



DOSSIER
AGEING, TERRITORY, AND
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Public open spaces for leisure and recreational walking among people aged 60 and over

Os espaços livres públicos de lazer e a caminhada recreativa de pessoas com 60 anos ou mais

Fernanda Faccio Demarco¹ , Vanessa Casarin¹ 

¹ Universidade Federal de Santa Catarina, Centro Tecnológico, Programa de Pós-Graduação em Arquitetura e Urbanismo. Florianópolis, SC, Brasil. Correspondence to/*Correspondência para*: F.F. Demarco. *E-mail*: arq.fernandademarco@gmail.com

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Abstract

Regular physical activity is essential to improve and maintain mental and physical health of older adults and its practice is associated with the quality of urban open spaces. In order to support decisions regarding design and management of urban spaces in order to be attractive for older adults, the central aim of this paper is to evaluate the quality of public open spaces for leisure in sample areas of the city, where older adults walk more and walk less for leisure in Florianópolis. The methodological procedures involved systematic observation of these open spaces in the selected sampled areas, in which the attributes that provide quality to public open spaces for leisure for the walking of older adults were quantified. These attributes were identified from a systematic literature review. The results demonstrated that in the sample areas where the percentage of older adults who practice walking is higher (between 60% and 80% of the elderly walk for leisure), there are open spaces with better quality, that is, they have a greater quantity of infrastructural elements which support activity in this group, compared to the sample areas where they walk less for leisure (between 0 and 20% of older adults who walk for leisure). So, it is understood that improvements in urban planning and design, taking into account pedestrian scale, could promote active aging and quality of life. Investments in infrastructure can reduce public health spending and offer a healthier and more sustainable city to the population.

Keywords: Urban green areas. Walking. Urban open spaces. Elders.

Resumo

A atividade física regular apresenta-se como um elemento essencial para melhorar e manter a saúde mental e física dos idosos e sua prática está associada ao potencial dos espaços livres urbanos. No sentido de amparar decisões tanto de projeto quanto de gestão desses espaços urbanos para que sejam atrativos ao usufruto do idoso, o objetivo central deste artigo é avaliar a qualidade dos Espaços Livres Públicos de Lazer dos núcleos amostrais onde os idosos mais caminham e menos caminham para o lazer em Florianópolis. Os procedimentos metodológicos

envolveram a observação sistemática desses espaços livres nos núcleos amostrais selecionados, na qual os atributos de qualidade para a caminhada no lazer da pessoa idosa, identificados a partir de uma revisão sistemática de literatura, foram quantificados. Os resultados demonstraram que nos núcleos amostrais onde o percentual de idosos que pratica atividade de caminhada é maior (entre 60% a 80% dos idosos caminham para o lazer), existem espaços com melhor qualidade, ou seja, que possuem uma maior quantidade de elementos infraestruturais que amparam a atividade neste grupo, se comparado aos núcleos amostrais onde os idosos menos caminham para o lazer (entre 0 a 20%). Com isso, entende-se que as melhorias no planejamento e desenho urbano, pensando uma cidade mais humana e na escala do pedestre, irão promover um envelhecimento ativo e com qualidade de vida. Os investimentos em infraestrutura podem reduzir os gastos com saúde pública, retornando para a população através de uma cidade mais saudável e sustentável.

Palavras-chave: Áreas verdes urbanas. Caminhada. Espaços livres urbanos. Idosos.

Introduction

The increasing life expectancy of individuals confirms the global trend of population aging. According to the World Health Organization (Organização Mundial da Saúde, 2020), in 2020 the global elderly population (aged 60 and over) surpassed one billion people, representing 13.5% of the world's population. Projections estimate this number will reach 2.1 billion by 2050. In Brazil, the 2022 demographic census reported approximately 32 million older adults, accounting for 15.8% of the country's total population of 203 million. In 2010, this group represented 11% of the total population, highlighting the rapid demographic aging process underway in the country (Brasil, 2023).

In light of this demographic development, promoting health and quality of life among the elderly has become increasingly important. Active aging is defined as the process of optimizing opportunities for health, participation, and security in order to enhance the quality of life as people age. Active aging depends on a range of interrelated determinants, including material conditions, social factors, and aspects of the urban environment that influence individual behaviors and perceptions. Public spaces, buildings, transportation systems, and housing conditions in the city—when thoughtfully designed—can contribute to safe mobility, social participation, autonomy, and, above all, foster healthy behaviors among the elderly population (Organização Mundial da Saúde, 2008).

In this context, regular physical activity emerges as a key element in improving and maintaining both mental and physical health in older adults. A promising approach to encouraging physical activity is through the potential of urban green spaces, which, beyond reducing stress and fostering social interaction, can stimulate active behaviors among the population. Several studies have shown that urban residents' physical activity levels are associated with the accessibility and quality of public green spaces (Petersen *et al.*, 2018).

Given this context, the main objective of this article is to evaluate the quality of Public Open Leisure Spaces (POLS) located in the sample areas of Florianópolis where elderly individuals engage most and least frequently in leisure walking.

Methodological Procedures

This study was developed based on walking data for leisure activities among the elderly population (60 years or older) from the EpiFloripa Idoso Cohort Study, a survey based on the population and households that monitors the living conditions and health of a representative sample of older adults (60 years or older) in the urban area of the municipality of Florianópolis, in the state of Santa Catarina (SC).

This study was conducted in three waves. The study commenced in 2009/2010 with Wave 1, involving 1705 individuals aged 60 years or older (n=1,705). The second wave occurred in 2013/2014 with the participation of 1197 individuals in this age group (n=1,197), and the third wave took place in 2017/2019, with 1327 respondents (n=1,327).

The analysis presented in this paper considered only the walking data of the elderly population from Wave 1. This decision was made because the reduction in sample size during the second wave also decreased the number of elderly individuals interviewed in each census tract.

To ensure the sample's representativeness of the urban area of Florianópolis, the selection of baseline participants for the EpiFloripa Idoso Cohort Study (Wave 1) occurred within randomly selected census tracts (Instituto Brasileiro de Geografia e Estatística, 2000). These tracts were drawn equitably from groups of sectors stratified by the head of household's income decile. Eighty out of the 420 urban census tracts were selected, aiming for an estimated number of 20 elderly individuals randomly selected within each chosen tract (Giehl *et al.*, 2012).

For the analysis presented herein, contiguous or very close census tracts within the same neighborhood were aggregated to increase the number of respondents in each sampling area. Consequently, the aforementioned 80 census tracts were grouped into 58 sampling areas (Figure 1) for the current analysis.

Drawing upon the leisure walking data of the elderly population in Florianópolis, as reported by the EpiFloripa Idoso Study, Wave 1, and systematized by neighborhood sampling area, this study aimed to evaluate, through systematic field observations, the quality of public open spaces for walking among the elderly in sampling areas where this population walks more frequently and where they walk less frequently.

To this end, the research was conducted in two stages. The first stage involved a systematic literature review with the objective of systematizing attributes of public open spaces for leisure that contribute to their quality of walking among this population, with the aim of developing an evaluation tool for these spaces.

In the second stage, the public open spaces for leisure within the sampling areas were evaluated through systematic observation supported by the tool developed in the first stage of the research, quantifying the quality attributes.

Observation is a widespread and consolidated method in scientific research. In systematic observation, the researcher develops a specific plan for the organization and recording of information prior to data collection. This involves establishing, in advance, the categories necessary for the analysis of the situation. In other words, before going into the field, the researcher knows which aspects of the community or group are significant for achieving the intended objectives (Gil, 1994).

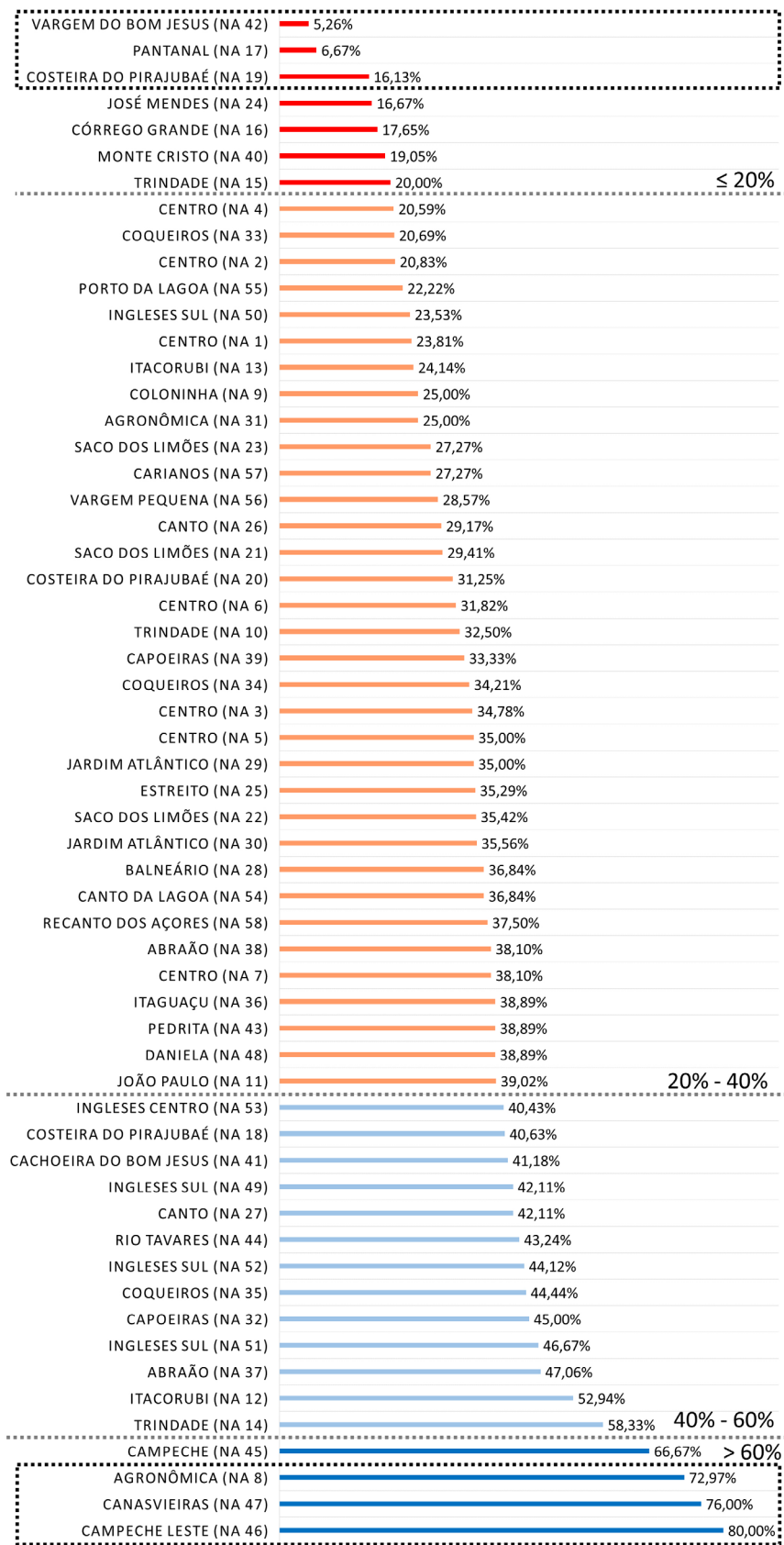


Figure 1 – Percentage of elderly people who walk for leisure more than 10 minutes per week by sampling area (NA), as determined by the neighborhood in which each area is located.

Source: EpiFloripa Idoso (2009) edited by the authors (2020).

Research Scope

To define the spatial scope for the field evaluation of public spaces, sample areas were selected based on data regarding walking habits among the elderly, drawn from the EpiFloripa Idoso Study (Wave 1). These sample areas were classified according to the percentage of older adults who reported walking for leisure. Only individuals who reported walking for leisure for at least 10 minutes per week were included in the analysis.

With the sample areas classified by the percentage of leisure walking, the three areas that had the largest walking percentages for leisure between the elderly and the three areas that had the lowest percentages were chosen to evaluate the quality of the POLS for the use of the elderly (Figure 1). The determination of the number of sampled census tracts considered the researchers' available time for conducting the on-site evaluation.

The three sampling areas exhibiting the highest percentages of walking for leisure among elderly individuals are located in Campeche Leste, where 80% of elderly individuals walk for leisure; in Canasvieiras, where 76% of elderly individuals engage in leisure walking; and in the Agrônômica neighborhood, where 72.97% of elderly individuals walk for leisure for more than 10 minutes per week.

The three areas exhibiting the lowest percentages of walking for leisure among older adults are located in Vargem do Bom Jesus, with only 5.26% reporting they walk for leisure for more than 10 minutes per week; in Pantanal, where 6.67% walk for leisure; and in Costeira do Pirajubaé, where 16.13% of older adults walk for leisure for more than 10 minutes per week.

Figure 2 presents the sample areas that constitute this selection, as well as the POLS located within each area, characterizing the residential surroundings of the elderly population studied.

To identify the POLSs to be evaluated within each sample area, a spatial overlay was performed using the shapefile of the POLS and an 800-meter network buffer along the street network from each older adult's residence, according to the composition of each sample area. Only public spaces existing at the time of the older adults' walking data collection for the sample were included in the analysis. Field assessments were also verified through the historical imagery available on Google Earth Pro for the corresponding period.

The sample area 46, situated in Campeche Leste, comprises the census tracts 420540712000010 and 420540712000035. Within this area, 20 older adults constitute the sample, with 80% of them walking for leisure for more than 10 minutes per week. This area exhibits the highest percentage of older adults engaging in walking for leisure. Located within this area is a portion of Campo de Aviação (a former airfield), currently appropriated by the population as an urban park known as the Parque Cultural do Campeche—PACUCA. This site is subject to judicial dispute, and no park infrastructure is provided by public authorities within this space. The area features dirt trails formed informally by pedestrians crossing through it. Although no formal squares are present within this sample area for evaluation, the neighborhood features sidewalks suitable for walking and is situated near the shoreline (beach), which also constitutes a public space for leisure. It is hypothesized that this proximity influences the high percentage of walking for leisure among older adults in this area.

Sample area 47, situated in Canasvieiras, comprises the census tracts 420540715000013, 420540715000014, and 420540715000009. Within this area, 25 older adults constitute the sample, with 76% of them engaging in walking for leisure for more than 10 minutes per week. The following POLSs were observed in this area: República do Líbano Square and Virgílio Várzea.

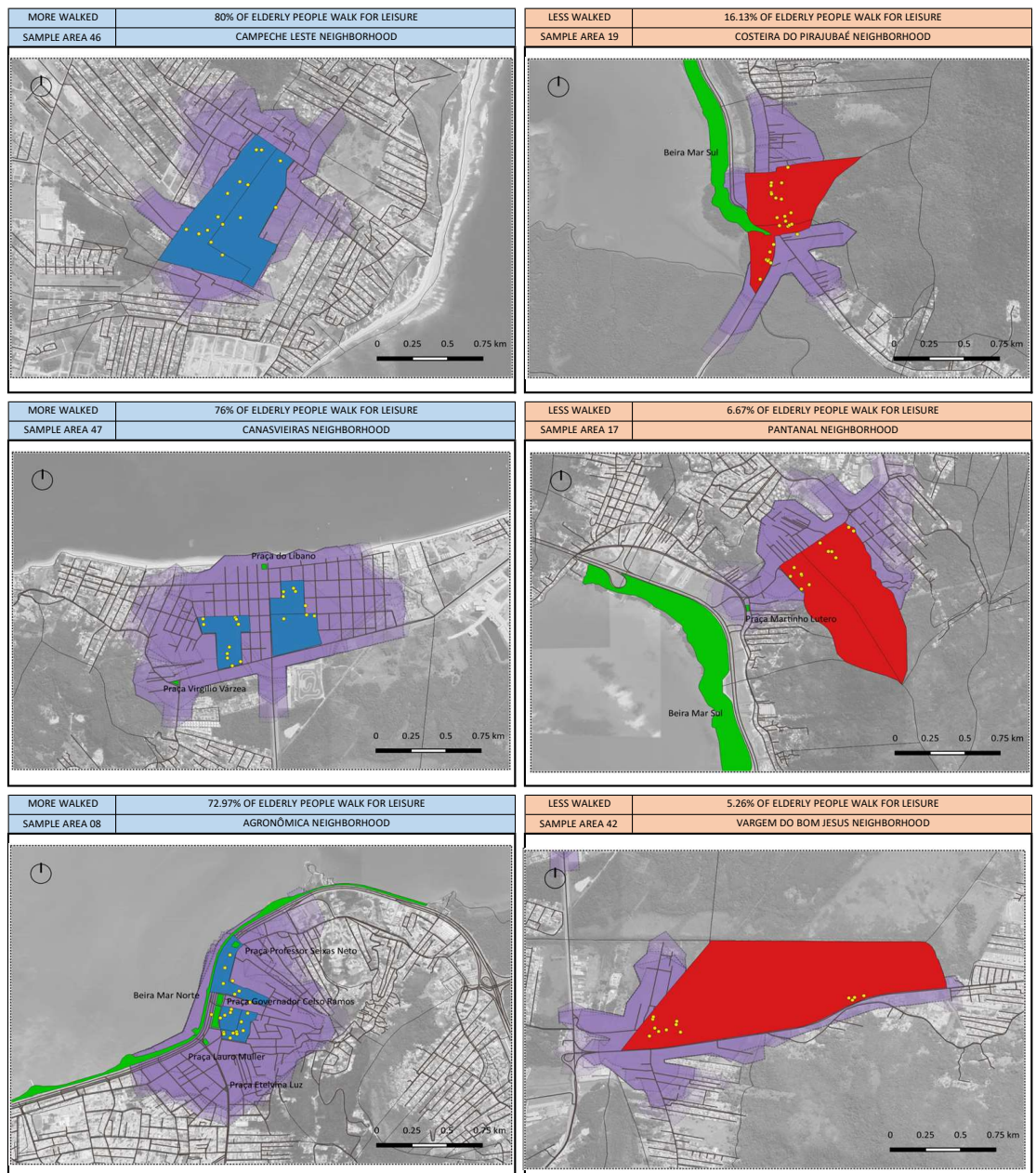


Figure 2 – Selected sample areas.

Source: prepared by the authors (2020).

Sample area 08, located in the Agrônômica neighborhood, comprises census tracts 420540705000087, 420540705000088, and 420540705000090. Within this area, 37 older adults constitute the sample, with 72.97% of them walking for leisure for more than 10 minutes per week. The following POLSs were observed in this sample area: a section of Beira Mar Norte linear park, Etelvina Luz Square, Governador Celso Ramos Square, Lauro Muller Square, and Prof. Seixas Neto Square.

It is worth noting that these aforementioned three sample areas, in which older adults exhibit the highest percentages of walking for leisure, are located near the shoreline.

Sample area 42, situated in Vargem do Bom Jesus, is composed of census tract 420540710000017. In this area, 19 older adults are part of the sample, with only 5.26% reporting

walking for leisure for more than 10 minutes per week. Elderly residents in this area do not have any POLSs within a 15-minute walk from their homes that could be evaluated in this study. Furthermore, there are no walking paths or sidewalks suitable for walking within this area and it is also not near the shoreline. It is believed that these characteristics of the sample area influence the low percentage of walking among the older adults residing there.

Sample area 17, situated in the Pantanal neighborhood, comprises census tracts 420540705000194 and 420540705000195. Within this area, 15 elderly individuals constitute the sample, and only 6.67% of them reported walking for leisure for more than 10 minutes per week. The following POLSs were observed in this residential environment: Martinho Lutero Square and a section of the linear park Beira Mar Sul (Via Expressa Sul). The latter, previously classified as a Leisure Green Area in the former municipal zoning, is currently categorized as a Large Landfill Area; and although it features a walking track, parking pockets, a cycle path, and large green spaces, it is not classified as a Park by public authorities. It was included in this study as it presents infrastructure pertinent to the analysis.

Sample area 19, located in the Costeira do Pirajubaé neighborhood, is composed of census tracts 420540705000204 and 420540705000203. In this area, 31 elderly individuals are part of the sample, and only 16.13% of them reported walking for leisure for more than 10 minutes per week. By overlaying the 800-meter network buffer along the street network, these elderly individuals have access to a section of the linear park Beira Mar Sul (Via Expressa Sul).

Given the above, the sample areas of Campeche Leste (where older adults walk the most for leisure) and Vargem do Bom Jesus (where older adults walk the least for leisure) were excluded from the POLSs (squares and parks) evaluation. Thus, the sample areas of Canasvieiras and Agronômica, where older adults walk the most, and Pantanal and Costeira do Pirajubaé, where older adults walk the least, were included in this sample selection for the POLSs evaluation of parks and squares, totaling 4 sample areas.

Systematic Literature Review and Development of the Assessment Tool

According to Sampaio and Mancini (2007), systematic reviews are planned to be methodical, explicit, and reproducible. To this end, the research process is conducted following a methodologically well-defined sequence of steps, according to a previously planned study protocol (Kitchenham, 2004).

The systematic literature review of this article aimed to identify the attributes that confer quality to public open spaces for walking by older adults, for the development of an assessment tool for the quality of public open leisure spaces for walking by this group; a tool through which these attributes could be quantified for comparative purposes. The databases used for the search were Compendex (Engineering Village), Scopus, and Web of Science. The selection of articles was restricted to those written in Portuguese, English, or Spanish, and no initial date was established for the search, which considered articles published up to 2019, when the search for the tool's construction was conducted.

For the systematic literature review, the free software Start, developed by the Lapes laboratory of *Universidade Federal de São Carlos* (UFSCar, Federal University of São Carlos) was used as support, based on the methodology proposed by Barbara Kitchenham (2004) and encompassing

three phases: planning, execution, and summarization. Initially, the search in the aforementioned databases identified 186 articles using the informed search strategy².

After the removal of duplicate articles, the initial selection was made through the reading of titles, keywords, and abstracts.

The inclusion criteria for article selection were: including older adults in the sample; addressing public open spaces; comprising studies with environmental quality attributes; and encompassing the activity of walking. The exclusion criteria considered: articles outside the study area; not being articles with primary data (systematic reviews); studies in rural areas; not having older adults in the sample; and not discussing public open spaces.

The second stage of selecting the material pertinent to the research consisted of a full-text reading of the remaining material, resulting in 16 articles. From these, all quality attributes identified in the literature were extracted through content analysis, categorized, and included in the assessment tool.

All identified attributes were encompassed by 6 categories of analysis that integrate this assessment tool: accessibility, landscape, safety, infrastructure, comfort, and surrounding urban uses. An evaluation form for the spaces (assessment tool) was developed, considering elements that could be quantified in the field, in the POLSs of the sample areas that constitute the research selection.

Chart 1 shows the attributes identified by category of analysis, the frequency with which the attributes appear in the selected studies, the references used, and the assessment tool, that is, the list of elements to be quantified in the field within each category.

For comparative purposes, the infrastructural elements (quality attributes) quantified in the POLSs observed in this research were analyzed considering the area of these spaces (in hectares) and the population served within the 800-meter network buffer along the street network (per 1000 inhabitants)³.

It is worth mentioning that the studies selected for the construction of the tool according to the aforementioned inclusion and exclusion criteria are consistent studies with a large number of older adults in the sample composition, most of them of a quantitative nature and with a statistically representative sample of the older adult population in the research context.

² Search string in the three databases ((Greenspaces OR "Open spaces" OR "Green areas" OR "Public urban parks" OR "Urban parks" OR "Public green space" OR "Urban green space" OR "Urban green areas" OR parks OR "Espaço verde" OR "Espaço aberto" OR "Áreas verdes" OR "Parques urbanos públicos" OR "Parques urbanos" OR "Espaço verde público" OR "Espaço urbano verde" OR "Áreas verdes urbanas" OR parques) AND (Walkable OR Walkability OR Walking OR Caminhar OR Caminhada OR Caminhabilidade OR "Physical Activity" OR "Physical Activities" OR "Physical Exercise" OR "Physical Exercises" OR "Leisure Activities" OR leisure OR "Atividades de lazer" OR Lazer OR "Atividade física" OR "Exercício Físico") AND (elderly OR "Older adults" OR "Aged, 60 and over" OR "Oldest Old" OR Velhíssimos OR "Idosos de 60 ou mais" OR Idoso OR Idosos OR "Pessoa Idosa" OR "Pessoa de Idade" OR "Pessoas de Idade" OR "Pessoas Idosas" OR "População Idosa") AND ("Environmental quality" OR "Place quality" OR quality OR infrastructure OR "qualidade do ambiente" OR "qualidade do lugar" OR qualidade OR infraestrutura OR amenities OR facilities OR facilidades))

³ Data from the last IBGE census – 2010 – until the conclusion of this research.

Chart 1 – Systematization of the Literature Review and evaluation tool for POLS.

		Literature Review		Assessment Tools		
Category	Attribute	Frequency	References	Attributes/Elements quantified in the POLS assessment tool for squares and parks (/ha; /1000 inhab.)	Qualitatively assessed attributes in POLSs (*1)	
Accessibility	Elements of accessibility and reduced mobility	10	Jorgensen and Anthopoulou (2007); Cerin <i>et al.</i> (2013); Thompson <i>et al.</i> (2014); Pleson <i>et al.</i> (2014); Finlay <i>et al.</i> (2015); Mitra <i>et al.</i> (2015); Schuett <i>et al.</i> (2016); Loukaitou-Sideris <i>et al.</i> (2016); Yung <i>et al.</i> (2016); Zhai and Baran (2017).	Number of accesses to POLS; number of ramps		
	Quality of sidewalks	9	Sugiyama and Ward Thompson (2008); Sugiyama <i>et al.</i> (2009); Carlson <i>et al.</i> (2012); Thompson <i>et al.</i> (2014); Finlay <i>et al.</i> (2015); Mitra <i>et al.</i> (2015); Loukaitou-Sideris <i>et al.</i> (2016); Artmann <i>et al.</i> (2017); Zhai and Baran (2017).	Total number of category (/ha; /1000 inhab.)	Presence and quality of sidewalks	
	Proximity	7	Sugiyama <i>et al.</i> (2009); Thompson; Aspinall (2011); Pleson <i>et al.</i> (2014); Finlay <i>et al.</i> (2015); Mitra <i>et al.</i> (2015); Yung <i>et al.</i> (2016); Colom <i>et al.</i> (2018).		(*2)	
	Access to urban transport	4	Pleson <i>et al.</i> (2014); Thompson <i>et al.</i> (2014); Loukaitou-Sideris <i>et al.</i> (2016); Yung <i>et al.</i> (2016).		Number of bus stops; number of parking spaces and senior parking	Presence of cycle path
	Traffic conditions	3	Mitra <i>et al.</i> (2015); Finlay <i>et al.</i> (2015); Loukaitou-Sideris <i>et al.</i> (2016).	Number of pedestrian crossings		
Landscape	Natural landscape	10	Sugiyama <i>et al.</i> , 2009; Sugiyama and Ward Thompson (2008); Thompson and Aspinall (2011); Cerin <i>et al.</i> (2013); Thompson <i>et al.</i> (2014); Finlay <i>et al.</i> (2015); Mitra <i>et al.</i> (2015); Loukaitou-Sideris <i>et al.</i> (2016); Zhai and Baran (2017).	Number of large or medium-sized trees; vegetation cover	Total number of category (/ha; /1000 inhab.)	
	Relationship with water	7	Sugiyama and Ward Thompson (2008); Thompson <i>et al.</i> (2014); Thompson and Aspinall (2011); Finlay <i>et al.</i> (2015); Loukaitou-Sideris <i>et al.</i> (2016); Yung <i>et al.</i> (2016); Zhai and Baran (2017).	Number of elements with water (reflecting pools, fountains, lakes)		Presence of water bodies (sea, river, stream, lake)
	Visual quality / landscape aesthetics	6	Sugiyama and Ward Thompson (2008); Sugiyama <i>et al.</i> (2009); Thompson and Aspinall (2011); Carlson <i>et al.</i> (2012); Cerin <i>et al.</i> (2013); Yung <i>et al.</i> (2016).			Conservation/ Maintenance conditions of the space
Safety	Safety	9	Jorgensen and Anthopoulou (2007); Sugiyama and Ward Thompson (2008); Sugiyama <i>et al.</i> (2009); Pleson <i>et al.</i> (2014); Loukaitou-Sideris <i>et al.</i> (2016); Finlay <i>et al.</i> (2015); Cerin <i>et al.</i> (2013); Mitra <i>et al.</i> (2015); Yung <i>et al.</i> (2016).	Number of guardhouses, number of on-site personnel, number of commercial establishments (kiosks) within the space	Total number of category (/ha; /1000 inhab.)	

Note: (*1): The attributes assessed qualitatively are described textually within the research findings for each category. (*2): The evaluated spaces are located within an 800-meter radius of the older adult’s residential address.

Source: prepared by the authors (2020).

Chart 1 – Systematization of the Literature Review and evaluation tool for POLS.

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		Literature Review		Assessment Tools	
Category	Attribute	Frequency	References	Attributes/Elements quantified in the POLS assessment tool for squares and parks (/ha; /1000 inhab.)	Qualitatively assessed attributes in POLSs (*1)
Infrastructure	Walking Track	7	Jorgensen and Anthopoulou (2007); Schuett <i>et al.</i> (2016); Loukaitou-Sideris <i>et al.</i> (2016); Finlay <i>et al.</i> (2015); Yung <i>et al.</i> (2016); Artmann <i>et al.</i> (2017); Zhai and Baran (2017).		Presence and quality of walking track
	Presence of benches	7	Jorgensen and Anthopoulou (2007); Cerin <i>et al.</i> (2013); Yung <i>et al.</i> (2016); Mitra <i>et al.</i> (2015); Finlay <i>et al.</i> (2015); Loukaitou-Sideris <i>et al.</i> (2016); Zhai and Baran (2017)	Number of benches	
	Presence of restrooms	6	Sugiyama <i>et al.</i> (2009); Thompson and Aspinall (2011); Cerin <i>et al.</i> (2013); Finlay <i>et al.</i> (2015); Loukaitou-Sideris <i>et al.</i> , (2016); Yung <i>et al.</i> (2016).	Number of restrooms	
	Maintenance	4	Thompson and Aspinall (2011); Cerin <i>et al.</i> (2013); Thompson <i>et al.</i> (2014); Yung <i>et al.</i> (2016).	Number of litter bins	
	Playground equipment for children	3	Sugiyama <i>et al.</i> (2009); Sugiyama and Ward Thompson (2008); Yung <i>et al.</i> (2016)	Number of playground equipment items	
	Equipment for physical exercise and recreation	2	Pleson <i>et al.</i> (2014); Loukaitou-Sideris <i>et al.</i> (2016)	Number of exercise equipment items, tables, game tables	
	Legibility/Information	2	Jorgensen and Anthopoulou (2007); Loukaitou-Sideris <i>et al.</i> (2016)	Number of signage boards and information elements	
	Presence of lighting	2	Loukaitou-Sideris <i>et al.</i> (2016); Zhai and Baran (2017)	Number of lighting fixtures (light posts/lamps)	
Comfort	Rest areas	6	Sugiyama <i>et al.</i> (2009); Sugiyama and Ward Thompson (2008); Mitra <i>et al.</i> (2015); Schuett <i>et al.</i> (2016); Loukaitou-Sideris <i>et al.</i> (2016); Zhai and Baran (2017).	Number of shaded seating areas	
Land uses in the surrounding area	Land use diversity	2	Sugiyama and Ward Thompson (2008); Mitra <i>et al.</i> (2015).	Number of commercial establishments in the surrounding area	
				Total amount of attributes (/ha, (/1000 inhab.)	

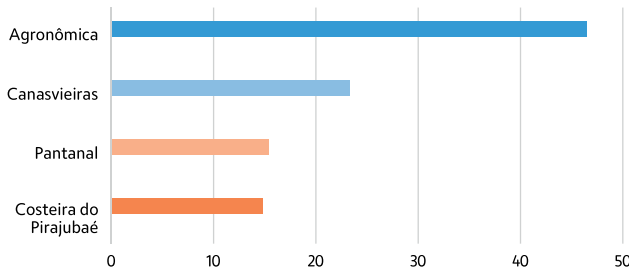
Note: (*1): The attributes assessed qualitatively are described textually within the research findings for each category. (*2): The evaluated spaces are located within an 800-meter radius of the older adult's residential address.

Source: prepared by the authors (2020).

Results and Discussion

Generally, when analyzing the number of attributes that contribute to the quality of public leisure spaces for walking among the elderly population, quantified for each POLS (parks and squares) based on its area and the population it serves, it is evident that the POLSs located in the sample areas where older adults walk more for leisure possess a greater number of quality attributes. Conversely, the spaces situated in the sample areas where they walk less exhibit fewer crucial infrastructural elements across many categories when the attributes of the categories are aggregated by sample area (Figure 3).

Quality attributes in POLSs per area / 1000 inhab.



Quality attributes in POLSs per area / hectare

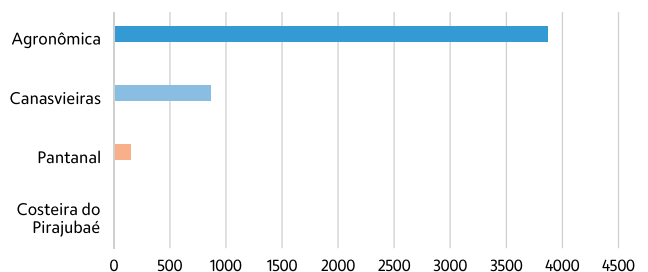


Figure 3 – Total quality attributes by sample area.

Source: prepared by the authors (2020).

This result corroborates previous findings, which assert that age-friendly environments, providing conditions for autonomy and independence for older adults, play a role in health promotion and prevent sedentary behavior. Beyond being a significant motivator for physical activity among the elderly, the quality of public spaces contributes to the improved quality of life for the entire population (Bai *et al.*, 2013; Gilroy, 2008; Na; Lee; Kim, 2013; Petersen *et al.*, 2018; Yeh; Chang; Yang, 2017).

This finding aligns with the results reported by Dorneles (2006) in their study, wherein older adults in Florianópolis discussed the factors attracting and deterring them from POLSs. Among the attracting factors to public open leisure areas, the author highlights proximity to residence, safety, good maintenance of furniture and pavements, the possibility of safely crossing vehicular roads, and diverse surrounding land uses. Conversely, the reported deterrents from public open leisure areas include a lack of safety, limited visibility between different points, the absence of vegetation within the spaces, and a general lack of maintenance.

Beyond the observed difference in the quantity of quality attributes within the POLSs in the sample areas where older adults walk more for leisure compared to those where they walk less, the sheer number of POLSs in these areas is also imbalanced. Specifically, there is a greater quantity of POLSs in the areas where older adults exhibit higher rates of walking, with the exception of the Campeche Leste area, which warrants further investigation.

The residential environment can contribute to the health of older adults by offering opportunities for physical activity and providing spaces where they can establish social connections and engage with nature (Ward Thompson; Aspinall, 2011; Sugiyama; Thompson, 2008). Previous studies indicate that older adults residing in higher-quality neighborhood environments, characterized by supportive infrastructure and the absence of perceived barriers, are more likely to engage in physical activity (Mitra; Siva; Kehler, 2015; Parra *et al.*, 2010; Ward Thompson *et al.*, 2014; Sugiyama; Ward Thompson; Alves, 2009).

The quality of POLSs for leisure walking among the elderly population in each of the evaluated areas, considering existing parks and squares, will be presented in the following text according to the analysis categories in which the attributes were grouped: accessibility, landscape, safety, infrastructure, comfort, and surrounding urban uses.

Accessibility

Within the accessibility category, the number of access points/paths leading into the POLS, the number of ramps (curb cuts) on the sidewalks of the location, and across the street, the number of pedestrian crossings for site access, the number of bus stops, and the number of parking spaces for the elderly were quantified. The presence and quality of sidewalks and cycle paths were observed and qualitatively evaluated.

The attributes composing this category appeared more frequently in the studies reviewed in the literature, which informed the development of the evaluation tool. This highlights their greater importance for the elderly population in relation to the topic under study.

From the field observations, it is possible to ascertain that in the sample areas where the target group walks more, there is a greater supply of public leisure spaces constituted by parks and squares, provided with a larger quantity of quality infrastructural attributes, as demonstrated in Figure 4. In this figure, the data quantified in the field are analyzed from the perspective of the POLS area in hectares (ha) and the quantity of the population served in the surrounding area within an 800-meter radius (per 1000 inhabitants).

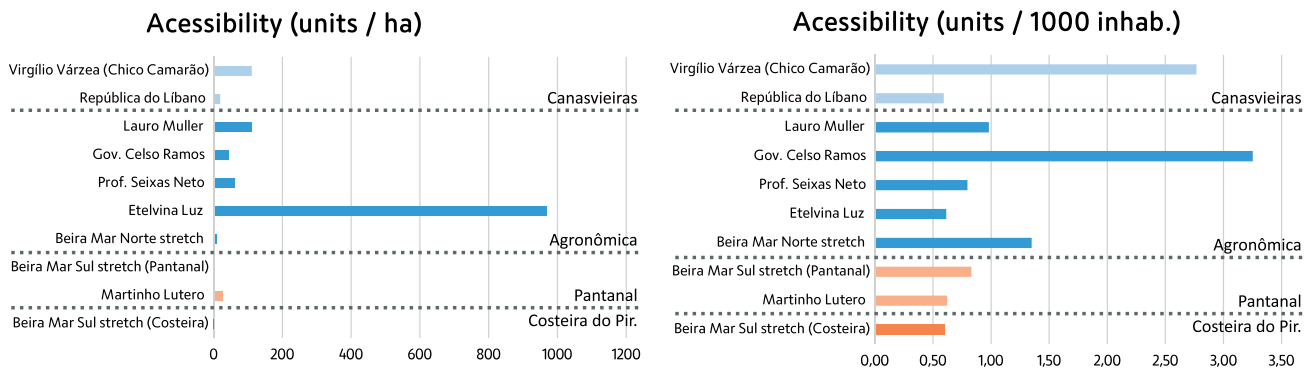


Figure 4 – Quality attributes in the accessibility category for each observed POLS.

Source: prepared by the authors (2020).

The POLSs of Agronômica, one of the areas where older adults walk most for leisure, are notable for their ease of access, in contrast to what was observed in the POLSs of the sample areas where older adults walk less for leisure. This ease of access favors appropriation by the elderly population. In addition to lacking uneven surfaces and barriers, the pathways are wide and easily reachable on foot, by car, or via public transportation. They, therefore, align with the preferences of older users (Zhai; Baran, 2017; Ward Thompson *et al.*, 2014; Loukaitou-Sideris *et al.*, 2016). Etelvina Luz Square, within Agronômica sample area, stands out in this evaluation as it presents several accessibility attributes within a small area.

Bartalini (1986) argues that open spaces should possess physical and visual accessibility to their surroundings and that, in this sense, linear spaces have an advantage over extensive surface areas, as they have a greater perimeter of contact with the urban fabric. This advantage of linear spaces over extensive surface areas is corroborated by the research of Casarin *et al.* (2024).

This characteristic can be visualized in Beira Mar Norte linear park, where accessibility occurs along its entire length.

In contrast, the linear park of Beira Mar Sul (Via expressa Sul) does not exhibit the same, as access points are restricted to pedestrian overpasses and parking pockets, hindering access and creating a barrier to mobility.

Similarly, in the sample areas where older adults walk more for leisure, there is a greater presence of sidewalks in the surroundings, and these sidewalks are wider and flatter, which is corroborated by the neighborhood environment perception data reported by older adults in the EpiFloripa Idoso Cohort Study (Wave 1). According to Giehl *et al.* (2012), leisure-time physical activity was more prevalent among older adults who perceived the existence of sidewalks (32.1%), pedestrian crossings (32.0%), cycle paths, streets/paths, and trails (38.7%), and the absence of steep terrain (32.0%) in their neighborhood. By observing the raw data of the aforementioned study, it is possible to notice that the highest percentages of older adults who have sidewalks on the streets surrounding their homes are in the areas where they walk the most for leisure. Conversely, streets near residences of most older adults living in sample areas with lower levels of walking for leisure (Costeira do Pirajubaé and Pantanal) are not flat, which hinders walking for this age group over 60 years of age.

Landscape

In this category, one of the most frequent elements contributing quality to POLSs in the context of older adults’ walking for leisure, identified in the literature review, is the relationship with nature, whether through green areas or contact with water (Tilley *et al.*, 2017; Finlay *et al.*, 2015; Sanchez-Gonzalez; Adame Rivera; Rodriguez-Rodriguez, 2018; Sugiyama; Ward Thompson, 2008).

Within the landscape category, the number of isolated trees (or trees in landscape compositions) amidst low-lying vegetation and the number of water features (whether in scattered points like reflecting pools, fountains, artificial lakes, or linear features like the shoreline) were quantified. The presence of water and incivilities in the landscape, such as areas with scattered litter, signs of vandalism, and broken installations, were also observed and qualitatively assessed.

The quantification of quality attributes related to the landscape category (number of isolated trees or trees in landscape compositions, number of water features) in each POLS is represented in Figure 5.

The POLSs with the highest landscape quality—regarding tree coverage, presence of water, and absence of incivilities (*e.g.*, litter, graffiti, vandalism, and broken structures)—are located in

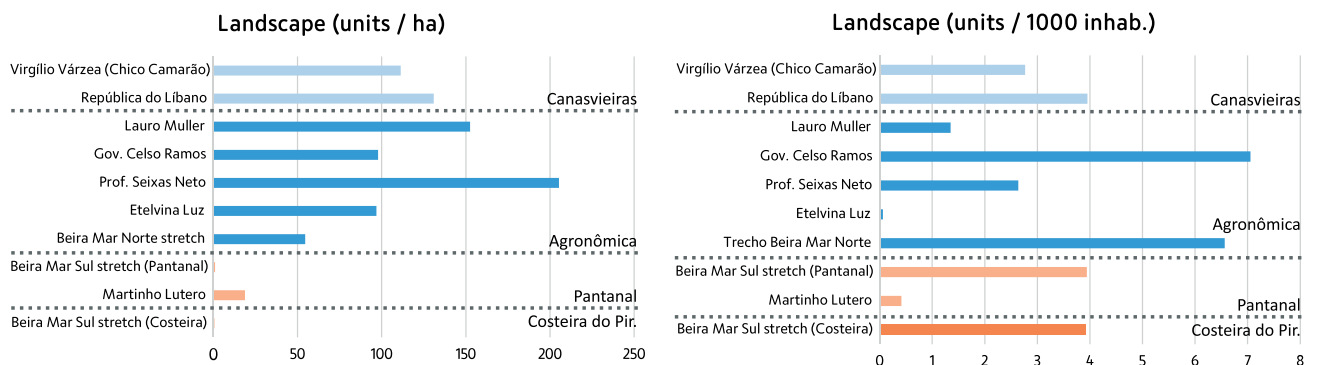


Figure 5 – Quality attributes in the landscape category for each observed POLS.

Source: prepared by the authors (2020).

the most vegetated sample areas. It is also regarding the tree coverage of these spaces that the areas where older adults walk more stand out, with a significantly higher amount of tree coverage compared to the POLSs in the areas where they walk less. This is corroborated by data collected by IBGE in 2010, during the research period, which confirms higher rates of street tree coverage in the vicinity of older adults' homes in the areas where they walk more for leisure.

The POLSs situated in Canasvieiras and Agrônômica, areas where older adults walk the most for leisure, are located in contact with water. Despite having a large vegetated area and being situated along the shoreline, Beira Mar Sul linear park does not offer visual contact with the water along most of its length. The use of the space is also restricted to the paved area of the walking and cycle path. Although the vegetation cover of the surrounding flowerbeds is low-lying, the dense vegetation composed of the mangrove, while enhancing the overall landscape quality, may evoke feelings of insecurity among older adults.

Safety

In the safety category, the number of staff/policing/security personnel responsible for the area, the number of security booths, and the number of commercial establishments located within the POLS (such as kiosks, cafes, restaurants, etc.) were quantified.

The graphs in Figure 6 quantify the quality attributes of the safety category of the POLSs that contribute to leisure walking among the elderly population.

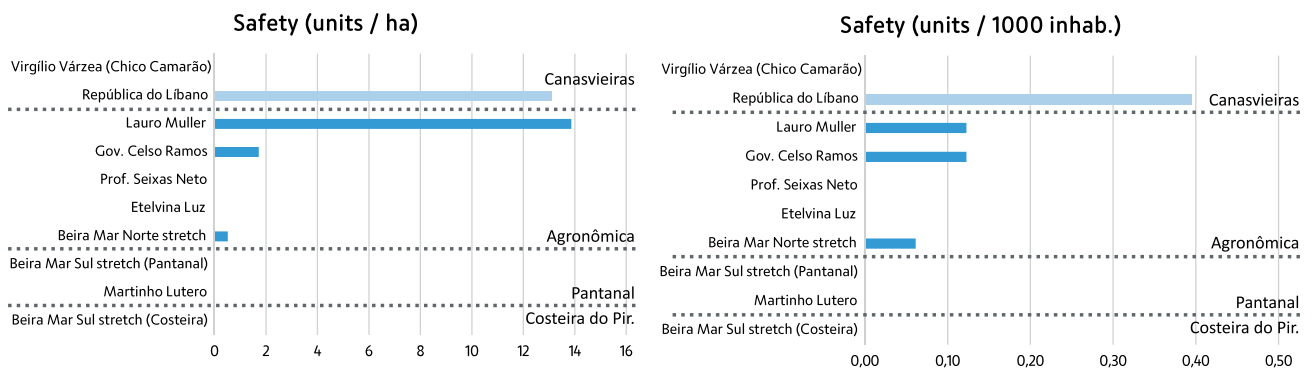


Figure 6 - Quality attributes in the safety category for each observed POLS.

Source: prepared by the authors (2020).

Given the vulnerability of older adults, safety elements were identified in the literature review as a category with significant influence on their decision to use, or not use, a public open space.

In the observed spaces, only four had the presence of infrastructural safety elements, and all were located in areas with the highest percentages of leisure walking by the elderly. Hotels are located in República do Líbano square and Lauro Muller Square, where there is the circulation of guests and the constant presence of staff welcoming clients. Governador Celso Ramos Square had a staff member from a community group that manages the space, stationed at a built structure within the place. In Beira Mar Norte linear park, the presence of a municipal guard vehicle was observed. In the areas located in the areas where the elderly walk less, the feeling of insecurity perceived by the researchers was greater, whether due to the smaller number of people circulating, the lower visual permeability in the surroundings, or the lack of maintenance of the places.

The perception of safety also permeates other categories in different psychological aspects, since the elderly person, in addition to the fear of suffering violence (a factor related to the visual

permeability of the space and the circulation of other vulnerable groups) also has concerns about falls (a factor related to the lack of accessibility), and fear of getting lost (a factor related to the lack of information in the landscape) (Sugiyama; Ward Thompson, 2008; Loukaitou-Sideris *et al.*, 2016; Dorneles, 2006; Gehl Institute, 2018).

Infrastructure

In the infrastructure category, the number of trash bins, the number of playground equipment for children, the number of benches, the number of tables and game tables, the number of public restrooms, the number of exercise equipment items, the number of signage boards, and the number of light posts/lamps were quantified.

In the systematic observation, it was verified that the POLSs situated in the sample areas where older adults walk more are those that offer the greatest diversity of infrastructures/amenities for users, whether through benches, lighting, game tables, playground equipment and exercise equipment (Figure 7).

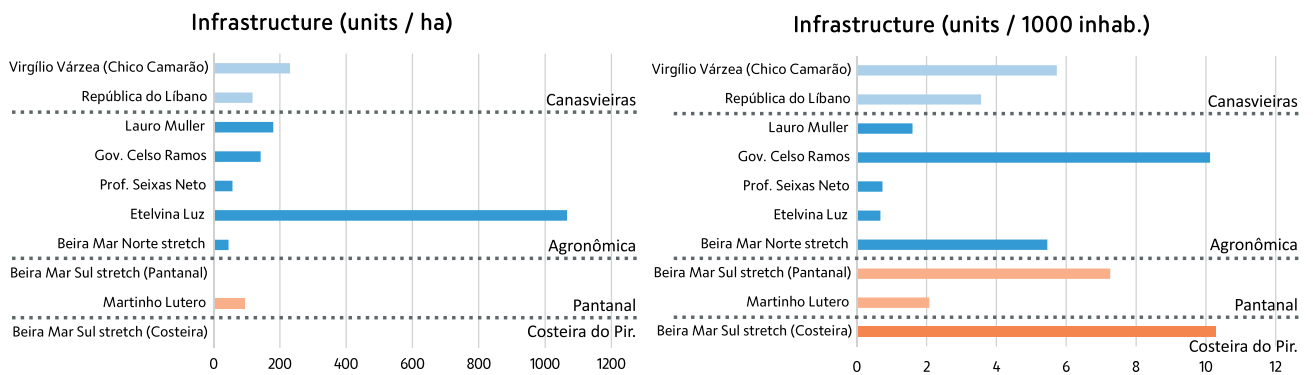


Figure 7 – Quality attributes in the infrastructure category for each observed POLS.

Source: prepared by the authors (2020).

The linear park of Beira Mar Sul (Via expressa Sul), despite its large extent, has minimal infrastructure, composed only of a walking track, cycle path and light posts/lamps, enabling limited activities and little appropriation by the population. It should be noted that the apparent quality perceived in this section of the POLS, in the figure above, refers to the installation of light posts/lamps in the space, which are mostly dedicated to illuminating the various traffic lanes in the location, and does not necessarily reflect the quality for elderly walking. Allied to this is the lower population density of the area.

It is worth noting that, in Dorneles' (2006) study, older adults in Florianópolis mentioned that places offering diversified activities in public open spaces, as well as the presence of other vulnerable groups such as women and children, are more attractive for use by the elderly. For this, it is necessary that the space is equipped with varied infrastructure elements that support diverse users and functions (Gehl Institute, 2018).

Comfort

In the comfort category, the number of shaded structures (e.g. pergolas) and the number of shaded rest areas (benches or other elements under trees) were quantified in the POLS of each sample area, the result of which is represented in the graphs of Figure 8.

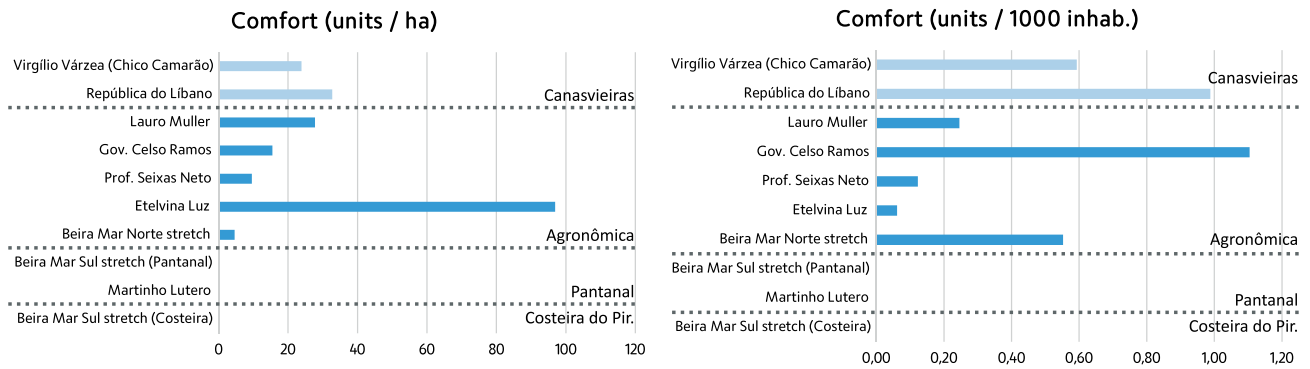


Figure 8 – Quality attributes in the comfort category for each observed POLS.

Source: prepared by the authors (2020).

It is noticeable that in the observed sections of Beira Mar Sul linear park and Martinho Lutero square, spaces located in the areas where older adults walk less for leisure, no attributes were observed to provide passive leisure and rest during the older adults’ walks. This finding corroborates the study developed with Chinese older adults, where the paths with more benches were the most used by the elderly (Zhai; Baran, 2017). In addition to the demand for accessible and safe places, older users need comfortable locations, where they can sit and rest, protected from the sun and without unpleasant odors and the presence of loud noise, according to the studies of Dorneles (2006), Cerin *et al.* (2013) and Mitra, Siva, Kehler (2015).

Land Uses in the Urban Surroundings

Within the category of land uses in the urban surroundings, the number of commercial establishments around the POLSs was quantified, represented in the graphs in Figure 9. The diversity of land uses in the neighborhood and around the open spaces was identified in the literature as a factor that may influence leisure walking among older adults.

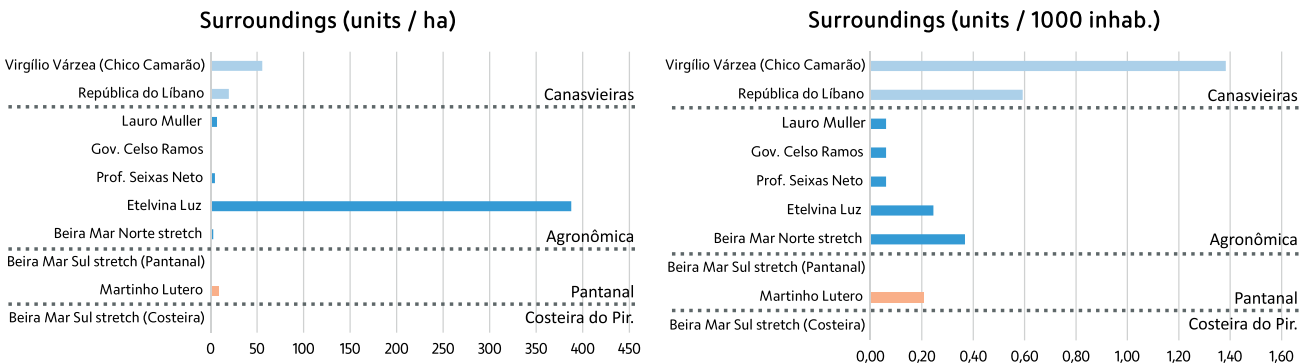


Figure 9 – Quality attributes in the surrounding urban uses category for each observed POLS.

Source: prepared by the authors (2020).

Virgílio Várzea Square, located in Canasvieiras, one of the sample areas where older adults walk the most for leisure, stands out due to the quantity of shops around the site, generating significant pedestrian circulation and occupation at various times of the day. As pointed out by Mitra, Siva, and Kehler (2015), neighborhood shops and other establishments act as incentives for walking in the vicinity of older adults’ housing, serving as both a destination and a place to sit, rest, and have coffee.

Final Considerations

This study, aiming to assess the quality of POLSs within sample areas where older adults walk the most and the least for leisure in Florianópolis, was developed essentially from the systematic observation of these spaces, quantifying the attributes that are important to older adults identified in the literature. The results corroborate the study's premise, as in the sample areas where the percentage of older adults engaging in walking activity is higher (between 60% and 80% of older adults walk for leisure), there are POLSs with better quality compared to the sample areas where less walking for leisure occurs (between 0 and 20% of older adults who walk for leisure).

Furthermore, systematic observation demonstrated a scarcity of quality attributes in the areas where older adults walk less for leisure. The spaces with more quality attributes are situated in the more walked areas, with greater circulation of people, diversified activities occurring throughout the space, and better integration with the urban fabric, indicating that, to some extent, a relationship may exist between walking for leisure activity and the quality of POLSs in the vicinity of older adults' housing.

It is necessary to highlight however, the limitations of this study, which did not focus on analyzing to analyzing income data, which possibly influences the population's walking for leisure and the supply of infrastructural facilities for leisure open spaces in neighborhoods; and which considered in this analysis only considered qualitatively the aspects of the surrounding topography, which is known to influence the walking of the older population. It is therefore suggested that these variables be addressed in future research.

Considering the influence of the built environment on the behavior of older adults, it is understood that improvements in planning and urban design, envisioning a more human-centered city at the pedestrian scale, will promote active aging and quality of life. Investments in infrastructure can reduce public health expenditures, ultimately benefiting the population through a healthier and more sustainable city.

It is understood that knowledge about the needs and preferences of older adults can assist in the construction of more democratic cities, contributing to the quality of urban space and the promotion of active aging.

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Contributors

F. F. Demarco contributed to data curation, data analysis, data presentation design, and original manuscript writing. F.F. Demarco and V. Casarin collaborated on conceptualization, research, and methodology. V. Casarin collaborated on supervision, data and experiments validation, and writing – review and editing.