

Therapeutic Perspective of the Multisensory Interior Garden for the Older People

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1. Abstract

Introduction: The conceptualization of the inherent relationship between man and nature is called biophilia which refers to the belief that humans are genetically predisposed to be attracted to nature. Science has strengthened the hypothesis contributing to its expansion in various fields such as medicine and psychotherapeutic interventions.

Objectives: This article aims to review quantitative and qualitative studies to identify the effects of indoor garden on the olderpeople quality of life.

Methods: This review complied with the Reporting and Guidance Standards for Systematic Review and Meta-Analysis Protocols (PRISMA) and consisted a descriptive analysis of empirically selected studies based on inclusion criteria. Studies were searched in three databases (PubMed, Science Direct, Medline) and the search words were: indoor garden, therapeutic garden and sensorygarden.

Results: 47 studies were selected from research, meta-analyses and best practice guidelines. Of these, only 7 studies were found according to the criteria and were analyzed, 3 articles focus on the inner multisensory garden, 2 articles analyze the benefits of an outdoor sensory garden compared to an indoor one and 2 articles consider the effects of an enriched therapeutic garden.

Discussion and Conclusion: The results indicate psychophysiological improvements in people who have attended a multisensory garden. The positive influence was identified in areas as active involvement, psychomotor agitation, depression, stress level and medication compliance. The presence of Multisensory Interior Gardens in hospitals, in recovery and older people's centers could have a positive impact on older people well-being.

2. Introduction

Interaction with nature has played an important role in people's lives. The conceptualization of the intrinsic relationship between man and nature is called biophilia. The biophilia hypothesis refers to the belief that humans are genetically predisposed to be attracted to nature. In ancient Egypt, more than 2,000 years ago, walks through the palace gardens were prescribed for those suffering from mental fatigue or various ailments while the interior was decorated with various plants [1]. People are healthier when they are connected to the nature. Science has strengthened this hypothesis and contributed to its extension and application in various fields such as architecture, medicine and psychology. Research has shown that the presence in the middle of nature helps to lower the level of cortisol, strengthens the ability to concentrate and stimulates creativity. Nature not only improves health but also helps to maintain a sense of happiness. Research into the benefits of plants to humans has begun to grow. The beginning of these studies was

an empirical one [2]. The effect of the outdoor and indoor gardens is analyzed, as well as the possibility of having a plant nearby that they can take care of or that they can see through the window. Exploration of biophilia has made a significant contribution to the process of gerontogenesis. The contribution of biophilia is to influence the design of green spaces in urban areas. The creation of spaces enhances the environment and the older people by combining functional and aesthetic elements with the ecosystem and biophilia so that environmental factors support the development of therapeutic intervention strategies and active aging [3]. There are several important factors that influence the health and longevity of the older people: quality of life, implementation of programs for protection and social and financial support, living conditions, pension level, prevention of chronic diseases, diversity and quality of projects dedicated to this age group. The fragility that is beginning to make its presence felt, for some of the older people, is due to both the environment and genetic information. The most common accusations mentioned by the older people are: insomnia, body aches, anxious thoughts (fear of loneliness, feeling worthless or useless, various types of deprivation, fear of death etc.), depression (desire to die, inability to enjoy, etc.), cognitive disorders, difficulties in terms of autonomy [4]. Fear of falling, weakening of muscle strength, difficulty sleeping increase the risk of developing depression [5]. Neuronal problems can occur increasing the risk of developing dementia, Parkinson's. These combined may reduce cognitive function over time, sometimes reducing autonomy to the level of disability. In this scenario, some of the relatives choose to institutionalize the suffering/ affected person. Attitude towards aging is an element also that can sustain or have consequences for the older people [4]. Thoughts like "old age is hard", "old age is ugly", "I'm old and useless" cause negative attitudes both for oneself and for those around them. Applied research on biophilia from a geriatric perspective has focused on the analysis of the effects of both indoor and outdoor gardens. The aim is to understand the extent to which these gardens can influence both physical and mental health. Among the most studied effects of the therapeutic/ sensory garden or exposure to plants are those regarding: sleep, reduced agitation, dementia, Alzheimer's disease, neuronal recovery, cognitive function, improved quality of life, recovery from surgery. The results of these studies show that the impact of plants on the psyche increases mental well-being [6], improves the quality of sleep [7] by reducing negative states such as stress, fatigue, confusion, psychophysiological agitation [8,9]. Cognitive dysfunction is ameliorated by increasing and regenerating the ability to concentrate [10,11]. Improves quality of life [12], postoperative recovery [13,14], neurological recovery [13,15], accesses existing resources to stimulate people with Alzheimer's disease [16,17] and dementia [18, 19, 20], encourage the activation of emotional memory that can help self-control of the inner state [17], increases attention for the present moment leading to the satisfaction of personal psycho-

logical needs: attachment, belonging, inclusion, identity, comfort [21]. Most studies are done on outdoor gardens. In some studies, outdoor gardens are also considered to be nearby parks [22] or green areas in the area of residence [1]. The fewest studies are on the effects of indoor gardening [21,23,24,25] or indoor plant use [1,21,26,27]. The advantage of the indoor garden is that, regardless of the season, it can be permanently accessed by all categories of people. The composition of the garden, the arrangement and choice of plants, the decorative elements, how are the spaces for relaxation created, the amount of natural light, the time spent here and the purpose for which it is used (socializing, performing exercises) influence the psychological effects obtained. Depending on all these aspects, different effects can be obtained on those who use these gardens: relaxation, therapeutic sensory stimulation, facilitation of physical and mental recovery.

- **The garden for relaxation** is the garden in which people have the opportunity to walk, to sit and watch and to relax in a safe and secure environment.
- **The garden for therapeutic sensory stimulation** is designed as a green area to train the senses, to relax the mind and to facilitate the feeling of being an integral part of nature. It can be used passively (just to sit in the garden and enjoy the senses of aromas, sounds, temperature, etc.) and actively (involvement in a concrete action) [16]. A well-appointed garden with an architecture adapted to the needs of the older people activates the desire to move and strengthens the feeling of inclusion/ belonging [28]. From a technical perspective, the elements are arranged strategically, in order to favor specific therapeutic objectives, focusing on the amelioration of some sufferings and diseases. Among the therapeutic effects obtained in the sensory garden was the access to existing resources to stimulate and facilitate physical and mental recovery. Among the disorders where the benefits of this type of garden have been registered are: Alzheimer's disease, paralysis, blindness, dementia [29], depression [30], anxiety, stress [28], insomnia and negative states as stress, anger, fatigue, confusion [7]. Thus, especially in the early or mild-moderate phases, in the case of people in need of neurological recovery, the interaction with various environmental stimuli is encouraged [13, 15]. It accelerates clinical recovery by meliorate physical symptoms and improves well-being for both: patients and staff [6]. Also activates emotional memory that can help in control of the inner state [17], normalizes blood pressure and oxyhemoglobin levels [31].
- **The (enriched) therapeutic garden** refers to environments which are designed to compensate for impairments related to advancing age and neurocognitive disease. These are the result of specific research on the most appropriate way of conception and organization depending on the therapeutic goal it pursues: stimulation of cognitive functions, gait and balance, improvement of sleep [32].

3. Methods

This review complied with the Reporting and Guidance Standards for Systematic Review and Meta-Analysis Protocols (PRISMA) and consisted of a descriptive analysis of empirically selected studies based on inclusion criteria.

Inclusion/exclusion criteria:

1. The texts were searched on: PubMed, Science Direct, Medline.
2. The literature focused on information related to: therapeutic gardens, sensory garden, inner garden, indoor environment, plant benefits in relation to the well-being of the older people
3. Type of literature studied: meta-analysis, research studies, good practices guides.
4. The literature included in the research is in English.
5. Most of the articles studied have been published in scientific journals and conferences.
6. Articles treating air quality using plants were excluded.

Relevant research has been selected in which there are assessed directly (interaction in the garden) and indirectly (plants that existed in the room or were seen on the window) experiences with plants. These focused on the effects of sensory gardens and gardening activities on a person’s physical and mental health. The basis of this review was the selection of those research that analyzed the psychological effects of the indoor garden and plants on the older people. In relation to the previously mentioned criteria, 47 articles were identified. Because the interest of the study was on the effects of the indoor sensory garden and therapeutic garden on older people, 7 studies were selected. Of these, 3 articles focus on the benefits of the indoor sensory garden, 2 articles analyze the benefits of an outdoor sensory garden compared to an indoor one and 2 articles consider the effects of an enriched (therapeutic) garden. The selection of the two comparative studies was made to emphasize the fact that the benefits of access to an interior multisensory garden are not reduced compared to an exterior multisensory garden.

RESEARCH/ Year/ Author	TYPE of RESEARCH	NUMBER of SUBJECTS	TYPE of EXPERIMENT (what was used in the experiment)/ types of plants, number and setup	DURATION of SUBJECTS EXPOSURE to PLANTS	WHAT WAS MEASURED / tracked/ what was used as a measurement/ testing technique/ what did they have to do	REPORTED EFFECTS
1. "Enriched gardens improve cognition and independence of nursing home residents with dementia" 2021/ Bourdon et al ³²	Multi-center cluster -Controlled pilot trial.	120 participants.	Four nursing homes that offered separated access to one conventional sensory garden (CSG) and one <i>enriched (therapeutic) garden</i> (EG).	Six months.	Cognitive function (MMSE); Independence for activities of daily living and risk of falls. The participants were residents with dementia, independent for walking and with no severe dementia or behavioral troubles. Eligible residents were divided into three groups according to the proximity of their room: close to the CSG or EG gardens for the first two groups and further from the gardens for the third (control) group.	EGs offer a new approach to therapeutic mediation for residents of nursing homes with dementia.
2. "The Impact of a Sensory Garden for People with Dementia" 2020/ Collins et al ²¹	Experimental program for 12 weeks using alternately <i>indoor and outdoor garden</i> .	4 people with dementia.	Sensory garden and interaction with the plants there; Plants used: Coriander, Lettuce, Autumn lily, Rosemary, Giant Red Mustard, Chrysanthemum and Dracaena grown in pots.	Stage A: 2 weeks; Stage B and BC: 4 weeks each; Stage A resumed for another 2 weeks. The exposure was 30-45 minutes 3 times/ week.	The impact of the sensory garden on agitation and quality of life in people with dementia.	Decreased agitation; Improving the quality of life.

<p>3. “Elderly care center” 2016/ Wagiman et al²⁵</p>	<p>Methods of comparison and observation between case studies for the years 2010-2014; The study is performed in 2 stages.</p>	<p>People over 60 years; 50 subjects.</p>	<p>Atrium equipped as an <i>indoor garden</i> with natural light.</p>	<p>Not specified; It is a space where they can go at any time and stay as long as possible.</p>	<p>Characteristics architectural (quality of space); indoor garden facilities; Selection program for old people's centers.</p>	<p>The natural environment encourages the desire to be active; The interior garden incorporated in the space of the center for the elderly leads to a healthier and more comfortable environment.</p>
<p>4. “Garden therapy in neurorehabilitation: well-being and skills improvement” 2016/ Meneghello et al¹³</p>	<p>Experimental research.</p>	<p>The research lasted for 1 year; Patients with: brain trauma, multiple sclerosis, stroke, aphasia, hemiparesis; 28 subjects.</p>	<p><i>Therapeutic garden</i> (TG) in which he carries out various activities (including physiotherapy, psychotherapy, counseling sessions); Activities are adapted to the specifics of motor and cognitive ability; Fast growing plants; Plants of different heights and accessible to people in wheelchairs.</p>	<p>5 sessions minimum with a duration of at least one hour each session were used.</p>	<p>Visual self-assessment questionnaire: previous experience with plants, improvement of skills after interacting with plants, well-being during garden activities, opinion about the therapeutic garden, contribution of the garden in neurological recovery, level of stress during TG sessions.</p>	<p>Interaction between people was facilitated, which supports the process of neural recovery, communication, improves social skills.</p>
<p>5. “Design characteristics of sensory gardens in Norwegian nursing homes: a cross-sectional email survey” 2016/ Gonzalez et al²⁹</p>	<p>Cross-sectional study; Web-based survey.</p>	<p>75 final respondents.</p>	<p>Sensory experiences in an <i>outdoor garden</i> at the level, visual, olfactory, auditory gustatory, kinetic; It follows: safety and space, the possibility of movement, landmarks, indicators, visibility and accessibility, protection support, chairs/ benches, garden care.</p>	<p>Online selection questionnaire sent to the directors of centers for the elderly in Norway (Norwegian NH leaders).</p>	<p>Features related to garden design/ plan were followed.</p>	<p>The researched gardens have the following characteristics: enough space for activities follow the recommendations of specialized guides, involve multisensory experiences, attention to details (brightness, visibility, indicators, support devices, safety, non-toxic plants, for outdoor gardens snow remover etc.).</p>
<p>6. “Using indoor plants and natural elements to positively impact occupants of residential aged-care facilities” 2016/ Scott et al²⁴</p>	<p>Pilot study in the center for the older people; Quantitative analysis.</p>	<p>15 subjects aged between 68-98 years.</p>	<p><i>Indoor garden</i>; Exposure to plants in a specially created space for indoor palm trees, deciduous plants and flowering plants (eg orchids) in pots; wallpapered with the image of a tree; The plants are arranged next to the benches placed next to the wall.</p>	<p>The time spent in the indoor garden is not specified.</p>	<p>Pre and post tests to measure the satisfaction level of living in the center; -measures of social engagement; -appreciation of the new interior space; The evaluation of the answers is on the Likert Scale.</p>	<p>Creating a green corner space can cause positive changes in well-being and increase social interaction.</p>

<p>7. "Benefits of sensory garden and horticultural activities in dementia care: a modified scoping review"</p> <p>2014/ Gonzalez et al¹⁶</p>	<p>Sensory garden meta-analysis and horticultural activities.</p>	<p>6 studies were included; each study includes between 8-129 subjects; 8 studies indicate the benefits of the sensory garden.</p>	<p>Descriptive analysis of 16 studies from the perspective: purpose, type of study, number of subjects, type of activity, what was measured and conclusions of each study included in the research. Were included only studies regarding dementia.</p>	<p><i>Outdoor gardens</i> for relaxation with free access: 6 days of observation, 30 minutes daily with and without activity for 3 weeks, 30 minute/ week across 9 weeks; -Walking nearby parks 3times/ week for 6 months; Wander garden: not specified/ during one year before and after establishing a wander garden; customized activities in the garden; walks in nearby parks 3 times/ week for 6 weeks; Exterior space, monitored for 6 days; Horticulture: groups observed for 50 minutes in groups of maximum 8 participants; 3 session/ week (30-45minutes) for 10 weeks; Groups activities 3 sessions/ week during 30-40 min/ session. <i>Comparison of indoor-outdoor activity:</i> indoor 32 hours/ month summer time and 34 hours in winter time and outdoor 30 hours per month over 3 months; activities one hour over 10 days. <i>Indoor garden</i> activities for 4 weeks (fast growing, easily recognizable plants), indoor horticultural activities 1 hour over 10 days (one year pilot study).</p>	<p>Agitation level/ behavior; Cognitive status; Engagement; Frequency of fall and fall severity; Medication administration (type and dose); Degree of independence in caring out the activities; Sleep; Affect; Mapping activities (indoor and outdoor: direct observation and questionnaires).</p>	<p>Alternative interventions can improve well-being and emotional state by reducing disruptive behaviors; -There is limited research on the inner garden and its effects.</p>
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4. Discussion and Conclusion

The medical and social measures, the research and development programs that were undertaken with the purpose of antiaging have resulted in an increased life expectancy and longevity. As a result, globally, the segment of the older population experienced rapid demographic growth. An increasingly older population with multiple health problems requires complex care and a wide range of diversified therapeutic interventions.

Currently, the scientific focus is on identifying as many alternative intervention strategies as possible to allopathic treatment. Starting from the idea that people are healthier when they are connected with nature, building a multisensory garden associate multiple therapeutic valence. The multisensory garden is a garden where all components are carefully constructed to maximize sensory impact. Our team's experience in working with the older people contributed to the identification of clear criteria of interest in the selection of studies to demonstrate the impact of the multisensory garden on the well-being and physical condition for them. Focusing on the benefit of the indoor multisensory garden starts from the advantage of a garden of this type that can be accessed regardless of the season. The environment becomes more pleasant by reducing the feeling of being in a hospital or at home. In the study [24] people from a nursing home confirmed that after the completion of the indoor garden, the environment became more pleasant compared

to the period before the creation of this indoor green space and even led to a better social interaction. Specific therapeutic effects on the condition of the elderly have been identified through research analyzes of the enriched sensory garden. Among the participants invited to visit an enriched multisensory garden, the MMSE score changed after 6 months, compared to the group that visited a conventional multisensory garden ($+ 0.93 \pm 0.65$ vs 0.25 ± 0.71 and -0.24 ± 0.73 in EG vs CSG and control groups, respectively, $p < 0.0001$) [32]. The exposure to the multisensory gardens lasted at least 30 minutes at least 3 times/ week. The number of weeks ranged from 1 week to 4 weeks. The results of these studies were obtained through qualitative methods (direct observations) and/or quantitative methods (completing questionnaires, screening tests or scales) [16]. Comparative studies of outdoor and indoor gardens indicate that although outdoor gardens offer a large space where you can arrange spacious alleys, activities specifically for sensory stimulation, the effects obtained in these spaces, whether they are indoor or outdoor, or just exposure to plants, reinforce the importance of studying and arranging gardens in recovery spaces: older people's homes, recovery centers, hospitals. Natural space leads to the creation of a comfortable and healthy environment, stimulates well-being by encouraging the desire to be active which leads to: decrease the level of agitation, facilitating cognitive recovery, encouraging people interaction, reducing disruptive behaviors, improving sleep quality. The multisensory garden can be used for

multiple purposes: relaxation, therapeutic stimulation, counseling space or psychological therapy, neurological stimulation, support for activities that stimulate mobility and cognition. After researching the articles and information collected for the multisensory indoor garden, it is found that there are few articles that focus on indoor gardens. This area offers a wide branch that can be exploited. The field of multisensory garden effects in the mental and physical recovery of the older person remains open for research.

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