Systematic Review

Systematic Review of the Use of the Walk-Along Interview Method to Assess Factors, Facilitators and Barriers Related to Perceived Neighborhood Environment and Walking Activity in Healthy Older Adults

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Abstract: Background: Based on findings from a recent systematic review of the methodological aspects related to data collection for the walk-along interview (WAI) method applied to healthy older adults, complementary questions emerged, among them, what are the main outcomes of studies that have used the WAI? **Objective**: The aim of this systematic review is to identify the outcomes of published studies that have used the WAI method to identify correlates of the perceived neighborhood environment on walking activity in healthy older adults. **Methods:** In accordance with the PRISMA guidelines, a date-unrestricted search spanning four databases was performed. Of the 164 articles identified in the initial search, 31 articles published between 2012 and 2022 met the inclusion criteria. **Results:** The extracted outcomes were classified into two categories: (1) the relationship between the physical characteristics of the environment and walking among healthy older adults (e.g., pedestrian infrastructure, safety, access to facilities, aesthetics and environmental conditions) and (2) the facilitators and barriers to walking, based on the dimensions of the socioecological model. **Conclusions:** This review provides a valuable resource for researchers, students and professionals who wish to work with the WAI method, working on aging and age-friendly cities policies.

Keywords: qualitative methods; walk-along interview; parcours commentés; older adults; walking; neighborhood; socioecological model; built environment; social environment

1. Introduction

In 2018, the World Health Organization (WHO) published the Global Network of Age-friendly Cities and Communities Report, which reports on two simultaneous global phenomena affecting both developed and developing countries: population aging and urbanization [1]. Aging is one of the most important social transformations of the 21st century, with repercussions in almost every sector of society [2], so new tools and solutions need to be explored today to better meet the future needs and expectations of older people in their living environments [3].

Examining the concept of sustainability in a city with regard to its aging population is essential. This allows us to consider the quality of life of all inhabitants and the specific needs of older people in urban areas from economic, demographic, cultural and environmental points of view [4]. Research showed that the ability of older adults to move through urban spaces is a key factor for a positive residential experience [5,6]. Considering that

people over 75 years old make more than half of their local trips by walking, urban spaces play a very important role in the quality of life of these people [7].

In addition, neighborhood contexts play an important role in the lives of older adults as places can both support and pose barriers to health, participation, engagement and inclusion through complex interactions between people and places [8–10]. Fully exploring how neighborhoods shape the lives of older adults requires innovative and creative methods [11]. In line with these needs, the "walk-along interview" method (later, WAI) is a variant of qualitative interview techniques that has great utility (alone or in combination with other methods) for exploring and subsequently enhancing the understanding of people's experiences of the residential context [12].

The WAI method has become an internationally recognized spatial qualitative method within the research and practitioner communities [13–15]. The WAI method developed by Cresson's team at Grenoble Alpes University in France [16,17] is a type of in-depth qualitative interview [12] that involves accompanying the participant through a familiar environment, such as a neighborhood or a wider local area [12,18,19].

During a WAI, participants can not only recount their memories of the place but also describe their present experience, incorporating their perspective, ideas and emotions of the environment, stimulated by the act of walking and talking at the same time. Together, this helps to capture the natural relationship of the participant with the environment in a participatory way [20]. Thus, it is a unique and original method that is able to merge the interview and participant observation [21].

The application of this method is intended to help to better understand how people perceive their environment, to obtain context-sensitive information [17] and to identify new topics that would not be generated by traditional interviews [19]. However, there is little published work on the use of the WAI method itself [12,15,19,22], so greater knowledge and understanding of how this method has been applied is crucial to improving its effective use.

The present work was designed to complement a recently published systematic review [22] that focused on data collection methods related to the use of WAI with healthy older adults. This paper now addresses the following question: what are the outcomes of the WAI method that identify correlates of the perceived neighborhood environment to walking activity in healthy older adults?

To achieve this goal, we first extracted and synthesized outcomes obtained from the included studies and then classified them into two main categories. The first category of outcomes is related to the relationship between the physical characteristics of the environment and walking of older adults, using Moran and colleagues' classification [23]. The second category of outcomes is related to the facilitators and barriers to physical activity, mostly walking, of healthy older adults, based on the dimensions of the socioecological model (the environmental, interpersonal, intrapersonal and organizational dimensions) [24].

We believe that it is important to consider the outcomes of studies that have applied the WAI method with healthy older adults to identify correlates of the perceived neighborhood environment on walking activity as these could serve to deepen certain under-studied aspects. On the other hand, the results of this systematic review could inspire policies that facilitate the design of more age-friendly and walkable cities.

2. Materials and Methods

Guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [25] and the Cochrane Handbook for Systematic Reviews guidelines [26], we conducted a systematic search of several electronic databases. This systematic review solely focused on publicly accessible studies. See the PRISMA checklist in the Supplementary Materials.

2.1. Data Sources and Search Strategy

A comprehensive search was performed in PubMed, SocINDEX, Web of Science and Scopus from inception to 4 July 2022 [22]. The search terms were combinations of Medical

Subject Headings terms about (1) the population—older adults (e.g., aging, ageing, aged, older, elderly and senior)—and (2) the intervention—WAI (e.g., commented route, walk-along interview, go-along interview and walking interviews). The search strategy included combinations of these keywords found in the abstract, title or keywords of the included articles. More details on the search strategy and methodology can be found in the first systematic review [22].

2.2. Selection Criteria

Only studies meeting the following criteria were included: original articles in peer-reviewed journals written in English that used the WAI method to discern correlations between the perceived neighborhood environment and walking activities in healthy older adults aged ≥55 years.

2.3. Study Selection and Data Extraction

Two reviewers (V.A. and M.C.) independently screened the titles, abstracts and key-words based on the inclusion and exclusion criteria. Full-length texts underwent a similar process. Discrepancies in article inclusion or exclusion were resolved through discussions, and if needed, a third reviewer (N.V.) made the final decision.

Data extraction was carried out by two independent reviewers (V.A. and M.C.) according to a pre-designed table. First, general and methodological information was extracted. Secondly, the reported findings on correlates of a perceived neighborhood environment to walking activity in healthy older adults were extracted. Disagreements were resolved by discussion; a third reviewer (NV) mediated if needed.

2.4. Summarizing and Analyzing the Outcomes

We analyzed and classified the outcomes extracted from the included studies according to two main categories. The first refers to the relationship between the physical characteristics of the environment and the walking activity of healthy older adults, using the classification of Moran and colleagues [23]. The second refers to the facilitators and barriers to walking, based on a classification using the dimensions of the socioecological model [24]. Attention was hence first given to whether the results of the studies applying the WAI reflected issues with respect to the environmental setting and walking activity in healthy older adults, mainly with respect to pedestrian infrastructure, safety, access to facilities, aesthetics and environmental conditions [23]. An inductive approach [27,28] was used to analyze the content of the extracted outcomes.

3. Results

3.1. Study Selection

A total of 164 articles were identified by searching four databases: PubMed (*n* = 18), Web of Science (*n* = 47), SocINDEX (*n* = 15) and Scopus (*n* = 84) (see Figure 1). One additional article was identified through a manual search. After removing duplicates (*n* = 65), 99 records were identified. After screening the titles and abstracts, 37 full texts were assessed for eligibility, of which 31 articles met the inclusion criteria and were included in this systematic review, published between 2012 and 2022 [22].
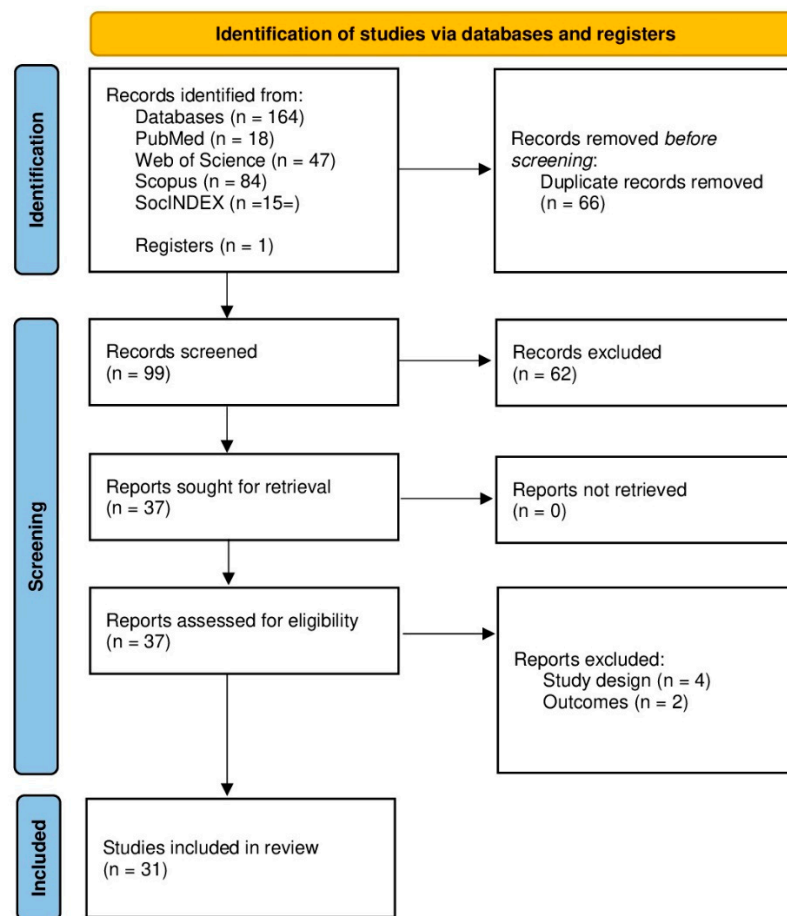
Figure 1. Flow diagram of the study selection.

3.2. Study Area in Which WAI Was Applied

Among the 31 articles included in this systematic review, 20 (65%) studies applied the WAI in individuals' own neighborhoods [13,29–47]; 1 (3%) study applied the WAI in subway stations in high-density areas [48]; 5 (16%) studies applied the WAI in parks and/or green spaces [49–53]; 2 (6%) studies applied the WAI in smart cities [54,55]; 2 (6%) studies applied the WAI in community housing [14,56]; and 1 (3%) study applied the WAI in a residential care facility [57].

3.3. Relationships between Physical Environment and Walking in Healthy Older Adults

Previous studies showed the importance of the physical environment in promoting physical activity, including walking, in older adults [11,58,59]. Studies also supported that the WAI can inform about the relationship between an environment and older adults [17,19] by providing information on how and why the environment influences older adults' walking experience and perception. Therefore, based on Moran and colleagues' classification of themes, subthemes and environmental factors related to the physical activity behaviors of older adults [23] (see Table 1), we categorized the outcomes of the studies in this systematic review into five main themes: (1) pedestrian infrastructure, (2) safety, (3) amenity access, (4) aesthetics and (5) environmental conditions.

Table 1. Themes, subthemes and environmental factors reported in the reviewed studies.

Themes	Subthemes	Environmental Factors	Number of Articles	Studies Reference Numbers
Pedestrian Infrastructure	Sidewalk characteristics	Sidewalks' presence and continuity	8	[14,29,30,34,36,40,44,53]
		Sidewalks' quality and maintenance	13	[13,14,29,30,34,36,39,41,44–46,48,51]
		Sidewalks' slopes and curbs	13	[13,30,31,34,36,38,40,44–46,48,49,57]
		Temporary obstacles on sidewalks	9	[30,31,34–36,41,44,46,48]
		Connectivity [*]	4	[44,47,48,50]
		Sheltered walkways (in sidewalk characteristics) [*]	4	[13,29,41,53]
	Separation between pedestrians and non-motorized transport	Cyclists on sidewalks	5	[13,41,44,46,56]
		Skateboarders and roller-bladers on sidewalks	1	[13]
Safety	Crime-related safety	Lack of street lightning	10	[30,36,37,41,44–46,50,52,55]
		Upkeep (i.e., vacant houses, overgrown lots, vandalism)	9	[13,31,36,37,39,44,45,49,53]
		Other people	11	[14,32,40,44–46,48,50,52,54,55]
		Presence of authorized personnel	1	[45]
	Traffic-related safety	Zebra crossing characteristic and wayfinding signs	11	[13,30,36,37,39–41,44,46,48,55]
		Heavy road traffic [*]	6	[34,40,44,46,47,56]
		Reckless driving behavior	2	[13,44]
Access to facilities	Access to exercise opportunities	Access to recreational facilities	13	[14,31,34,37,39–41,45,47,49,53,55,56]
		Access to senior-oriented group activities	6	[32,33,37,45,47,56]
		Access to green open spaces	15	[13,14,31,34,37,40,41,44,45,47,49,51,52,56,57]
	Access to daily destinations	Access to daily destinations	19	[13,31,32,34–42,44–47,51,55,56]
		Access to public transit	9	[13,14,36,44,45,48,50,55,56]
	Access to rest areas	Access to benches	11	[13,29,31,42,44,46,48,50–53]
		Access to public washrooms	4	[13,46,48,53]
Aesthetics	Building and streetscapes	Private property	7	[13,29,36,39,40,51,57]
		Public realm	10	[14,34,36,44,46–48,53,55,57]
	Natural scenery (green–blue spaces)	Presence of greenery	17	[14,29,34,36,39–42,44–46,49–53,56]
		Presence of water	8	[14,42,44,45,50,51,55,56]
	Level of cleanness [*]	Presence of trash and level of cleanness [*]	11	[13,36,39,44–46,48,49,51–53]
Environmental conditions	WeatherWeather and seasonal/climatic conditions	Cold weather	7	[29–31,38,41,44,46]
		Hot weather	3	[13,31,35]
		Warm weather	2	[44,50]
	Environmental quality	High environmental quality	2	[13,39]
		Pollution	5	[14,44–46,50]

Note: This table shows the environmental factors reported by the studies in this systematic review, according to their classification, using the classification proposed by Moran and colleagues [23]. [*] indicates subthemes and/or factors that we added to the classification proposed by Moran and colleagues.

At this point, some factors that were not identified in Moran and colleagues' classification were added, based on other studies featured in this systematic review. These identified factors include (1) the sidewalks' connectivity; (2) the presence of sheltered walkways; (3) heavy road traffic; and (4) the presence of trash and the level of cleanness.

3.3.1. Pedestrian Infrastructure

Of the 31 articles included in this systematic review, 23 (74%) studies reported outcomes related to the pedestrian infrastructure [13,14,29–31,34–36,38–41,44–51,53,56,57].

Furthermore, the pedestrian infrastructure includes two subthemes: (1) sidewalk characteristics (*n* = 22; 71%) [13,14,29–31,34–36,38–41,44–51,53,57] and (2) separation between pedestrians and other non-motorized transport modes (*n* = 5, 16%) [13,41,44,46,56].

Reported sub-topics were as follows:

- Quality and maintenance of sidewalks (*n* = 13, 42%) [13,14,29,30,34,36,39,41,44–46,48,51];
- Sidewalks' slopes and curbs (*n* = 13, 42%) [13,30,31,34,36,38,40,44–46,48,49,57];
- Temporary obstacles on sidewalks (*n* = 9, 29%) [30,31,34–36,41,44,46,48];
- Presence and continuity of sidewalks (*n* = 8, 26%) [14,29,30,34,36,40,44,53];
- Cyclists on sidewalks (*n* = 5, 16%) [13,41,44,46,56];
- Sidewalks' connectivity (*n* = 4, 13%) [44,47,48,50];
- Presence of sheltered walkways (*n* = 4, 13%) [13,29,41,53];
- Presence of skateboarders and roller-bladers on sidewalks (*n* = 1, 3%) [13].

3.3.2. Safety

Of the 31 studies, 23 (74%) reported safety-related outcomes [13,14,30–32,34,36,37,39–41,44–50,52–56].

The safety theme includes two subthemes: (1) crime-related safety (*n* = 20, 65%) [13,14,30–32,36,37,39–41,44–46,48–50,52–55] and (2) road safety (*n* = 15, 48%) [13,30,32,34,36,37,39–41,44,46–48,55,56].

Reported sub-topics were as follows:

- Presence of other people (*n* = 11, 35%) [14,32,40,44–46,48,50,52,54,55];
- Zebra crossing characteristics (*n* = 11, 35%) [13,30,36,37,39–41,44,46,48,55];
- Lack of street lighting (*n* = 10, 32%) [30,36,37,41,44–46,50,52,55];
- Upkeep (*n* = 9, 29%) [13,31,36,37,39,44,45,49,53];
- Heavy road traffic (*n* = 6, 19%) [34,40,44,46,47,56];
- Reckless driving behavior (*n* = 2, 6%) [13,44];
- Presence of authorized personnel (*n* = 1, 3%) [45].

3.3.3. Access to Facilities

Of the 31 studies included in this systematic review, 28 (90%) studies reported outcomes related to access to facilities [13,14,29,31–42,44–53,55–57].

The theme of access to facilities includes three subthemes: (1) access to exercise opportunities (e.g., access to recreational facilities, senior-oriented group activities and green open spaces) (*n* = 20, 65%) [13,14,31,33,34,36,37,39–41,44,45,47,49,51–53,55–57], (2) access to daily destinations (*n* = 22, 71%) [13,14,31,32,34–42,44–48,50,51,55,56] and (3) access to rest areas (*n* = 11, 35%) [13,29,31,42,44,46,48,50–53].

Reported sub-topics were as follows:

- Access to daily destinations (*n* = 19, 61%) [13,31,32,34–42,44–47,51,55,56];
- Access to open green space (*n* = 15, 48%) [13,14,31,34,37,40,41,44,45,47,49,51,52,56,57];
- Access to recreational facilities (*n* = 13, 42%) [14,31,34,37,39–41,45,47,49,53,55,56];
- Access to benches (*n* = 11, 35%) [13,29,31,42,44,46,48,50–53];
- Access to public transit (*n* = 9, 29%) [13,14,36,44,45,48,50,55,56];
- Access to senior-oriented group activities (*n* = 6, 19%) [32,33,37,45,47,56];
- Access to public washrooms (*n* = 4, 13%) [13,46,48,53].

3.3.4. Aesthetics

Of the 31 studies included in this systematic review, 22 (71%) studies reported outcomes related to aesthetics [13,14,29,34,36,39–42,44–53,55–57].

The aesthetics theme includes three subthemes: (1) buildings and streetscapes (*n* = 15, 48%) [13,14,29,34,36,39,40,44,46–48,51,53,55,57], (2) natural scenery (*n* = 18, 58%) [14,29,34, 36,39–42,44–46,49–53,55,56] and (3) cleanness (*n* = 11, 35%) [13,36,39,44–46,48,49,51–53].

Reported sub-topics were as follows:

- Presence of greenery (*n* = 17, 55%) [14,29,34,36,39–42,44–46,49–53,56];
- Presence of trash and level of cleanness (*n* = 11, 35%) [13,36,39,44–46,48,49,51–53];
- Public realm (*n* = 10, 32%) [14,34,36,44,46–48,53,55,57];
- Presence of water (*n* = 8, 26%) [14,42,44,45,50,51,55,56];
- Private property (*n* = 7, 23%) [13,29,36,39,40,51,57].

3.3.5. Environmental Conditions

Of the 31 studies included in this systematic review, 13 (42%) reported outcomes related to environmental conditions [13,14,29–31,35,38,39,41,44–46,50].

The environmental conditions theme includes two subthemes: (1) weather (*n* = 10, 32%) [13,29–31,35,38,41,44,46,50] and (2) environmental quality (*n* = 7, 23%) [13,14,39,44–46,50].

Reported sub-topics were as follows:

- Cold weather (*n* = 7, 32%) [29–31,38,41,46,59];
- Pollution (*n* = 5, 16%) [14,44–46,50];
- Hot weather (*n* = 3, 10%) [13,31,35];
- Warm weather (*n* = 2, 6%) [44,50];
- High environmental quality (*n* = 2, 6%) [13,39].

3.4. Facilitators and Barriers to Walking in Healthy Older Adults

The ability to keep moving around the neighborhood is recognized as one of the factors contributing to healthy aging in place [44]. The WAI is an effective method for exploring the influence of the environment on older people's mobility [42,44] and a particularly useful method for exploring the subjective experiences of walking in urban environments and studying the space–place relationship [12].

We identified the facilitators and barriers that influence the walking behavior of healthy older adults based on the results presented by the studies of this systematic review. For this purpose, the data were classified using McLeroy's socioecological model [60] as a theoretical framework that recognizes that people's health behaviors are influenced by the environment in which they live, along with psychosocial, personal, cultural and political variables [61] (see Table 2).

Table 2. Facilitators and barriers to walking activity reported in the studies included in this systematic review.

Socioecological Model	Factors	Facilitators		Barriers	
		Number of Articles	Studies' Reference Numbers	Number of Articles	Studies' Reference Numbers
Environmental Dimension	Pedestrian infrastructure	12	[13,29,33,36,41,44–47,49,53,57]	13	[13,29–31,34–36,38,41,46–48,57]
	Safety	10	[13,29,32,36,44–47,53,55]	15	[13,31,32,36,37,39–41,44,46–49,55,56]
	Access to facilities	20	[13,14,32,33,35–38,40–42,44–47,49,52,53,55,56]	7	[13,29,32,40,41,47,48]
	Aesthetics	14	[36,39,41,42,44–47,49,51–53,56,57]	6	[36,39,41,46,47,53]
	Environmental conditions	3	[44–46]	10	[13,29–31,33,35,38,41,46,48]
Intrapersonal Dimension	Health status	4	[13,38,40,56]	8	[13,14,31,32,35,38,40,48]
	Physical capabilities	4	[32,38,55,56]	7	[13,31,32,38,42,48,54]
	Financial capabilities	2	[13,45]	1	[47]
	Feelings and emotions	4	[31,36,38,56]	2	[36,56]
Interpersonal Dimension	Social exposures	17	[13,14,29,31–34,38,40–42,44–46,49,55,56]	3	[13,33,48]
Organizational Dimension	Policy issues	1	[13]	0	-------

This table shows the facilitators and barriers to walking activity reported in the studies in this systematic review. For classification, the socioecological model proposed by McLeroy [60] was used.

3.4.1. Environmental Dimension

Of the 31 studies included in this systematic review, in the environmental dimension, 24 studies (77%) reported facilitators to walking in healthy older adults [13,14,29,32,33,35–42,44–47,49,51–53,55–57] and 22 studies (71%) reported barriers to walking [13,29–36,38–41,44,46–49,53,55–57].

Facilitators

The most commonly reported facilitator was access to facilities (n = 20, 65%) [13,14,32, 33,35–38,40–42,44–47,49,52,53,55,56], which included the following:

- Variety, presence and proximity to local stores, restaurants and activity centers [13,32, 33,35–38,40,41,45,47,49,55,56,58];
- Presence of benches and places to rest [29,42,45,46,52,53];
- Presence of parks, squares, green spaces and/or recreational centers [14,36,37,47,49];
- Better support and access to public transportation [32,45,56];
- Places/spaces that have shade, especially in hot weather [52,53].

The second most reported set of facilitators were related to aesthetics (n = 14, 45%) [36, 39,41,42,44–47,49,51–53,56,57], which included the following:

- Landscaping and the presence of greenery (gardens, flowers, plants and trees) [39,41, 42,45–47,49,51,52,56];
- Clean and well-maintained areas/places [13,36,44–46,51];
- Presence of water elements (fountains, rivers and lakes) [45,53,56] and
- Design and maintenance of buildings [44,57].

The third most reported set of facilitators were related to pedestrian infrastructure (n = 12, 39%) [13,29,33,36,41,44–47,49,53,57], which included the following:

- Presence of pedestrian walkways that are unobstructed, even, well-defined or slip-resistant [13,36,41,44–46,49];
- Presence of walkways, spaces or walkways protected from inclement weather (rain, drizzle, sun and wind) [13,29,33,41];
- Connectivity of pedestrian paths and alternative routes [13,44,47];
- Wide sidewalks [36,45];
- Flat, paved paths [45,53];
- Presence of ramps rather than stairs [41].

The fourth most reported set of facilitators was related to safety (n = 10, 32%) [13,29, 32,36,44–47,53,55], which included the following:

- Presence of street lighting, as a key element in providing safety at night [36,55];
- Locations away from traffic or with little traffic [44,53];
- Presence of vertical and horizontal signage such as crosswalks and traffic lights [13,44];
- Presence of police patrols and neighborhood watch activities [45].

Finally, the fifth most common set of facilitators reported in the studies was related to environmental conditions (n = 3, 10%) [44–46], which include the following:

- Vegetation and cool breeze in spring and summer that encourage older adults to engage in outdoor activities [44,45];
- Good air quality that encourages walking [45,46].

Barriers

The most commonly reported barrier was related to crime-related safety and traffic-related safety (n = 15, 48%) [13,31,32,36,37,39–41,44,46–49,55,56], which included the following:

- High-traffic areas and high-speed traffic [31,36,40,44,46,47,56];
- Absence of lighting and/or street lighting [37,39,41,46,48,55];
- Presence of other strangers or "suspicious-looking" people [31,32,46,48,49,55];
- Noise nuisance [36,46,48];

- Maintenance and appearance of the built environment (e.g., unkempt front yards, dilapidated buildings, blind walls and graffiti) [31,36];
- The behavior and presence of cyclists and people with personal mobility devices such as scooters on pedestrian paths [13,49];
- Absence of signage [41].

The second most common set of barriers reported was related to pedestrian infrastructure (*n* = 13, 42%) [13,29–31,34–36,38,41,46–48,57], which included the following:

- Uneven/irregular, narrow, deteriorated and/or slippery walking paths [13,29–31,35, 36,41,46,48];
- Obstruction of walking paths caused by items such as plants, trash cans, garbage, trash, kiosks and bicycle parking, among others [31,34,36,41,48];
- Steep slopes or changes in level [30,38,57];
- Absence of shelters/shades or continuous protected walkways [41,48];
- Presence of stairs [41,48];
- Absence of sidewalks [34].

The third most common set of barriers reported were environmental conditions (*n* = 11, 35%) [13,29–31,33,35,38,41,44,46,48], which included the following:

- Adverse weather conditions (rain, snow, wind and ice) [13,29–31,33,38,41,44], as well as high temperatures [13,35];
- Poor air quality, high noise levels, and the absence of shade along the walkway [13,46,48].

The fourth most common group of barriers reported in the studies was related to access to facilities (*n* = 7, 23%) [13,29,32,40,41,47,48], which included the following:

- Poor variety of local services/shops [13,32,40,47];
- Poor availability of seats/benches and resting areas [13,29,48];
- Absence of public toilets [41].

The fifth most common set of barriers reported was aesthetics (*n* = 6, 19%) [36,39,41, 46,47,53], which included the following:

- Dirty public toilets, and garbage accumulation in public spaces and walking paths [36, 39,41,47,53];
- Lack of trees and green areas [36,47,53].

3.4.2. Intrapersonal Dimension

Of the 31 studies included in this systematic review, 9 (29%) studies reported facilitators to walking [13,31,32,36,38,40,45,55,56] and 13 (42%) studies reported barriers to walking [13,14,31,32,35,36,38,40,42,47,48,54,56].

Facilitators

The facilitators most reported were related to health status and physical capabilities (*n* = 4, 13%) [32,38,55,56], which included the following:

- Walking for exercise, and staying active and healthy [38,55,56];
- Ability to walk independently [32,38].

The second most reported group of facilitators were related to feelings and emotions (*n* = 4, 13%) [31,36,38,56], which included the following:

- Experiences of well-being and/or security they felt on previous walks that motivated and/or facilitated future walks [36];
- Going for walks as a means of retaining a feeling of autobiographical interiority [38];
- Adherence to routines to which the participant had become accustomed [56];
- Need to get away from the monotony of the home environment, loneliness and isolation [31].

Some facilitators for walking related to financial capacity (*n* = 2, 6%) [13,45] were also reported, e.g., affordability of stores and services or presence of free-of-charge public spaces or services.

Barriers

The most reported set of barriers reported are related to the health status and physical abilities of the older adults (*n* = 10, 32%) [13,14,31,32,35,38,40,42,48,54], which included the following:

- Deterioration of health (e.g., problems with sight, hearing, lung function and cardiovascular diseases) that make it difficult for people to go out and walk [14,30–32,35,38,40,48];
- Deterioration of their physical abilities, resulting in reduced mobility that can be caused, for example, by injury, pain in the knees and/or feet, ankle problems and a degeneration of leg muscles, among others [13,32,42,48,54];
- Reduced energy level and sense of balance [38].

In two studies (6%) [36,56], barriers to walking related to feelings and emotions were also reported, which included the following:

- Stress and/or insecurity, fear, anger, sadness and disgust that are related to elements of the environment and that can make walking difficult [36];
- Traumas that the person may have because of incidents (for example, having been run over) [56].

On the other hand, one study (3%) [47] reported barriers to walking related to financial ability, which included the following:

- Some facilities (i.e., restaurants and cafes) were perceived as being unaffordable for some participants and did not encourage these participants to walk.

3.4.3. Interpersonal Dimension

Of the 31 studies included in this systematic review, 17 (55%) studies reported facilitators for walking [13,14,29,31–34,38,40–42,44–46,49,55,56] and 3 (10%) studies reported barriers [13,33,48].

Facilitators

The most reported set of facilitators was related to social interaction (*n* = 17, 55%), which included the following:

- Seeing and/or meeting other people [13,31–33,38,40–42,44,45,55,56];
- Presence of people in outdoor spaces [14,40,44,46,49];
- Neighborhood friendliness [33,34,40,41];
- Participation in community activities [41,45].

Barriers

The most reported set of barriers were related to the following:

- Crowds of people on sidewalks and other spaces, difficulty in being able to move among crowds, and fear of being hit and falling [13,48];
- Lack of physically and mentally capable companions to walk with them [33].

3.4.4. Organizational Dimension

Of the 31 studies included in this systematic review, 1 (3%) study reported facilitators to walking [13]. No study reported barriers to walking. In the study by Cao and colleagues [13], it was reported that the older adults positively valued government efforts to promote walking, including step trackers and the promotion of friendly places for older adults.

4. Discussion

The WAI has proven to be a methodology capable of providing access to the attitudes, knowledge and perceptions of participants in relation to the surrounding environment [50], as well as obtaining information sensitive to the context and new themes that would not be generated through traditional interviews [19].

For this reason, numerous works have used the WAI to explore diverse topics and in diverse environments [62–65]. At this point, however, to the best of our knowledge, to date, there are no published systematic reviews on the results of research that have applied the WAI as a methodology to study aging and its relationship to the environment and walking activity. The present review aims to fill this gap by focusing on the results reported by studies that applied the WAI to study aging and its relationship to the environment and walking activity. The intention is that these could be of great use to researchers and/or students as well as inspire more age-friendly policies. Precisely, this work was designed as a companion review to a recently published systematic review [22] that focused only on data collection methods related to the use of WAI with healthy older adults. The objective of this systematic literature review was specifically to identify and synthesize the results of the studies under a double perspective. Therefore, we will discuss our findings through two major themes: (1) relationships between the physical environment and walking activity in healthy older adults, and (2) facilitators and barriers to walking activity in healthy older adults.

4.1. Relationships between the Physical Environment and Walking Activity in Healthy Older Adults

The results show that the built environment factors most frequently reported in the studies included in this systematic review are related to access to facilities (n = 28, 90%), followed by pedestrian infrastructure (n = 23, 75%), safety (n = 23, 75%), aesthetics (n = 22, 71%) and environmental conditions (n = 13, 42%). We will discuss each of these five factors below.

4.1.1. Access to Facilities

Access to daily destinations was the most commonly reported theme across studies (n = 28, 90%). Močnik and colleagues [41] indicated that their participants appreciated the variety of conveniently located stores, restaurants and activity centers in their neighborhoods; likewise, Lauwers and colleagues [39] indicated that proximity to these amenities was related to mental well-being, as participants could meet their needs within walking distance. The study by Lager and colleagues [38] indicated that their participants had developed daily place-making routines around destinations, such as walking to stores or to the local senior center. However, are all stores of interest to the healthy older adults? Lee and Dean [40] indicated that some stores were not relevant to the needs of the older adults, including, for example, a home furnishings store, an interior design office and a children's toy store.

Also, senior activity centers, community centers and sports facilities were reported as important for the promotion of social interaction and physical activity [32,37,39,41,45,56]. Access to green spaces was also mentioned in several studies (n = 15, 48%), including the importance of parks, reservoirs and tree-lined walks, among others [13,14,49,52,57]. In Sundevall and Jansson's study [52], the authors reported the importance of aesthetic parks, with beautiful plants and views along the walks, while Macintyre and colleagues [51] reported that participants often referred to green spaces as places to sit and relax rather than places to walk. Access to seating and rest areas as well as public toilets were also reported as important [13,48,49,53]; for example, Macintyre and colleagues [51] reported that green spaces without benches were considered less useful: for some, due to mobility issues, while for others, it was because there was nowhere to sit and relax. Ottoni and colleagues [42] reported that benches that enlivened sidewalks with human activity contributed to participants' positive experience of their neighborhood.

4.1.2. Pedestrian Infrastructure

Pedestrian infrastructure was the next most reported theme in the studies (n = 23, 74%), especially regarding sidewalk and pedestrian pathway characteristics. In the study by Sun and Lau [48], they reported the importance of the condition of the pavement of pedestrian

walkways and the use of slip-resistant materials for tiles since older people might have a relatively poor balance [66]. Curl and colleagues [30] indicated that the surface material was also important; for example, cobblestones and tiles are characterized as slippery and uneven, whereas asphalt was considered a more favorable material as it is slip-resistant and less prone to being uneven. Finally, the importance of sidewalk dimensions was also reported in four studies, wide sidewalks were more appreciated by older adults [29,36,45,46].

A separation between pedestrians and non-motorized transport was also reported [41,46,56]. The study by Močnik and colleagues [41] reported the importance of a dedicated space for bicycle parking, as older adults considered pedestrian walkways to be unsafe when they were crowded with bicycles and shared by non-pedestrians. The above examples highlight the importance of the presence of sidewalks and pedestrian paths and the importance of their condition and maintenance.

4.1.3. Safety

Safety was a theme reported in several studies (*n* = 23, 74%), both crime-related safety (*n* = 20, 74%) and traffic-related safety (*n* = 15, 48%).

A lack of street lighting was among the most commonly reported factors (*n* = 10, 32%). In Sundevall and Jansson's study [52], participants were reported to avoid locations where bushes obscured their view and formed potential hiding places for addicts and criminal gangs.

Zandieh and colleagues [46] reported that the lack of street lighting made neighborhoods much more intimidating, and Van Cauwenberg and colleagues [44] reported that adequate street lighting could identify fall hazards during evening walks. We conclude that the presence of street lighting provides increased visibility and safety for older adults.

On the other hand, other elements related to criminal safety reported in the studies of this systematic review were vacant lots, dilapidated or abandoned buildings [31,36,44], as well as vandalism and the presence of other people [39,44,45,50]. For example, Van Cauwenberg and colleagues [44] reported that the presence of other people influenced older adults' perception of safety from crime and thus their walking experience; the presence of youths, immigrants, beggars and people facing homeless made them feel unsafe. Such a "feeling of insecurity" has a long history in criminology and urban sociology through the "broken window" hypothesis [67], i.e., signs of disorder that might symbolize crime in a certain area. In aging studies, it has recently be considered as an example of a "representational space", which refers to a passively, instead of actively, experienced space [68].

With respect to safety from traffic, the most reported elements were related to the presence of zebra crossings and wayfinding signs, heavy traffic and the behavior of vehicle drivers. Zandieh and colleagues [46] reported that speeding cars and a lack of traffic islands were the main walking hazards for older adults. In the study by Lee and Dean [40], the presence of crosswalks was reported as important for the safety of older adults, and in the study by Cao and colleagues [13], they reported that traffic lights and crosswalks, as well as the speed of drivers on the roads played an important role in their feeling of safety.

4.1.4. Aesthetics

Aesthetics was a theme reported in numerous studies in this systematic review (*n* = 22, 71%), and natural scenery, i.e., green–blue spaces, was one of the most reported factors (*n* = 18, 58%). The presence of green elements (e.g., trees, grass, shrubs and flowers) and blue elements (e.g., canals, lakes, rivers oceans and ponds) was identified as relevant for older adults [42,45,50,56]. In the study by Van Cauwenberg and colleagues [44], numerous participants reported that they greatly appreciated the presence of vegetation along the route and naturalistic environments. Macintyre and colleagues [51] reported that the purpose of green spaces was to enhance social cohesion by providing a place for residents living adjacent to green spaces to sit together and to socialize. The study by Veitch and

colleagues [53] reported that the features that participants liked most in parks were the presence of trees, nature, gardens and landscaping.

Regarding the urban landscape, which includes buildings, public spaces and architecture in general, Herrmann-Lunecke and colleagues [36] reported that historical buildings and public art such as murals elicited well-being, as well as low- and mid-rise buildings. These examples are consistent with other international studies that highlight contact with natural and landscape elements as an important factor for older adults [58,69].

4.1.5. Environmental Conditions

Environmental conditions were the least reported issue in these studies (*n* = 13, 42%); however, this does not mean that it is a less important factor. Several studies have reported that weather and seasonal conditions influence older adults' walking activities [70–72]. Seasonal and weather conditions were reported the most in these studies (*n* = 10, 32%), followed by environmental quality (*n* = 7, 23%). For example, as reported by Lager and colleagues [38], adverse weather conditions such as snow and ice in winter could disrupt the daily routine of older adults, while Hand and colleagues [35] reported that high temperatures can also be a hindrance to older adults' outdoor activity. Curl and colleagues [30] indicated that weather is a dynamic factor, which has a significant impact on falls and fall risk, as in certain weather conditions, it can increase the risk of falls as some surfaces become slippery and people may have to deviate from the intended route and windy conditions can also cause imbalance problems for the older adults.

Additionally, in the study by Lauwers and colleagues [39], some of their participants expressed concerns about traffic-related air pollution so they avoided busy streets. In addition, traffic noise caused discomfort, prevented relaxation and disturbed bird sounds. However, participants were mostly concerned about the possible health effects. Two studies also reported noise pollution [13,36], noise from construction sites and noise from street vending.

4.2. Facilitators and Barriers to Walking
4.2.1. Environmental Dimension

The studies included in this systematic review reported a higher number of facilitators (*n* = 24, 77%) and barriers (*n* = 23, 74%) in the environmental dimension than with respect to the other dimensions. The most reported facilitators were related to access to facilities (*n* = 21, 68%) and aesthetics (*n* = 14, 45%). The most reported barriers were related to safety (*n* = 15, 48%) and pedestrian infrastructure (*n* = 13, 42%).

Our results showed that the variety of services, facilities and stores, as well as local activity centers were considered as facilitators for walking [13,35,36,40,56]. For example, dining destinations such as supermarkets, fresh produce markets and hawker centers, neighborhood centers and public transport stations (especially those located near shopping malls) were important everyday living spaces and neighborhood attractors that boosted older adults' out-of-home mobility [41]. Kou and colleagues [49] reported that, for some of their participants, cafes were seen as a strong incentive for seniors to go out walking. However, it was also shown that the presence of some facilities were seen as barriers, the presence of schools and industries discouraged outdoor walking, as both generated traffic and hazards for walking [47].

We also found that good access to facilities plays an important role in establishing routines in older adults. For example, one of the participants in Grove's study [32] reported that one of her most valued daily routines was to walk to the park in her neighborhood to visit the local store and to buy a newspaper. Also, in the study by Lager and colleagues [38], participants developed daily routines such as walking to the stores or to the local senior center, spreading out tasks on their list throughout the week, in order to have a reason to walk every day. However, not only is there a need for variety and good access to amenities, but there is also a need for senior-oriented destinations, as indicated in Lee and Dean's study [40]. Indeed, in this study, participants noted that commercial uses lacked diversity,

uses were more family-oriented, and there was a lack of places that would interest them and their peers *"There is no reason for us to get from A to B, there is nothing to interest us"* [40]. Therefore, the lack of attractive destinations for older adults could be considered a barrier to walking.

The presence of green spaces was also reported as a facilitator of walking. Cassarino and colleagues [14] reported that these spaces were highly valued by their participants and that participants expressed a preference for walking in places that offer easy access to green spaces. Similarly, participants living in neighborhoods with a larger area devoted to green spaces and recreational centers were more likely to take longer outdoor walks and that distance to these spaces played an important role for outdoor walks [47].

Additionally, practical elements such as seating, built shelters and barbecue/picnic areas were also considered important to facilitate and motivate walking [29,42,53]. The absence of benches and seating areas was a barrier to walking [29,48]. For example, for people with chronic diseases and physical mobility limitations, benches critically facilitate their mobility [42]. The presence of these made the environment more attractive for walking, as people could sit and rest on them [44]. Benches are also accompanied by symbolic significance, from a space of "rest and relaxation" to urban governance forms of "social participation" [73].

Having various social opportunities and diverse destinations in the community that are age-inclusive thus makes it easier for older adults to remain active in daily life [45].

Moreover, the aesthetics of the environment also play an important role in outdoor walking levels [13,42,45,47,56,57]: the presence of attractive buildings, such as historical monuments, old buildings/houses of a particular style (e.g., art deco); well-maintained public places and being free of litter; well-kept gardens and the presence of a pleasant natural landscape (green and blue spaces) facilitated and motivated going out. However, the absence of green areas, trees and gardens; a lack of maintenance of public spaces (deteriorated buildings and vandalized walls); and the accumulation of garbage can cause negative perceptions and experiences in the outings of older adults, negatively influencing their decision to go out [36,39]. These spaces (green–blue) are important to maintain physical activities outdoors, in addition to the mental well-being of older adults [39], encouraging them to walk more and with more pleasure [41].

In addition, the characteristics of pedestrian paths play an important role in the activity levels of older adults outside home. For example, numerous studies (*n* = 12, 39%) indicated that smooth/flat, defined, well-maintained, wide, low-slope and unobstructed paths facilitate a safe, comfortable and enjoyable walking experience. Also, alternative routes and shortcuts facilitated outdoor walking for older adults [47]. However, uneven, slippery paths, temporary obstruction of paths (due to plants, garbage, street trading, etc.), indiscriminate bicycle parking on pedestrian paths, sidewalks with parked cars, holes, unevenness and lack of ramps were also mentioned by older adults as elements that cause stress and impede/hinder walking [34,36,38,41,47,48,57]. For older adults who had experienced falls, changes in the level of a path stood out as the most significant environmental feature as they were perceived to cause falls; these could be curbs, drops or steps or more unexpected changes in level, such as uneven pavement [30].

Also, protected walkways were reported to play an important role in encouraging older adults to go out, as they protect them from rain, drizzle, the sun and wind [13,33], and these spaces promote random encounters between neighbors [29,41,53]; for example, protected walkways to bus stops, rapid transit stations, stores, supermarkets and cafes motivate walking [41]. Furthermore, the presence of ramps for walking instead of stairs was also considered as the former required less effort, and elevated pedestrian bridges posed a barrier due to the need to climb stairs [41].

Safety issues, both crime- and traffic-related, were mostly related to the presence of crosswalks, traffic lights and good lighting on routes generating safety, thus facilitating walking outdoors [13,44]. Good lighting encouraged people to go out and to move around more, especially in autumn and winter [55], but poor lighting caused fear, especially at

night, so older adults are more likely not to go out [39]. Street lighting was reported in studies as a key element in creating a safe and pleasant environment for physical activity, especially at night or in Nordic cities [36,45,55].

In terms of environmental conditions, air quality and weather conditions influence the level of outdoor activity of older adults. Clean air and a cool breeze encourage older adults to engage in outdoor activities [45], and weather and seasonal conditions during spring and summer which are related to greenery and the presence of leaves, flowers and trees motivated much more walking [44]. However, poor air quality and seasonal and meteorological conditions, especially in winter, related to not only rain and slippery surfaces, snow, ice and wind but also hot weather, represented obstacles for older adults, having to stay at home, limiting walks around the neighborhood to a minimum and even forcing a change in the original plans for their outings [35,38,41]. Additionally, winter was associated with a perceived lack of safety from crime due to early nightfall and a fear of falling due to icy and/or snowy conditions [44]. The results showed that in the face of this, they tried other alternatives, for example, walking around a shopping mall [33] and avoiding going out in the early afternoon (when the weather is hot) [13].

In recent years, the importance of healthy aging and the role of physical activity and the built environment [8,69,74] have been highlighted. Everything discussed above highlights the importance of the built environment for older adults, since depending on its characteristics, it can motivate or discourage them to leave the house and to participate in the neighborhood space.

4.2.2. Intrapersonal Dimension

Health status and physical ability were highlighted in several studies as either facilitators (*n* = 6, 19%) or barriers (*n* = 10, 32%) to outdoor physical activity for older adults. Walking was described as necessary to be able to remain active and independent, which motivated older adults to go outside [32,38,55]; in addition, the ability to walk independently is highlighted as an important motivator. Thandi and colleagues [56] highlighted that their participants' motivation lay in knowing that physical activity would improve their mental, emotional and physical health. Good physical health and mobility levels also allow participants to leave their house at will and to walk around their neighborhoods [40]. However, health problems such as decreased vision, hearing, lung function and cardiovascular disease hamper the walking ability of older adults [14,30–32,35,38,40,48]. In addition, impaired physical abilities, such as injuries, knee and/or foot pain, ankle problems and leg muscle degeneration, are also mentioned as barriers to walking [13,32,42,48,54]. These findings reinforce the idea that physical limitations may hinder participation in walking activities in older adults. Another barrier mentioned is reduced energy levels and a diminished sense of balance, which can hinder walking ability [38].

With respect to feelings and emotions, previous experiences of well-being and security during previous walks are mentioned as motivating factors for future walking. This suggests that positive emotions associated with walking may be a driver for continuing the activity [36]. Likewise, adherence to established routines and the need to escape the monotony and loneliness of the home environment are also mentioned as motivators for walking [31,56]. To a lesser extent, barriers related to feelings and emotions are reported, such as stress, insecurity, fear, anger, sadness and disgust, which may be associated with elements of the environment and may hinder walking [36]. In addition, past traumas, such as having been run over, are also mentioned as barriers to walking [40]. Finally, the economic factor is highlighted as a barrier in some studies, where unaffordable prices in facilities such as restaurants and coffee shops may discourage walking [47].

The analysis of the results of the studies in this review in the intrapersonal dimension showed us that the motivators for walking are mainly related to health, physical capabilities and positive emotions, while barriers focus on health problems, physical limitations, negative emotions and economic factors.

4.2.3. Interpersonal Dimension

The results show that social interaction was a strong attractor for older adults to get out of their houses. Markets, hawker centers, senior activity centers and coffee shops were the most frequented places to meet with friends and other people in the neighborhood [41]. The presence of other people in outdoor spaces stands out as a key motivator, as seeing and/or meeting other people generates an attractive social environment for older adults [13,29,32,38], although it was also reported that, on the contrary, some participants preferred natural spaces to avoid other people because they perceived them as a source of stress [56]. Thandi and colleagues [56] reported that participating in the community can significantly influence seniors' level of engagement with others, can help motivate walking activity by promoting socialization, and can give people a sense of connectedness and belonging to a group of people with similar interests.

However, barriers that may limit the participation of older adults in outdoor activities were also identified [13,33,48]. These include crowds of people on sidewalks and other public spaces, making mobility difficult and increasing the fear of bumping or falling [13,48]. On the other hand, the lack of physically and mentally capable companions to walk with older adults is also cited as a significant barrier [33]. The loss of walking companions can influence motivation and confidence to participate in outdoor activities, especially if they do not find people with whom they feel comfortable and safe to engage in such activities [13,33].

These findings are consistent with previous studies [5,74,75] that have shown that social interaction and community membership are critical to the well-being and quality of life of older adults. The opportunity to socialize, establish connections and feel part of a group may be especially relevant at this stage of life, when the risk of social isolation is higher.

With respect to the organizational dimension, it was reported in only one study [13] that the older adults positively valued the government's efforts and that the government promoted walking by promoting age-friendly public spaces and the use of step trackers, motivating them to walk at least 10,000 steps per day.

4.3. Strengths and Limitations

There are some limitations associated with this systematic review that should be considered when analyzing the results. These limitations include the search strategy, since only four databases were included; although they are databases that include a significant number of publications, perhaps there are other studies that are not found in the databases selected for this literature review. Additionally, we included only peer-reviewed studies written in English; we may have overlooked other prominent studies that are in other formats and/or languages.

Although all the studies included in this systematic review employed the WAI in their work methodology, they all had different objectives and were conducted in different countries (therefore, different study areas), so their results may differ. However, the multinational character of this systematic review is also a strength, as it provides a generalization of the identified relationships.

It is important to note that all studies included in this review ($n = 31$, 100%) were conducted in urban settings, and only one study ($n = 1$, 3%) included both urban and rural settings [14]. There are differences between urban and rural environments and the characteristics of each environment could influence the walking levels of older adults [14]. The aging of the population reveals the diverse challenges posed by rural, peri-urban and urban environments [76]; in this context, it seems relevant to also apply the WAI method in suburban and rural environments [33,40].

Additionally, our findings and analyses do not distinguish between genders. In fact, such categorization was not reported in the results of the studies included in this review, although elsewhere, it is reported that walking behavior differs between genders [77,78].

Therefore, future research efforts should consider potential distinctions between male and female subjects as potentially important.

Despite the abovementioned limitations, this review has several strengths. First, it highlights the increasing use of WAI as 74% ($n = 23$) of the studies included in this review were published within the last 5 years [22]. Its use appears to be most popular in the study of aging and environment.

The strength of this method lies in its ability to explore and better understand participants' attitudes, knowledge and perceptions of their environment [12].

This method provides the advantage of allowing the collection of context-specific information such as the interaction (physical, mental, social and emotional) between a person and their environment [34,39,47,53]. Our results provides detailed information about the place–person correlation, so it gave us the opportunity to explore the associations between the perception of the neighborhood environment and walking activity in older adults in good health. We were able to classify the outcomes into two broad categories: the first is identifying physical characteristics of the environment that have an impact on the physical activity of older adults, and the second is identifying the facilitators/motivators and barriers to walking for older adults. We believe that the present work could serve as a guide for future research, as well as for policy makers and urban planners.

5. Conclusions

Walking is the most economical, the least polluting and a totally healthy way to get around. In addition, walking is an important part of daily mobility, especially for older adults; it is an activity that is related to well-being and "staying active and in good health".

The WAI is a qualitative and participatory method in which the interviewer walks along with the participant during the interview. This method has gained popularity in the last 5 years due to its ability to empower older adults and to appreciate their diversity [29]. This methodology is able to provide access to the attitudes, knowledge and perceptions of the participants in relation to the surrounding environment, hence the richness of the results of the present work.

Our systematic review complements one already published [22]. This systematic review provides detailed information on the results of studies that applied the WAI method to assess neighborhood perception and walking activity among healthy older adults. Taken together, these results may be useful and may serve to develop intervention strategies and to promote walking activities in the older adult population, fostering friendly and safe environments that stimulate active and social participation in the community, as well as providing a theoretical framework that could serve as a basis for researchers, students and the professional community who wish to apply the WAI and/or who work on relational space; walking activity; pedestrian perceptions; walkable, livable and age-friendly cities; and older adults.

in the writing of the manuscript; or in the decision to publish the results. This work further forms part of a broader, translational, interdisciplinary research program called "GaitAlps" (N.V.).

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