasure in touching the land and taking care of the garden, with statements such as: “It would be good to have a vegetable garden space. I like working in the garden,” and

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"I like working in the land." Some even associated the moment with the experience of cultivating their own vegetable garden in previous homes, which created an emotional bond with the space.

Thus, the data reveal that residents tend to prefer outdoor spaces that also encourage rest and contemplation, valuing the presence of furniture and natural elements, data corroborated by the study by Wang and Rodiek (2019), which emphasizes that the integration of natural elements together with adequate furniture is essential to create outdoor environments that promote both rest and social interaction.

On the other hand, photograph number 14 (fourteen), which shows a space with a swimming pool at LTCF 06, obtained the lowest mean preference and was classified as the least appreciated, as it was indicated for the last position in the ranking by 10 (ten) interviewees. Justifications particularly highlighted fear of use, such as: "Because I don't know how to swim, I'm scared."

Special emphasis is placed on photographs 5 and 7, which depict the same space; however, photograph 7, which clearly shows a terrace with little vegetation, received worse evaluations.

3.3.2 Visual preferences (Stage 2): Integration of vegetation and natural materials into the architectural configuration of the indoor spaces of institutions

The second stage of measuring visual preferences consisted of ordering manipulated digital images representing 3 (three) environments, including a living room, dining room, and dorm room. As reported in the research procedures, the following criteria were explored in these images in different ways: a) Insertion of vegetation integrated into the architectural configuration of the indoor areas; b) Insertion of natural materials integrated into the architectural configuration of the indoor areas; c) Insertion of openings that promote the visualization of vegetation/nature from the indoor spaces; d) Insertion of direct access to green spaces from the indoor environments.

The images were classified by the older people from the one they liked the most (the most pleasant environment) to the one they liked the least (the least pleasant), and in this order, they are presented in the tables below. The means assigned to the images were calculated as informed in the methodological procedures (Item 2).

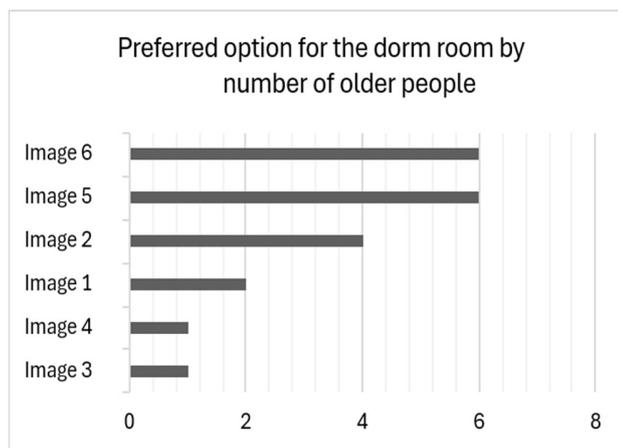
Table 3 shows the order in which the images of the dormitory were viewed. This space was manipulated in 6 (six) variations, and the image with the highest mean preference among older people stands out for its visualization of vegetation. Image number 5 (five), which only shows a view of green, was chosen as the first in the order by 6 (six) interviewees, while image number 6 (six), with access to green, also obtained the same number of preferences. However, the image with access to greenery was most frequently ranked in the last positions, suggesting a preference for more intimate or protected spaces for the dorm room environment. Furthermore, residents preferred wooden floors compared to ceramic, as the 3 (three) images with wooden floors obtained the highest means. The image with the lowest mean does not offer a view or access to green areas. It features a ceramic floor, which was rejected by 12 (twelve) of the 20 (twenty) interviewees, who considered it "dead", "stuffy", and lacking in colors or pleasant elements.

Table 3 – Order of preference of images relating to the dorm room

Dorm room		
 <p>Image number 5 Mean = 4.10</p>	 <p>Image number 6 Mean = 3.90</p>	 <p>Image number 2 Mean = 3.55</p>
 <p>Image number 3 Mean = 3.55</p>	 <p>Image number 4 Mean = 3.45</p>	 <p>Image number 1 Mean = 2.45</p>

*Images are sorted from highest mean preference to lowest mean preference
Source: Prepared by the authors, 2024.

Figure 3 – Option preferred by respondents in the dorm room environment



Source: Prepared by the authors, 2024.

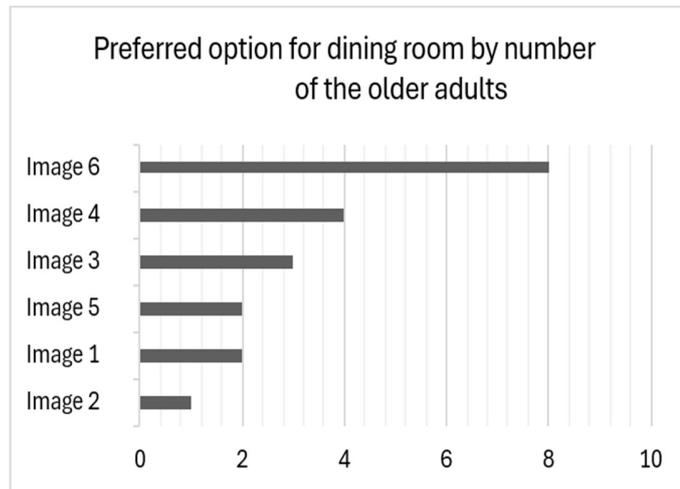
The table below shows the order in which the images of the dining room were viewed. After analyzing 6 (six) variations of the dining room environment, older people preferred images with physical and visual access to greenery. The image with the highest mean preference stood out for three aspects: access to green space, viewing vegetation through the windows, and the use of natural materials, such as exposed brick. On the other hand, the least appreciated image was criticized for the lack of green elements, being described as "more serious" and with a "dead look", highlighting the preference for environments with natural materials.

Table 4 – Order of preference of images relating to the dining room

Dining room		
		
Image number 6 Mean = 4.20	Image number 4 Mean = 3.90	Image number 3 Mean = 3.60
		
Image number 5 Mean = 3.55	Image number 2 Mean = 2.95	Image number 1 Mean = 2.80

*Images are sorted from highest mean preference to lowest mean preference
Source: Prepared by the authors, 2024.

Figure 3 – Option preferred by interviewees in the dining room environment



Source: Prepared by the authors, 2024.

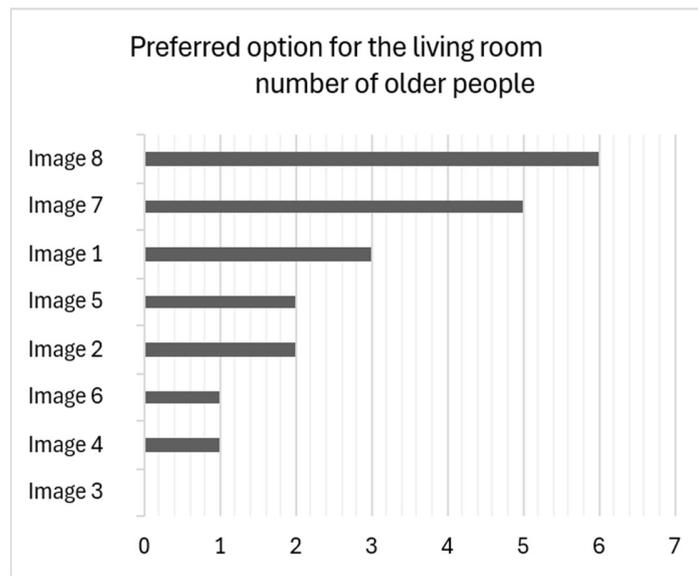
Table 5 below shows the order in which the images of the living room environment were assessed. The highest mean preferences for this space are associated with environments that offer visual and physical access to greenery. Access to outdoor space was valued by all interviewees and was considered a positive factor in the justifications given to the researcher for their choice. Of these images that presented physical and visual access to greenery, those that also presented natural finishing materials in the architectural composition obtained higher means. The least appreciated images, with similar and lower means, share the commonality of lacking physical and visual access to the outside.

Table 5 – Order of preference of images relating to the living room

Living room			
 Image number 7 Mean = 5.70	 Image number 8 Mean = 5.25	 Image number 6 Mean = 5.25	 Image number 5 Mean = 4.75
 Image number 1 Mean = 3.90	 Image number 2 Mean = 3.80	 Image number 3 Mean = 3.70	 Image number 4 Mean = 3.65

*Images are sorted from highest mean preference to lowest mean preference
Source: Prepared by the authors, 2024.

Figure 4– Option preferred by respondents in the living room environment



Source: Prepared by the authors, 2024.

The table below presents a summary, illustrating the images with the highest and lowest mean preference in each of the 3 environments presented.

Table 9 – Visual preferences regarding manipulated environments

Dorm room	
Image that achieved the highest mean	Image that achieved the lowest mean
 Mean = 4.10	 Mean = 2.45
Dining room	
Image that achieved the highest mean	Image that achieved the lowest mean
 Mean = 4.20	 Mean = 2.80
Living room	
Image that achieved the highest mean	Image that achieved the lowest mean
 Mean = 5.70	 Mean = 3.65

Source: Prepared by the authors, 2024.

Regarding the indoor environments, which correspond to the dorm room, the dining room, and the living room, the most valued elements were the view of vegetation through the windows, direct access to green spaces, and the integration of natural materials into the architecture of the environments. Access to greenery, an aspect that, according to those interviewed, promoted a more open and cheerful space, in addition to being associated with freedom.

The literature corroborates these indications, highlighting the importance of dynamic and welcoming spaces for promoting health and well-being in LTCFs (Rodiek and Fried, 2005; Wilson, 1984).

The least appreciated images were considered serious, “dead” or “lifeless” and dark, with emphasis on the lack of visualization and the lack of access to greenery in their composition, data corroborated by the study by Rodiek and Fried (2005), who highlight that the presence of natural elements in indoor environments, such as the visualization of vegetation and the use of natural materials, contributes to the creation of more welcoming and stimulating spaces.

In general, it is possible to state that the preferences of older people relative to their residential environment are strongly guided by the presence of natural elements, such as vegetation and natural materials, especially wood. The interviewees demonstrate a clear appreciation for environments that provide contact with nature, such as green areas. Furthermore, images featuring more vegetation and elements that encouraged socialization were most liked, while those lacking color (including colors derived from natural materials) were perceived as the least liked. This preference reflects a desire for spaces that not only offer

comfort, but also promote well-being and connection with the surrounding environment, highlighting the importance of nature in the quality of life of residents.

4 CLOSING REMARKS

This article discussed the importance of integrating green spaces and natural materials into the architectural configuration of Long-Term Care Facilities for Older People (LTCFs), highlighting the impact of these elements on the quality of life and well-being of residents. The research revealed that, despite the widely recognized benefits of nature for physical and mental health, many of these institutional spaces still lack adequate green areas and a design approach that values contact with nature.

The situation observed in the LTCFs of Criciúma/SC reflects a common challenge in several institutions, where the absence of natural elements in the indoor and outdoor environments can compromise the experience of older people, limiting their opportunities for leisure, socialization, and sensory stimulation. In this context, the analysis of residents' preferences and the current conditions of LTCFs in Criciúma/SC allowed us to identify aspects that can contribute to the qualification of these spaces, making them more welcoming and compatible with the needs of the older people population.

The presence of green areas, natural materials, and architectural solutions that integrate nature into the daily life of LTCFs can play a fundamental role in promoting the well-being of residents. In addition to promoting environmental comfort, these strategies help reduce stress, anxiety, and feelings of isolation, creating an environment conducive to relaxation and recovery, which is essential for the mental and physical health of older people. Biophilic design, which seeks to bring human beings closer to natural elements, is a powerful tool for creating healthier and more pleasant living spaces, allowing older people to feel more connected to the outside world.

The relevance of this research lies in the need to rethink the built environment aimed at the older people population, ensuring that LTCFs are conceived not only as welcoming spaces, but as environments that promote quality of life, belonging, and autonomy. The adoption of design strategies based on biophilia and the integration of natural materials can transform these institutions into healthier and more stimulating places, promoting the physical and emotional well-being of residents.

The proposal for architectural planning that is sensitive and adapted to the needs of the older people population is not just an aesthetic issue, but an urgent need that directly impacts the quality of life of this segment of society, with positive effects on the health, comfort, and vigor of the people who live in these institutions. The humanization of LTCF environments is, therefore, an imperative, and this transformation can be achieved through the creation of spaces that celebrate nature, coexistence, and hospitality, providing residents with a fuller, more dignified, and enriching life.

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