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The Role of Green Spaces in Supporting Physical Activity and Functional Rehabilitation in Older Adults: A Scoping Review

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Abstract
Introduction: Healthcare systems are under increasing strain owing to the rapid growth of the global aging population, underscoring the urgent need for environments that support healthy aging. Green open spaces (GOS) are increasingly recognized as vital infrastructure capable of mitigating age-related functional decline.
Methods: This scoping review systematically synthesized evidence on the impact of green open spaces (GOS) in promoting physical activity (PA) and supporting functional rehabilitation among older adults. Guided by the Population, Concept, and Context (PCC) framework, a structured search was conducted across the Google Scholar, PubMed, and Scopus databases. Of the records initially identified, ten articles published between 2015 and 2025 were included in the final synthesis.
Results: The findings indicate that green open spaces (GOS) support four primary dimensions of rehabilitation: physical (38%), psychological (31%), social (25%), and spiritual (6%). Furthermore, the influence of GOS design on physical activity (PA) can be categorized into gentle, simple movements (40%), moderate-intensity exercises (30%), and nature-integrated therapeutic activities (30%).
Conclusion: Optimizing the benefits of green open spaces (GOS) for older adults requires attention to modifiable design features, universal accessibility (e.g., even terrain and adequate seating), and adaptation to local climatic and social contexts.

Keywords: Older adults, green open spaces, physical activity, functional rehabilitation, scoping review.

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Introduction

The global demographic shift presents a significant public health challenge, particularly in maintaining functional independence in older adults. Green open spaces (GOS) offer a cost-effective, nature-based intervention to help address this issue. However, the integration of GOS into structured functional rehabilitation (FR) remains insufficiently defined in the literature. Over the past several decades, the global population of older adults has increased significantly. By 2020, the number of individuals aged 60 years and older surpassed one billion, and this figure is projected to reach 1.4 billion by 2030 and 2.1 billion by 2050.[1] According to the Central Bureau of Statistics (BPS)[2] the percentage of older adults in Indonesia was 10.48% of its total population in 2023 and this number is projected to continue ascending as there continues to be a depletion age structure from younger ages toward an aged society. This growth in the older adult population has significant implications for health care and social services and highlights the need for environments to support healthy aging.[3] There is an urgent need for this, particularly since older adults are a vulnerable population which are likely to experience loss of function and chronic disease. [4]

Older adults are often overlooked in initiatives such as urban planning, public resource allocation, and designing communal spaces. As they age, they encounter multiple challenges, including declining physical capacity, increased social isolation, and limited access to age-friendly environments. Despite being a vulnerable population, their needs are frequently insufficiently considered in professional environmental planning, resulting in urban areas that do not adequately support well-being. This oversight may further exacerbate the risk of physical and mental health decline among older adults.[4]

Physical activity plays a crucial role in maintaining mobility, muscle strength, and overall satisfaction among older adults. The World Health Organization recommends that older adults engage in 150–300 minutes of moderate-intensity aerobic exercise or 75–150 minutes of vigorous-intensity activity per week, while also minimizing prolonged periods of sedentary behavior. Several studies have shown that increased physical activity among older adults can reduce the risk of sarcopenia, improve cognitive function and balance, enhance psychological well-being, and contribute to a higher overall quality of life. Green open spaces (GOS) are important resources for supporting an active lifestyle, particularly among older adults. As part of urban green infrastructure, these spaces provide accessible settings for a range of physical activities such as walking, morning exercise, and group-based recreational activities. A study by Artmann (2017)[6] suggests that activity among older adults may be enhanced by GOS, consistent with a broader neighbourhood health potential. Further, GOS are spots where tension is relieved, recovery is supported and social links among participants are initiated.[7] Accessibility of such areas is most important, especially among the elderly who can use and enjoy these areas frequently. Evidence in China indicates that the presence and quality of GOS may promote seniors' physical and mental health, especially through fulfilling social life participations.[4] Other studies suggest that lush landscapes can help improve focus, encourage eye contact and ease social interactions.[6]

On the other hand, GOS also has therapeutic potential to facilitate recovery from injuries or manage degenerative diseases. While previous academic work has considered the benefits of exercise or green space in isolation, few studies here draw on their combined effects for promoting mobility and rehabilitative recovery among older people. However, understanding this connection is essential to inform fair and inclusionary senior urban design. Such understanding can further provide a robust foundation for the development of environmental interventions used in public health strategies and rehabilitation procedures. Therefore, the present study was conducted as a scoping review to explore published evidence about the impact of GOS on physical activity and functional recovery in the older population. The

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central objectives are to rise the curtain on which studies are available now and what has not yet been investigated to guide the development of future academic work.

Methods

This study adopted a scoping review design to systematically map the evidence regarding the role of Green Open Space (GOS) in promoting physical activity (PA) and functional rehabilitation (FR) among older adults. The review followed the framework established by the Joanna Briggs Institute (JBI) and was conducted between May and July of 2025. To ensure a comprehensive search, a structured search string was applied to three electronic databases: Google Scholar, PubMed, and Scopus. The search was conducted using a combination of Boolean operators (AND, OR) and keywords tailored to the Population, Concept, and Context (PCC) framework. The primary search string used was: ("older adults" OR "elderly" OR "geriatric") AND ("green open space" OR "urban park" OR "nature-based") AND ("physical activity" OR "exercise") AND ("functional rehabilitation" OR "recovery" OR "mobility").

Articles were screened based on the following predefined inclusion criteria: (1) published within the last 10 years (2015–2025), (2) focused on individuals aged 60 years, (3) empirical studies (qualitative, quantitative, or mixed-methods), and (4) available in full-text English or Indonesian. Literature reviews, editorials, and studies involving younger populations were excluded from the study. The selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram to ensure transparency and reproducibility. This process consisted of four quantitative stages. Identification: A total of 903 records were initially identified from the databases (Google Scholar: 429; Scopus: 410; PubMed: 64). Screening: After removing 52 duplicates, 851 records remained for title and abstract screenings. Eligibility: 77 full-text articles were assessed for eligibility. During this stage, 67 articles were excluded because they did not specifically link GOS with both physical activity and rehabilitation outcomes or did not meet the age criteria. Inclusion: A total of 10 articles met all the criteria and were included in the narrative synthesis.

This scoping review followed the JBI Manual for Evidence Synthesis. The search was conducted in May–July 2025 across Google Scholar, PubMed, and Scopus using the following search string: ("older adults" OR "elderly") AND ("green open space" OR "urban park") AND ("physical activity" OR "exercise") AND ("functional rehabilitation" OR "recovery"). The selection process followed the PRISMA flowchart (Figure 1). Initially, 903 records were identified for review. After removing 52 duplicates, 851 records were screened based on their titles and abstracts. 77 full-text articles were assessed, and 67 were excluded because they did not specifically address the intersection between GOS and functional rehabilitation outcomes. Ultimately, ten articles were selected. The small number of included studies was a deliberate result of applying strict eligibility criteria to ensure that only high-quality, relevant empirical data were synthesized, thereby minimizing selection bias and maintaining the review's specific focus on rehabilitation. To ensure a focused and systematic inquiry, the primary research question was defined as follows: "How does Green Open Space (GOS) contribute to Physical Activity (PA) and Functional Rehabilitation (FR) in older adults?". This question was operationalized using the Population, Concept, and Context (PCC) framework, as detailed in Table 1. This framework served as the foundation for developing the search strings and eligibility criteria used throughout the selection process.

Following the selection process, data from the 10 included articles were extracted using a standardized form covering the author, year, study design, objectives, and primary findings related to PA and FR outcomes. The synthesized data underwent narrative and thematic analyses to identify patterns in GOS categories, types of physical activities, and rehabilitation dimensions, specifically physical, psychological, social, and spiritual domains. Although this review included a final selection of 10 articles, the screening process was rigorous, starting

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with an initial pool of 903 records. The limited number of included studies reflects the strict application of the PCC framework and specific focus on the intersection between Green Open Space (GOS), physical activity, and functional rehabilitation in older adults. This highlights a significant knowledge gap in the current literature, where many studies discuss GOS or elderly physical activity in isolation, but few explicitly investigate their combined role in rehabilitative recovery. Therefore, this limited number does not indicate a lack of search depth but rather emphasizes the urgent need for more empirical research in this specific interdisciplinary field.

The literature review of the authors is based on three main electronic databases: Google Scholar, PubMed, and Scopus. The search strategy was first developed specifically for using it on PCC According to the subject headings, and then adapted for each database. Articles were eligible for inclusion if published within the last 10 years, focused on older adults as the primary population of interest, available in full-text format, empirical studies only and were written in English or Indonesian. Exclusion criteria removed investigations involving adolescents or children, editorials, conference abstracts, previous literature reviews and any materials that were not specifically related to the ensuing interconnected themes of green open space for the elderly with physical activity and rehabilitation.

The process of article selection was followed by PRISMA four-stages flow as: - identification, - screening, - eligibility and finally inclusion. The identification, search, selection and compilation of selected articles were shown graphically in the detailed overview presented as Figure 1, PRISMA diagram for the study. Information to be extracted from the selected literature was obtained through a form specifically created with the aim of systematically documenting important bibliographical data: title of article, author/s, year of publication, methodology used in researches, main aims and ultimate results. Narrative and thematic analyses were used to identify common patterns, predominant themes, as well as gaps in the literature as a basis for the following discussion.

Tabel 1. Review Question Framework Based on the PCC Model

Componen	**Description**
Population	Older Adults (individuals aged 60 years) in healthy conditions or with other limitations, including those living in the community or assisted living facilities (e.g., nursing homes).
Consept	The role of Green Open Space (GOS) in supporting physical activity (walking, elderly exercise, light mobility) and/or functional rehabilitation processes (restoring physical ability and independence).
Context	Diverse geographical and social settings, including urban, peri-urban, and rural areas, cover city parks, community gardens, public greenways, and green spaces surrounding older adults' living environments.

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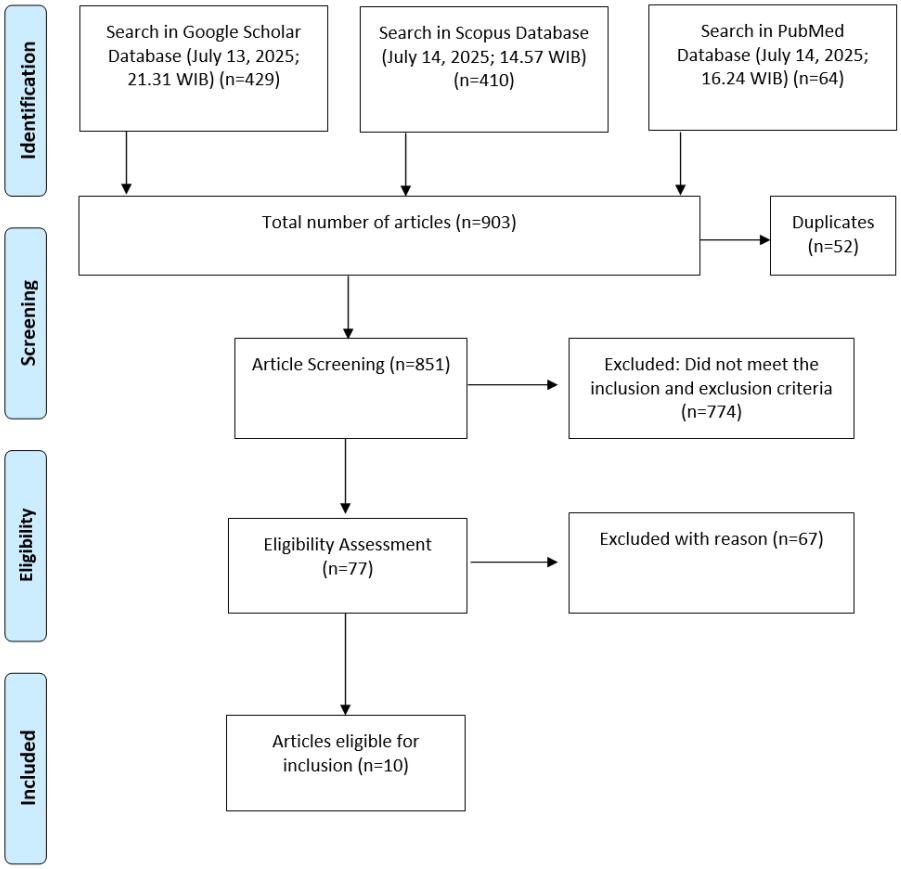

Figure 1. PRISMA Diagram of the Study

Results

To ensure the methodological rigor of the synthesized evidence, all the included studies underwent a quality assessment. The results of this critical appraisal, conducted using Joanna Briggs Institute (JBI) tools, are summarized in Table 2.

As shown in Table 2, the majority of the included studies (n=10) demonstrated acceptable methodological quality. Specifically, nine studies were rated as high quality, while one study was rated as moderate quality due to limited information on the sampling strategy. All ten studies were retained for synthesis because of their high thematic relevance to the role of GOS in rehabilitation.

The following section provides detailed coverage of the 10 chosen articles due to the knowledge they provide in relation to GOS, physical activity, and functional rehabilitation among older adults. Table 3 presents summary of remaining outcomes and characteristics across these studies in a structured manner enumerating the details of each article, aim, methodological approach and primary findings.

The combined results of the ten articles reviewed suggest that Green Open Space (GOS) has a valuable role in terms of GOS significantly contributes to supporting PA promotion and helping functional rehabilitation among the elderly.

The majority of the included studies focused primarily on city parks or public open space (40%) as older people's main area for physical activity. Nevertheless, several other types of GOS were also detected by the study like private green-space inside older adult residences (30%), community gardens (20%) and even visual contact at balcony or window (10%). The selection of these very different spaces indicates that contact with nature, below and above; in either public or private ownership, is still a leading feature of the studies. A graphical illustration of this decomposition can be found in Fig. 2.

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The physical activities recorded were mostly light and easily accessible exercises, such as walking or gardening, while sitting in the park accounted for 40% of observed activities. Finally, a significant portion of our articles were focused on structured fitness-based programs (30%); such as senior gymnastics and specific aerobic programs, in addition to cognitively challenging activities, including contemplative walking. This development suggests that the area of Green Open Space (GOS) has the necessary flexibility to cater for frail older individuals with varying levels of function, and thereby promote continued health maintenance and targeted rehabilitation programs. These specific types of PA are presented in Figure 3.

The rehabilitation measures described in the studies included are markedly varied. The physical aspect was the most important (38%), as there was a perceived clear progress in movement, muscle power and stability. The psychological or emotional aspect (31%), such as stress reduction and improved mood, was next. The social aspect of the (25%) game was then recognised, particularly through the relationships built through group exercises or community engagement. Finally, the spiritual or existential element (6%) provided unique contributions, in particular to elderly people with impaired mobility, by providing opportunities for personal reflection in a natural GOS. These different rehabilitation focuses are visually represented in Figure 4.

Table 2. Summary of Critical Appraisal Results

No	Author (Year)	Study Design	JBI Checklist Score*	Quality Rating
1	Suharti et al. (2022)	Cross-sectional	7/8	High
2	Darmawati & Rini (2019)	Qualitative	8/10	High
3	Levinger et al. (2025)	Randomized Trial	11/13	High
4	Artmann et al. (2017)	Mixed Methods	8/10	High
5	Anandh et al. (2021)	Cross-sectional	6/8	Moderate
6	Kling et al. (2018)	Qualitative	9/10	High
7	Levinger et al. (2018)	Quasi-experimental	7/9	High
8	Yu et al. (2018)	Cross-sectional	7/8	High
9	Leng et al. (2020)	Case Control	8/10	High
10	Kolster et al. (2025)	Qualitative	9/10	High

Table 3. Characteristics and Synthesis of Study Findings

No	Author (Year)	Article Title	Study Objective	Study Design	Main Findings
1	Suharti *et al*. (2022)[8]	Mengoptimalkan Komunikasi Sosial dan Aktivitas Sehat pada Lansia melalui Rehabilitasi Taman Mini Tresna	To analyze the impact of mini gardens on the social and physical activities of older adults.	Qualitative Observation	• The GOS supports social and physical activities as a form of community rehabilitation. • Utilization of TOGA (Family Medicinal Plants) in GOS as a *therapeutic landscape*.

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No	Author (Year)	Article Title	Study Objective	Study Design	Main Findings
2	Darmawati& Rini (2019)[9]	*Perception of Green Open Space as Medium of Therapy for Elderly*	To explore the perception of older adults towards GOS as a medium for physical, psychological, and social therapy and the characteristics of an ideal GOS.	Qualitative Interview	•The interaction of older adults with GOS provides multi-therapeutic benefits (physical, psychological, and social). •Ideal GOS elements consist of close distance, easy access, flat circulation, complete natural elements (plants, ponds, birds), and a social community.
3	Levinger *et al* (2025)[10]	*Recreational Spaces: How Best to Design and Cater for Older People's Safe Engagement in Physical Activity*	To identify the essential elements in the design of public recreational spaces that can support safe, comfortable, and enjoyable physical participation for older adults using a *co-design* approach.	Qualitative FGD	•Older adults desire inclusive spaces that do not make them feel limited by their age or physical ability. •The presence of nature (plants and bird sounds) increases psychological tranquility. Ideally, they are vehicle-free, have a flat surface, comfortable seating, adequate light, access to public restrooms, clear signs, and the availability of shade.
4	Artmann *et al*. (2017)[6]	*The Role of Urban Green Spaces in Care Facilities for Elderly People Across European Cities*	To explain the role of GOS in improving the well-being of older adults living in long-term care facilities across several European cities.	Quantitative Descriptive Cross-Country	•Access to GOS improves the quality of life and mental health of older adults. •GOS must be easily accessible, have a flat surface, attractive natural elements, and consider accessibility and activities tailored to the capacity of older adults. •Care facilities with good GOS allow older adults to be physically and socially active.

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No	Author (Year)	Article Title	Study Objective	Study Design	Main Findings
5	Anandh *et al*. (2021)[11]	*Influence of Exercise Environment on Attentional Awareness and Emotional Changes*	To assess the influence of the exercise environment (indoor vs. outdoor) on positive/negative mood and attentional awareness in older adults.	Quantitative Experimental	•Exposure to green spaces provides better emotional and cognitive stimuli in older adults and increases their active participation. •Engaging in physical activity in an outdoor environment can lower negative mood and provide a higher mindful attention awareness (MAAS) score than indoors.
6	Kling *et al*. (2018)[5]	*"The Effect of a Park-Based Physical Activity Program on Cardiovascular, Strength, and Mobility Outcomes Among a Sample of Racially/Ethnically Diverse Adults Aged 55 or Older"*	To evaluate the effect of a park-based physical activity program on cardiovascular health, lower body muscle strength, and mobility in racially/ethnically diverse adults aged ≥55 years.	Quasi-experimental	•Park-based physical activity caused a significant increase in body strength, mobility, and systolic blood pressure in older adults, making it a public health strategy for older adults.
7	Levinger *et al*. (2018)[12]	*"Outdoor Physical Activity for Older People—The Senior Exercise Park: Current Research, Challenges and Future Directions"*	To describe the experiences, challenges, and findings of implementing the *senior exercise park* program—an outdoor exercise park specifically designed for older adults—and to provide policy recommendations.	Descriptive-narrative	•Physical activity programs in the GOS successfully improved the balance, leg strength, and physical function of older adults. •Social and environmental elements were the reasons for high older adult participation. •Policy and infrastructure support are required for replication elsewhere.
8	Yu *et al* (2018)[13]	*Is Neighborhood Green Space Associated with Reduced Frailty? Evidence From the Mr. and Ms. Os (Hong Kong) Study*	To analyze the relationship between the availability of neighborhood green spaces and the level of frailty (physical limitations due to age) in older adults.	Quantitative Observational Longitudinal	Older adults living near GOS had a lower risk of frailty. •GOS plays an important role as an environmental protective factor in healthy aging.

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No	Author (Year)	Article Title	Study Objective	Study Design	Main Findings
9	Leng *et al* (2020)[14]	*Planning For Supportive Green Spaces In The Winter City Of China: Linking Exercise Of Elderly Residents And Exercise Prescription For Cardiovascular Health*	To provide a scientific basis for planning urban green spaces that support older adults' cardiovascular fitness through the relationship between older adult characteristics, physical activity patterns, and the GOS environment during winter.	Mixed Method	• An Ideal GOS has ice-free paths, wind protection, warm seating, and good lighting. •Older adults' physical activity will remain high during winter as long as the GOS supports thermal comfort and safety. •Physical activity in GOS during winter can prevent cardiovascular disease and be an ecology-based *exercise prescription* for older adults.
10	Kolster *et al* (2025)[15]	*The Importance Of Nature And Wishes For Nature-Based Experiences Among Older Adults In Assisted Living Facilities*	To explore the perception of older adults towards the importance of nature and nature-based experiences in assisted living facilities and to identify their desires for future interaction with nature.	Mixed Method	•Older adults consider nature to be an important part of supporting their quality of life. •Interaction with nature in GOS increases tranquility, reduces loneliness, and strengthens the sense of meaningfulness •Multisensory experiences (the scent of flowers, bird sounds, and sunlight) in GOS are key determinants of rehabilitation and improvement of the quality of life of older adults.

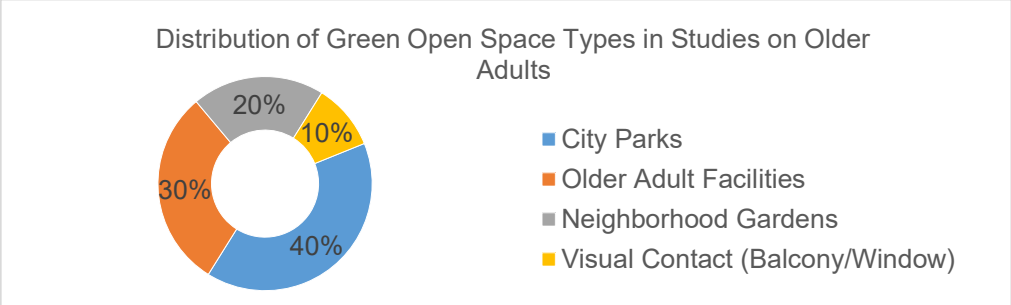

Figure 2 . Mapping of Selected Articles Based on Green Open Space Type

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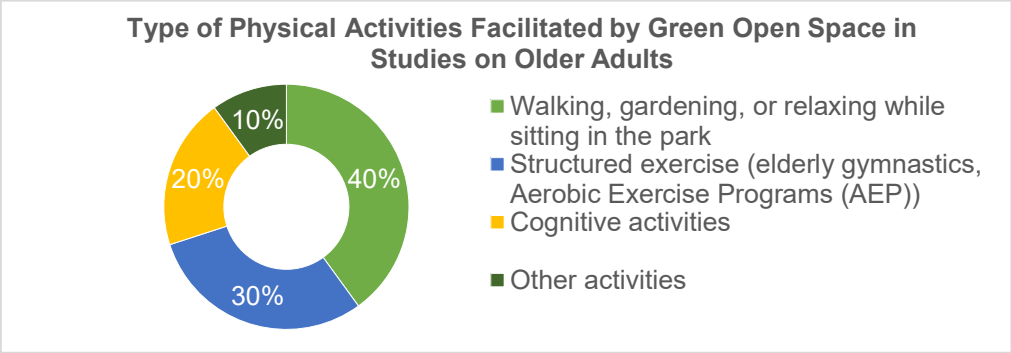

Figure 3. Mapping of Selected Articles Based on Older Adults' Physical Activity

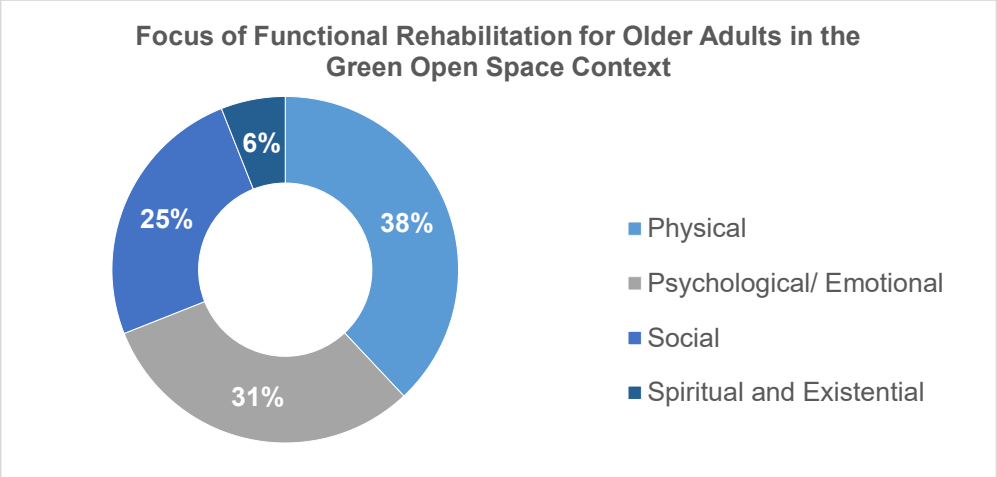

Figure 4. Mapping of Selected Articles Based on Older Adults' Functional Rehabilitation

Discussion

Characteristics and Variation of Green Open Space

Green open spaces (GOS) play a crucial role in urban development, fulfilling essential ecological purposes while serving as hubs for community interaction and public wellness. For elderly individuals, the particular features and diverse forms of GOS are especially significant, as they directly influence ease of access, security, and comfort. In general, GOS attributes can be grouped into physical, ecological, social, and therapeutic categories, all of which contribute to improved living standards for seniors.

Research by Levinger et al. (2025)[16] shows that effective planning for an inclusive and elderly friendly GOS constitutes level ground, unobstructed ways, good light, comfortable seats and basic facilities in terms of toilet facility and shaded areas. Such functions can greatly increase older people's attendance at outdoor activities. At the same time, Kolster et al. (2025)[15] emphasize that the various sensory components of nature, such as floral fragrances, bird songs and sunlight are of great importance to promote a sense of mental calmness and to facilitate recovery healing.

Different types of GOS include urban parks, local green corridors or paths, communal gardens, healing gardens and private green areas in senior citizens' housing. Urban and community parks create many opportunities for social interactions, whereas tiny gardens in neighbourhoods provide a safe, hassle-free venue for residents who might find it difficult to move around.[8,13] This structural and size variety suggests that each category of GOS have unique advantages adapted to the regional physical conditions and special

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demands from separate local elderly groups. In addition to shape the ecological is presence of diverse kinds of plant life, and water features such as ponds or fountains flows of air and sunlight are known factors influencing user satisfaction with GOS.[14] Leng *et al*. (2020)[14], in their Chinese study showed that seniors remain active in the winter when GOS incorporates wind blocks, good lighting and heated benches. This highlights the importance of redesigning GOS layouts according to local climatic conditions for sustainable elderly PA throughout the year.

Socially and therapeutically an ideal GOS for the elderly would provide a conducive environment to people's participation and play dual roles as a place for physical, mental, social therapy.[9] Seniors usually like GOS linked to their localities: easy access and liveliness of community. This social element enhances the potential for rehabilitation of GOS by stimulating self-dependence and purposefulness in the aged. With new insights therapeutic gardens are now introduced as a novel characteristic of the diversity of GOS. According to Suharti et al. (2022)[8] These gardens containing Family Medicinal Plants (TOGA) form restoring scenery, where slow activities can take place and offer an educational and therapeutic process. In senior care facilities, researchers Artmann et al (2017)[6] and Levinger et al. (2018, 2024)[12,17] indicate that on-site gardens in nursing homes or long-term care centers can reduce anxiety and enhance residents' physical and emotional health.

In the end, what we regard as the characteristics and variations of GOS is not only constructed by the space's physical dimensions or organization, but also by how well these spaces fulfil older people´s functional, social, and psychological requirements. An adaptive, easy-to-apply nature-inspired design can provide maximum benefits of GOS as an exercise and recovery aid. It is the combination of ecological, social and therapeutic aspects that allows GOS to be an effective instrument for public health in response to aging society.

Green Open Space as a Facilitator of Physical Activity for Older Adults

Green Open Space (GOS) plays a crucial role as facilitator in enhancing and maintaining physical activity among older ages.[18] As you get older, your body functions - such as muscle endurance power, balance and respiratory efficiency - decrease. GOS provides a friendly, safe and fun environment in which to exercise without the restrictions of forced entry. Unlike indoor sporting facility which can at times be constricting or structured, GOS has a natural feel to it that encourages ongoing spontaneous attendance.

Studies conducted by Levinger et al. (2018)[12] that city parks and green spaces with universal access, including flat surfaces, wide paths, good lighting and seating, also enhance older adults' participation in physical activities. Older people who feel their community is safe and elder-friendly are more likely to engage in activities such as across-the-road walks, light exercises or community team sports. Such initiatives not only maintain physical status, but also provide psycho-social benefits by improving social relations and creating group identity. Kling et al. (2018)[5] supports this view, showing that park exercise interventions were successful at improving muscle power, flexibility and cardiovascular health in ethnically elderly adults. Leng et al. (2020)[14] also consider that the maintenance of physical exercise among elderly is greatly dependent on GOS's flexibility to accommodate to local environment and weather conditions. In cold winter regions, seniors still get exercise if greenspace comes equipped with wind shields, proper lighting and heated rest spots.[19] This exposes that the supportive nature of GOS is not simply due to its presence, but to an intelligent design strategy that considers user comfort and safety.

Physical benefits aside, what you do in GOS also carries a lot of mental effort. Anandh et al. (2021)[11] found that natural workouts have more benefits for focus and mood than indoor ones. While elderly regulars in urban parks or greenways tend to be less anxious, calmer and more mindful. Here GOS serves anorganic catalyst combining somatic and affective

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rewards into a single system. Also, GOS acts as a community center that inspires seniors to get involved and bonded. Research by Suharti et al. (2022)[8] showed that group exercise and dawn walks in local parks could power not only higher physical output but stronger social connections and reduce isolation risks. This dimension of interpersonal experience in turn contributes to the mental health and well-being necessary for successful aging, and reflects itself in general life satisfaction.[20] GOS goes beyond mere recreation it is a versatile means to support the physical activity of older people. A safe, attractive and accessible greenspace integrated within the neighbourhood is crucial to promoting an active lifestyle for seniors.

Contribution of Green Open Space to Functional Rehabilitation and Health

GOS go beyond recreation and gentle physical activity to have an important role in facilitating functional recovery and health restoration in older people.[21] Functional rehabilitation consists of all activity and actions to re-establish a person's physical, psychological, and social functioning as normal or good as possible. GOS is a natural and holistic rehabilitation method, easily accessible to all age groups and most significantly for seniors with aging or other diseases.

Various studies report that GOS significantly increases physical function in the elderly. Kling et al. (2018)[5] reported in a park rehabilitation program, such as easy aerobic exercises, walking programs and flexibility activities improves the muscle power of the lower extremity, increases the range of motion (ROM) and lowers systolic blood pressure level. Similar results were found in Levinger et al. (2018)[12], who showed that senior exercise parks furnished with customized adaptive equipment could improve balance and motor skills without the pain that typically characterizes clinical settings. In addition, the natural elements in these green spaces have a healing effect that can contribute to accelerated physical recovery when injured or medically treated.

In addition to the physical benefits, the psychological and emotional aspects of rehabilitation in GOS are just as important. Anandh et al.(2021)[11] for example, how lush surroundings can spark feelings of optimism, improve concentration and relieve stress through sensory in puts such as the color of greenery, sounds of water and scents of flowers. This exposure to the natural world can evoke a replenishing response in the parasympathetic nervous system, which serves to help relieve you of your mental stress and restore some peace. Kolster et al. (2025)[15] also suggest that beauty experiences of birdsong or early morning light in parks contribute to reducing isolation and the sense of purpose among residents in LTC homes.

GOS also has social benefits that help community-based rehabilitation. Shared activities on local parkland — whether gardening or exercising as a group — are social medicine for seniors, cementing friendships and expanding social circles.[8] These exchanges increase a person's happiness, reduce their risk of depression and all round well-being. Also, a lively community in the vicinity of GOS has induced an environment conducive to helping elderly recover from immobility after acute diseases or enduring illness (Kling et al., 2018).[5] Beyond physical and societal components, some studies have highlighted the existential and spiritual benefits that nature can offer to older generations. Kolster et al. (2025)[15], contend that direct, unmediated contact with nature--from relaxing under a tree to walking in the park—nurtures appreciation, connection to natural resources, and meaningfulness. This spiritual dimension often is an important part of holistic rehabilitation that facilitates older adults to balance physical, mental and spiritual domains.

Geographical and Cultural Context Differences

Local cultural and geographical influences strongly determine the usefulness and use of GOS as an instrument promoting physical activity and functional rehabilitation in elderly people.[22] The climate, patterns of urban development, and socio-cultural norms are factors influencing to what the extent people, especially seniors, interact with natural settings. Internationally developed

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countries including Australia, Europe and the USA have included GOS in basic public health programs but developing countries such as Indonesia face various challenges regarding availability as well as quality and long-term sustainability of public green areas.

Studies in Europe suggest that GOS layouts in moderate climates are developed with safety, comfort and availability in mind.[6,16] Wide paths, smooth terrain, sufficient lighting and seating all are important features for accommodating seniors' physical needs. In contrast, Leng et al. (2020)[14] in cold urban environments in China focuses on thermal features such as wind protections and heated lighting to allow elderly residents to engage in outdoor activities throughout the year. The adaptation of spatial designs to environmental factors emphasizes the appealing aspect of GOS, which requires a situational and user-centered perspective.

In the tropical countries, such as Indonesia, highly warm and humid weather often prevents elderly individuals from participating in outdoor activities. Yet, there is ample evidence to suggest that green vegetation (and water and shade) does have a role in creating thermal comfort and encouraging participation in light physical activity.[23,24] The investigation by Suharti et al. (2022)[8] in Indonesia shows that GOS per focus community, such as local parks or traditional herbal gardens (TOGA), serve ecological function and provide venues for social interactions and education. Indigenous uses of GOS such as gardening, exercise, or religious gatherings contribute to the cultural identity and sense of connectedness that older people have with their surroundings, perpetuating a feeling of collectivism which may further enhance social bonds associated with GOS.[25]

Artistic heritage is also associated with how GOS are used by older persons. In East Asia, in countries such as Japan and South Korea, the spending time green space are often associated with *shinrin-yoku* or forest bathing a contemplative and rejuvenation experience in nature that seeks to promote physiological and psychological well-being.[26] Across Europe and Australia, park-based physical activities are likely to be more structured in nature, like designated senior fitness zones or government-sponsored exercise sessions for older adults.[12] These differences reveal different feelings and patterns of activities, mainly due to social norms, cultural practices and levels of urbanisation.

In Indonesia, there are other challenges related to the availability of GOS as it is not age-specific and not evenly distributed. Inclusive design and universal access are often poorly done in many urban parks.[27] Problems of security, cleanliness, and maintenance also threaten the continued use of these areas. Yet, according to Darmawati (2019)[9], older adults value GOS, which are close to home and encourage community interaction. Therefore, promoting GOS in hot and densely populated locations such as Indonesia necessitates to respond to regional culture, thermal comfort provision, and facilitation for elderly.

While the number of studies is limited (n=10), the synthesis reveals a critical consensus: GOS design must go beyond aesthetic value to include functional elements, such as non-slip surfaces and social seating, to be effective for rehabilitation. This review identifies a significant knowledge gap, as most studies treat GOS and rehabilitation as separate entities. Our findings serve as a preliminary framework for future large-scale studies.

Conclusion

This scoping review has systematically reviewed academic literature on the importance of Green Open Spaces (GOS) for physical activities and functional recovery for older adults. The amalgamated results unambiguously place GOS as a flexible resource of public health touching upon two core aspects of geriatric care, preventive and curative. The most important benefits of GOS are apparent in four aspects:

1. Physical Benefits. GOS provides a context for unstructured activities, like walking or gardening, and structured programs such as exercise classes that lead to objective improvements in muscle

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power, physical function, balance and cardiovascular health.
2. Psychological and Cognitive Gains. Nature-based engagement Provides a powerful rejuvenating effect that not only minimizes stress and loneliness, but also fosters attentiveness and mental health through enriched sensory experiences.
3. Social Advantages. GOS is a key model for social re-entry, to incentivize citizens' participation in their community, reduce isolation risks and build a connection network for older adults.
4. Functional Rehabilitation. The natural environment also allows for holistic recovery methods that include physical, social and emotional aspects, allowing seniors to recover naturally and maintain independence outside of a medical institution.

Crucially, the realization of GOS is contingent on designing spaces that fit specific local geographic and cultural contexts. This includes incorporating things for accessibility in general, climate-specific things (such as windbreaks in cold areas, or building more eaves/overhang/shading elements into designs in hot climates), and representing the design to respect local traditions. For further research, there is a need to focus on experimental studies that measure the effects of tailoring GOS components for specific climatic and cultural settings, particularly within crowded, disadvantaged regions. Such understanding is needed to inform fair urban development processes and new models for public health in creating really older-people-friendly places.

The relatively small volume of existing literature found in this review (n=10) serves as a critical indicator for policymakers and researchers to prioritize more targeted studies on GOS-based rehabilitative therapy.

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Not applicable.

Availability of data and materials
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Author Contribution
AS and SGF were responsible for the original idea of the study (including identifying the main research questions as well as definition criteria for including or excluding sources). AS and APS worked together for a full literature review, articles evaluation, data extraction. AS was the main person involved in data analysis and interpretation, result synthesis, as well as developing the first draft of the manuscript. SGF and APS gave significant edits as well as intellectual contribution to the manuscript, focusing on methodology and discussion aspects. All authors read and approved the final manuscript.

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