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Salutogenic Parks: Health Promoting Green Infrastructure in Urban Environments

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Abstract

The effects of urban sprawl and global population growth have directly and indirectly negatively affected human health and well-being. Paying attention to the function of natural systems for survival and healing throughout history and the current expansion of urban green infrastructure and paying attention to salutogenic (origin of health) solutions in solving environmental problems are effective strategies for improving the quality of life and achieving appropriate health and well-being of city residents. Today, salutogenic parks are an important part of the green infrastructure of a sustainable city that improves the quality of the environment to improve health outcomes. This article examines topics such as the relationship between the development of urban areas and the expansion of urban green infrastructure with human health, and expresses the salutogenic approach to urban parks based on their cultural ecosystem services in various dimensions of human health as important health-generating resources in the city. It highlights the role of landscape architects in achieving these goals. Finally, it reaches a conceptual framework for the salutogenic effect of urban parks based on cultural ecosystem services on human health, and highlights its application in densely populated urban areas such as the metropolis of Tehran, the capital of Iran.

Keywords*:* Salutogenic parks, cultural ecosystem services, urban green infrastructure, health-promoting design, sustainable urban development, human well-being.

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1. Introduction

The functioning of cities in the 21st century, as the most important context for human life, work, recreational activities and leisure, have shaped the health, culture and organization of human populations. The United Nations (UN) predicts that by 2050, more than two-thirds of the world's population will live in cities (Uduporuwa, 2020). It has been noted that the densification of cities and the increase in urban populations have occurred since the Industrial Revolution of the 19th century until today. During this time, the world experienced a significant growth in human population, and this urbanization process led to a change in the global urban population from about 750 million in 1951 to 4.2 billion in 2018 (Singh et al., 2020).

Cities are the context of economic, social, political and technological growth opportunities; As a result, they have become the most important living environment for more than half of the world's growing population and have created dense urban areas (WHO, 2020; Ye et al., 2022; Yuting et al., 2024). These areas have consumed resources, produced various types of pollution and environmental

problems resulting from the destruction of natural resources for the growth of urban areas, and have exposed people of all ages, genders and economic status to high rates of poverty, inequality and widespread environmental, health and health challenges (Leviton et al., 2000). On the other hand, these unstable conditions have led to damage to the sustainability of natural ecosystems; as a result, human health and safety are at risk (Cepeliauskaite & Stasiskiene, 2020). Therefore, supporting approaches to development that harmonize the city with nature is essential as a fundamental step towards designing urban environments to achieve human health by living in sustainable and high-quality environments (WHO, 2020; Kadakia & Galea, 2023; Yuting et al., 2024).

In urban studies and planning, natural systems have received much attention from researchers as a platform with the goals of meeting basic human needs for survival, improving the quality of life of individuals (Souter-Brown, 2014, pp. 58-63; McPhearson et al., 2023), developing and facilitating social and local interactions for a sense of security and belonging (Reyes-Riveros et al., 2021; Menezes da Silva et al., 2023), solving environmental problems based on nature-based solutions (NBS) (McPhearson et al., 2023), and improving physical, mental, and social health (Vujcic et al., 2019; Wan et al., 2020). By expressing the definition of health from the perspective of the World Health Organization, which considers health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1946) and the introduction of new approaches to health in the field of medicine and treatment, such as "focusing on disease prevention and promoting the health of individuals, not just control and treatment", based on the salutogenic theory (the word salutogenic or salutogenesis is derived from the Latin words "Slus" meaning health and "Genesis" meaning origin) (Antonovsky, 1979); it has led to increased attention of researchers and urban planners to nature-based solutions in order to improve the health level of societies (McPhearson et al., 2023).

Long-term threats caused by unsustainable urbanization on human health such as inequality in access to nature-based resources, including parks in dense cities (Sarkar & Webster, 2017), inactive and unhealthy lifestyles (McPhearson et al., 2023), and stress contexts that underlie many mental and physical illnesses in individuals and society (Erickson, 2012; Pykett et al., 2020; McPhearson et al., 2023); have had potentially important effects on the main causes of non-communicable and chronic diseases (physical and mental), resulting in mortality (Souter-Brown, 2014, pp. 58-63; McPhearson et al., 2023, p. 168). Also, the adverse effects of urbanization have led to the disruption of social connections and isolation of individuals, thus negatively affecting their mental and physical health (Souter-Brown, 2014, p. 68; Arbuthnott, 2023). Such conditions have led to increased social, economic, and healthcare costs in cities globally (Souter-Brown, 2014, p. 68; Wilson & Xiao, 2023).

The Millennium Ecosystem Assessment's (MEA) definition of "nature as linked to human well-being and health through a set of ecosystem services" (ES) (MEA, 2005) provided a suitable platform for research on the relationship between green infrastructure and human health. Parks form an important and integral part of "urban green infrastructure" (GI) that provide important ecosystem services to promote human health (Maikov, 2016; Kabisch et al., 2017; Reyes-Riveros et al., 2021; Pukowiec-Kurda, 2022; Song et al., 2023). The concept of nature-based solutions today also introduces parks as an important part of urban green spaces that are the main platform for cultural ecosystem services (CES) in cities and directly affect human well-being and health (Hartig et al., 2014; Kabisch et al., 2017).

People are increasingly recognizing the effects of human health and well-being in providing a wide range of cultural and ecosystem services of urban parks. This realisation took place after the outbreak of the respiratory virus Covid-19 in 2019, which highlighted the role of urban parks as vital spaces for city dwellers to experience open space, connect with nature, and promote mental well-being and health (WHO, 2020). Also, many research results have introduced parks as important sources of salutogenic improvement of human health in the three dimensions of physical, mental and social health of individuals in cities (Hartig et al., 2014; Wan et al., 2020; Wilson & Xiao, 2023). These resources improve physical health through various salutogenic functions such as increasing levels of physical activity (Liu et al., 2023), alleviating urban stressors (Ulrich et al., 1991), and restoring the capacity to direct attention (Kaplan, 1995); improve mental health; and by providing a platform for people to

participate in activities that strengthen social connections; improve social health of individuals (Arbuthnott, 2023). Accordingly, a key priority for urban planners is to transform urban parks into public spaces that; Effectively improve people's attitudes towards urban parks, facilitate and encourage park visits to improve the physical health and well-being of city residents through their salutogenic functions (Wan et al., 2020).

This article first examines the salutogenic approach to human health in the concepts of sustainable development and urban planning through the cultural ecosystem services of urban green infrastructure in achieving origin of health goals of human health in dense cities. Then, by stating the important position of urban parks in urban green infrastructure and their salutogenic effects, it discusses the importance of these urban health-generating resources, and by highlighting the role of landscape architects in achieving these goals in the city, it arrives at a conceptual framework for the origin of health effect of urban parks based on cultural ecosystem services on human health and expresses its application in dense urban areas such as the metropolis of Tehran, the capital of Iran. The results of this research can be used in future urban planning and to guide landscape architects' research to improve the planning, design, and implementation of salutogenic urban parks in order to improve the health of residents of high-density urban areas such as Tehran. The figure below expresses a conceptual framework of the goals and stages of the research.

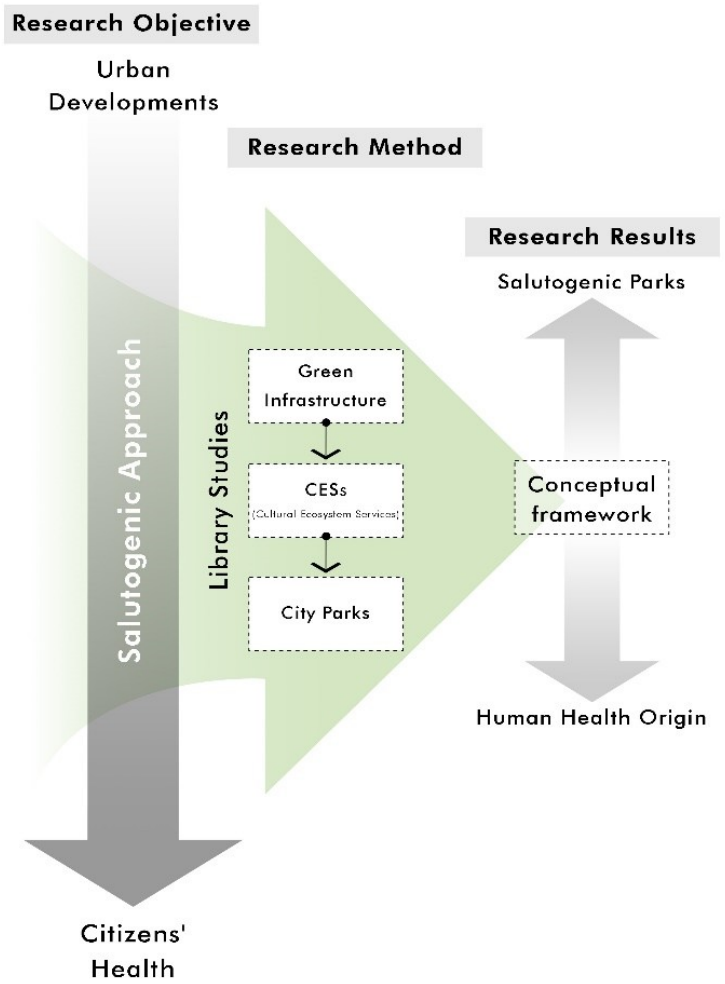

Figure 1. Structure of the study.

1.1 Human Health in Sustainable Urban Development

With the development of cities globally moving towards sustainability, the Brundtland Commission defined sustainable development in its report as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Based on this definition, the United Nations adopted 17 Sustainable Development Goals (SDGs) in 2015, which set

out a 15-year, 17-target global framework for action by 2030 to eradicate poverty, protect the planet, and achieve shared prosperity and health (Colglazier, 2015). To achieve these goals, promoting the sustainability of the social, economic, and ecological dimensions of cities is important to guide the international community towards sustainable development in the future (Chen et al., 2022). In the meantime, the role of architects, landscape architects, urban planners and designers can be very important in achieving some of the United Nations Sustainable Development Goals (Gramkow et al., 2021).

The Millennium Ecosystem Assessment defines an ecosystem as a dynamic collection of plant, animal and microorganism communities and non-living factors that interact as a functional unit, and urban ecosystems are defined as ecosystems that are managed and modified by humans and consist of natural or semi-natural areas (MEA, 2005). In achieving the Sustainable Development Goals, it is necessary to act as an urban ecosystem in solving urban problems and dilemmas (Yuting et al., 2024). A highly efficient and equitable urban ecosystem considers the sustainability of the urban ecosystem and the diverse needs of urban residents, and with appropriate ecosystem services, has a positive impact on promoting the well-being and mental health of residents and increases the quality of urban life. In urban ecosystems, it is stated that the integration of ecological indicators (including the optimization of landscape patterns, ecological space, ecological connections, the maintenance of ecological function and biodiversity, the balance of availability and carrying capacity) with cultural environmental services (including socio-cultural perceptions, the creation of recreational, aesthetic values, and social interactions in order to preserve the environment) leads to the sustainability of the urban ecosystem (Rathmann, 2021; Yuting et al., 2024).

Sustainable Development Goal 11 “Sustainable cities and communities”, also called the Sustainable Urbanization Goal, is related to the challenges associated with rapid and dense urbanization. The realization of this goal is related to the efforts of architects, landscape architects, and urban planners because it includes the following sub-goals; “safe and affordable housing”, “creating green public spaces” and “improving urban planning and management” (Chen et al., 2022; Küfeoğlu, 2022).

Following the impacts of the COVID-19 pandemic on societies and reverse globalization, cities have an increasingly important role to play in achieving the Sustainable Development Goals and in responding appropriately to climate change and biodiversity loss. Population growth, rural-urban migration and urban sprawl pose significant threats to human health and the health of urban ecosystems (Russo & Cirella, 2025). Cities also have critical direct and indirect global impacts on energy consumption, land use, climate change and resource consumption. However, cities promote innovation and sustainable planning and engage in local management of infrastructure, economies, and resource management, which is a suitable platform for achieving transformative solutions for global sustainable development (Chen et al., 2022).

In line with sustainable development, environmental justice focuses on the accessibility and affordability of urban environments for all urban residents, especially vulnerable groups, as well as its cultural inclusiveness. Environmental efficiency is related to the efficient management, conservation, and use of natural resources by people, thereby helping to curb adverse impacts on the environment, such as preventing unnecessary and inappropriate consumption of resources. Developing efficient urban environments and their equitable distribution is one of the most important directions for sustainable urban environments. A highly efficient and equitable urban environment considers the sustainability of the urban ecosystem and the diverse needs of urban residents, and has a positive impact on promoting the well-being and health of residents, thereby enhancing the quality of urban life (Russo, 2024; Yuting et al., 2024). For example, increasing people’s mobility in life, such as walking, and the presence of green and natural spaces with their ease of access, availability, and diversity, can provide many opportunities for urban residents to experience nature, strengthen their connection with nature, and improve their physical health and psychological resilience (Souter-Brown, 2014; McFarlane et al., 2019; Yuting et al., 2024).

To strengthen the connection between humans and nature in cities, human understanding of the natural environment is very important, as the 2030 Agenda for Sustainable Development explicitly states that

by 2030, people should be adequately informed and aware of sustainable development and lifestyles in harmony with nature (Colglazier, 2015). Addressing the ecosystem service aspects and the potential of urban green infrastructure in achieving Sustainable Development Goal 11, namely achieving "sustainable urbanization," can be done in achieving inclusive, safe, resilient and sustainable cities by increasing access to public green spaces such as parks for all city residents (Russo, 2024). Also, urban space is a shared environment between humans and nature, but focusing solely on human benefits cannot lead to sustainable connections between humans and nature in urban environments (Baste, 2021; WHO, 2024).

1.2 Urban Green Infrastructure and Human Health

Urban green infrastructure is defined as a network of strategically planned natural and semi-natural areas and other environmental features designed and managed to deliver a wide range of ecosystem services (Maes et al., 2015). Strategic planning and management of urban green infrastructure includes integrated, interconnected and coherent networks of green spaces that create a socio-ecological mix and offer opportunities for integrating ecosystem services and human health (Sunding et al., 2024). Urban, national and forest parks, community gardens and various forms of private and public protected or built landscapes are considered together and as a system and constitute the green infrastructure of a city. In urban environments, this infrastructure can include not only landscape patches and corridors, but also other forms of nature, such as urban green streets, that provide health-supporting ecosystem services without requiring the same level of use of limited urban land (Coutts & Hahn, 2015).

Urban green infrastructure is therefore defined as "an interconnected network of green spaces that maintain natural ecosystem values and functions and provide associated benefits to human populations" (Benedict & McMahon, 2012). The environmental and natural benefits of urban green infrastructure are complementary, so environmental protection through the implementation of green infrastructure leads to health benefits for humans. In fact, urban green infrastructure systems are essential for the proper functioning of urban ecosystems in providing ecosystem services. This is due to the concept of the impact of the physical environment on living organisms (Coutts & Hahn, 2015). Ecosystem services are also the benefits that humans derive from ecosystems, and the focus of this article is on the cultural ecosystem services that green infrastructure provides to humans to maintain and promote health and well-being.

WHO Regional Office for Europe, 2017 developed an analytical framework for the relationship between green infrastructure and health, which is a three-layer structure based on the socio-ecological framework. Its ecological domain represents the properties and functions performed by green infrastructure, and the human domain represents the health and well-being impacts and outcomes provided by the ecological domain of green infrastructure (Coutts & Hahn, 2015).

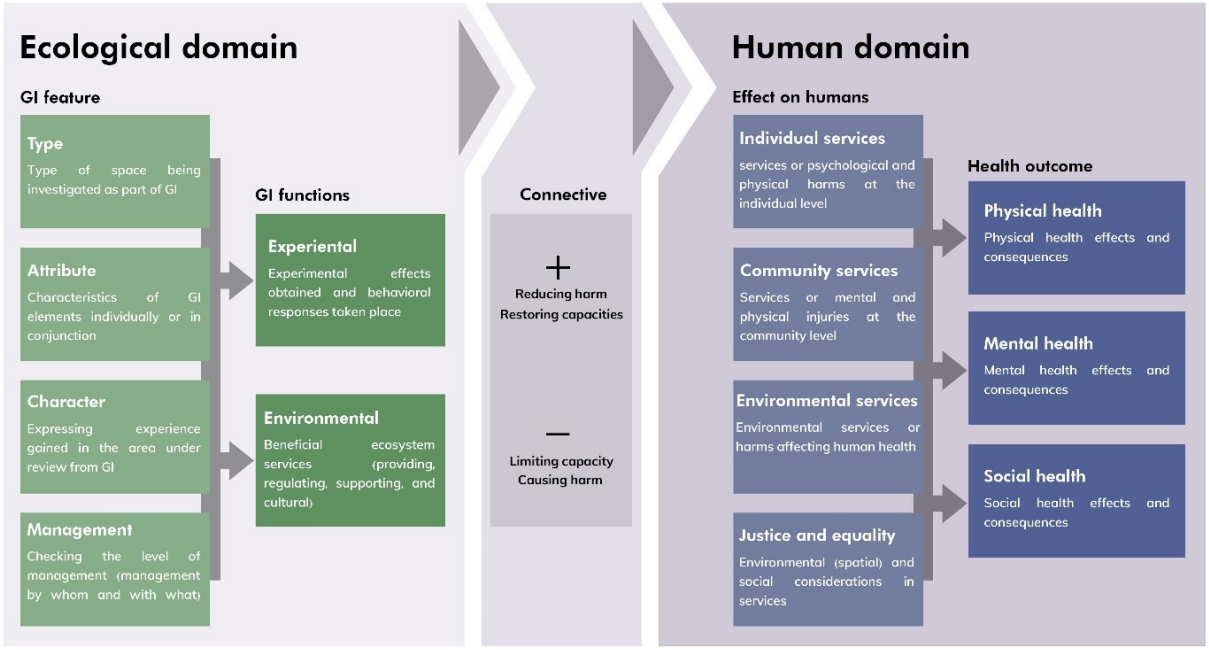

Figure 2. Analytical framework illustrating the link between green infrastructure and pathways to human health and well-being.

1.2.1 Ecological Domain

The ecological domain is divided into two main dimensions; the features of the green infrastructure geographical feature and its functions. The features of the geographical feature describe the physical characteristics or characteristics of a green space and the relationship between individual spaces or the overall geographical feature in an area. Some of these features are included in several models, such as features/facilities, condition/maintenance, access/accessibility, beauty/attractiveness/design and safety. In the model of Coutts and Hahn, 2015, the features of green infrastructure are divided into four categories; type, feature, character and management. From a well-being and health perspective, the green infrastructure components describe what the features of green infrastructure can do or what opportunities they provide and in terms of individual experiences or environmental processes, they are divided into two categories; experiential and environmental (Coutts & Hahn, 2015).

1.2.2 Human Domain

The human domain includes two dimensions; The effects of green infrastructure on humans and its health and well-being consequences. The effects on humans can be described as the specific services provided, that is, the impact of a green infrastructure section on humans. These effects can be divided into four categories; personal services, social services, environmental services, and equity and justice. The Coutts and Hahn, 2015 model, according to the World Health Organization's definition of health (WHO, 1946), has shown the effects of green infrastructure on human health in three main categories; physical, mental, and social health (Coutts & Hahn, 2015).

2. Materials and Methods

Access to and use of urban green infrastructure plays an important role in increasing and improving the well-being and health of city residents (based on the salutogenic approach). Parks also form an important and integral part of the "urban green infrastructure" that provides important cultural ecosystem services to promote human health (Maikov, 2016; Kabisch et al., 2017; Reyes-Riveros et al., 2021; Pukowiec-Kurda, 2022; Song et al., 2023). This study aims to investigate the salutogenic effect of parks on human health and seeks to highlight the interrelationships between parks and the health of urban residents through a conceptual framework of the salutogenic effect of urban parks based on their cultural ecosystem services on human health. Therefore, this research is conducted by

conducting a library study in the main Internet databases of articles in English, examining the literature and results of various researches on parks as the main part of urban green infrastructure as a source of human health in the city, in three parts: "The attitude of the salutogenic approach to urban green infrastructure", "Salutogenic ecosystem services of urban green infrastructure" and "Salutogenic parks". Then, the results of this research are summarized in a framework with the concept of the salutogenic effect of urban parks based on cultural ecosystem services.

2.1 Salutogenic Approach in Urban Green Infrastructure

Clinical concepts in medical science often focus on the achievement of human health on risk factors or findings that lead to diseases, disorders, and injuries that cause pain and require preventive treatment (pathogenic) (McPhearson et al., 2023, p. 167). However, in holistic and positive definitions, health is considered the ability of individuals and populations to experience a good life and well-being in resisting or recovering from life's conditions. In these definitions, it emphasizes characteristics that strengthen individuals' resilience in the face of health threats (Antonovsky, 1996).

The World Health Organization defines human health as the achievement of a state of complete physical, mental, and social well-being and not merely the absence of disease (WHO, 1946). By expressing the definition of health by the World Health Organization in 1986, the Ottawa Charter on Health Promotion significantly expanded the concepts and understanding of health and identified the basic conditions and elements of health as peace, adequate housing, education, nutrition, income, a sustainable ecosystem, the prudent use of available natural resources, social justice and equality of opportunity. It also stated that “any improvement in the state of health is necessarily linked to these basic conditions” (Rathmann, 2021). Then the philosopher Klaus Michael Meyer-Abich expresses a comprehensive concept of health that goes beyond the definition of health from the perspective of the World Health Organization. In his concepts of health, he strongly places the relationship of man with the nature around him at the center of his considerations and states; “A healthy person lives in harmony with nature” and sees the path to human health in a harmonious and positive relationship with nature (Meyer-Abich, 2010).

In 1979, the term origin of health and the salutogenic theory (positive model of health) were coined by medical sociologist Aaron Antonovsky. He introduced this theory and positive model of health as the missing theoretical foundation in health promotion. The term “salutogenesis” was translated by him as “the origin of health” (Antonovsky, 1979). The term salutogenic is derived from two Latin words, “Salus” meaning health and “Genesis” meaning origin (Hewis, 2023). Antonovsky’s (1979-1994) salutogenic theory (origin of health) was also introduced as a thought that focuses on health promotion rather than disease prevention. This thought states “what causes health, not what causes disease”. Therefore, Antonovsky used the term salutogenic instead of the term disease in his health studies (Antonovsky, 1996).

The salutogenic approach is a strategy for increasing individual and social well-being and aims to understand and support practices that promote the effective use of individual and collective resources to improve well-being and health (Hewis, 2023). In the salutogenic approach, the attitude towards health is as a preventive approach that pays attention to maintaining health and health-promoting factors, while in the pathogenic approach, the attitude towards health is often focused on treating diseases rather than preventing them (Antonovsky, 1979).

There is a growing interest worldwide in understanding the impact of physical outdoor environments on people’s health and well-being. In fact, it has been shown that good design not only creates appropriate functional efficiency, but also enhances and improves human health and well-being processes (Dilani, 2005). Accordingly, there has been an increasing interest in understanding the role of urban green infrastructure, which includes natural landscapes of forests and wilderness areas to gardens and human-managed urban green spaces such as parks, in promoting and supporting health and well-being. These areas provide beneficial ecosystem services for recreation and promoting human health (Kellert, 2008; Souter-Brown, 2014, p. 37; Russo, 2024).

The impact of urban green spaces on human health has been emphasized in the study of the impact of natural ecosystem services on health (MEA, 2005) and the cultural and historical concepts of healing landscapes, where contact with nature has been very beneficial for health and well-being in different cultures (Souter-Brown, 2014, p. 15). In fact, urban green infrastructure, from natural to artificial, are considered salutogenic landscapes, which have a specific combination of properties that support general physical, mental and social health and well-being (Maikov, 2016). The connection between these infrastructure and the concepts of the salutogenic approach to achieving human health in nature-based solutions based on scientific evidence as a sustainable way to achieve human well-being and health (Kabisch et al., 2017; Mateo, 2024) and the concepts of healing landscapes as a platform for spiritual achievement and physical, mental and spiritual healing (Gesler, 1993; Maikov, 2016) are introduced. On the other hand, the degree of health-promoting impact of these areas is not the same and depends on their quality (Maikov, 2016), and this quality arises from the relationship between the characteristics of green infrastructure and the effects of these characteristics on individuals (Daniel et al., 2012).

2.2 Salutogenic Ecosystem Services of Urban Green Infrastructure

Nature-based solutions consider natural ecosystem services of urban green infrastructure, especially its cultural services, as effective and vital solutions to address the environmental challenges of today's dense cities (Kabisch et al., 2017; Chen et al., 2019). Ecosystem services are defined as products of nature that humans directly enjoy, consume, or use to maintain or enhance human well-being and health (MEA, 2005), and are divided into four categories: providing services (e.g., food, energy, and biomass resources), regulating services (e.g., regulating services are services that control or maintain processes so that they function properly. For example, natural systems can manage runoff from rainfall, minimize the urban heat island effect, improve air quality, absorb and store carbon, mitigate extreme weather events and natural hazards, and prevent land degradation and desertification by preventing erosion and maintaining soil fertility), supporting services (e.g., supporting services are habitats that are essential in natural environments to maintain life and genetic diversity), and cultural services (e.g., the existence of spaces for physical activity, pleasant visual landscapes for contemplation and relaxation, gathering spaces for social interaction, and amenities to support community revitalization) (Jennings et al., 2016; Jennings et al., 2019; Kosanic & Petzold, 2020; Rathmann, 2021).

The contributions of urban green infrastructure to people in the form of ecosystem services contribute to a good quality of life (Kellert, 2008). Proximity to nature is also an important factor in maintaining or improving human health. Urban green infrastructure provides a range of direct and indirect ecosystem benefits or services that support our physical, mental, and social well-being (Jennings et al., 2016; Maikov, 2016; Kabisch et al., 2017; Chen et al., 2019; Reyes-Riveros et al., 2021; Barbosa et al., 2024). However, in recent decades, urbanization has led to spatial expansion and densification, as well as population growth, and has reduced people’s daily access to urban green infrastructure such as parks (Wang et al., 2015; Chen et al., 2019; Wan et al., 2020). Urban green infrastructure is linked to human health and well-being through ecosystem services based on the salutogenic approach (Dilani, 2005; Maikov, 2016). Therefore, in the context of urbanization, special attention should be paid to urban green spaces such as parks in urban planning to provide appropriate ecosystem services and ensure that these ecosystem services are received by urban residents (Pukowiec-Kurda, 2022; Menezes da Silva et al., 2023).

In recent years, the impact of cultural ecosystem services on human well-being and health has been investigated in more depth. These services can be defined as non-material benefits that people obtain from green infrastructure, including spiritual, aesthetic, educational, and recreational values (Kosanic & Petzold, 2020). Cultural ecosystem services are the non-material benefits that humans derive from ecosystems, including spiritual enrichment, cognitive development, recreation, and aesthetic experiences, including aspects such as cultural recreation, place and aesthetics, heritage, inspiration, and science education. These benefits can include the use of natural resources directly (e.g., enjoyment of walking or viewing natural landscapes) or indirectly (e.g., cultural heritage and spiritual value of a

green space) (MEA, 2005; Lead et al., 2010). These cultural ecosystem service functions are considered central to human well-being and health (Pukowiec-Kurda, 2022; Song et al., 2023).

2.3 Salutogenic Parks

The emergence of salutogenic concepts and their effects on public health promotion (Antonovsky, 1979, 1987, 1996; Jonas et al., 2014) and the emergence of health crises caused by environmental problems (Giles-Corti et al., 2016; WHO, 2020; Varadarajan et al., 2025) have transformed the relationship between public health organizations and urban management and planning. Today, the interaction between public health organizations and urban managers and planners is to examine how the built and social environments affect short-term and long-term health outcomes to understand which urban environments, with what elements and qualities, can control chronic noncommunicable diseases and other adverse health outcomes associated with an inactive lifestyle that affects a large part of society (McPhearson et al., 2023, p. 168).

One of these measures to promote human health is to maintain and promote human connection with urban green infrastructure such as parks, gardens, forests or natural parks, in and around urban areas to improve and increase healthy human behaviors in life (Varadarajan et al., 2025), whose health-promoting effects have been identified in the origin of health concepts (Gesler, 1993; Kellert, 2008; Souter-Brown, 2014, p. 37; Maikov, 2016; Russo, 2024). The most important part of urban infrastructure in promoting human health are parks, which are an integral part of cities, considered as urban green infrastructure, and provide beneficial ecosystem services in line with human health, which are social ecosystem services (environmental health) (Reyes-Riveros et al., 2021; Varadarajan et al., 2025). Nature-based solutions today have introduced parks as an important part of urban green infrastructure that is the main platform for cultural ecosystem services in cities and directly affects human well-being and health (Hartig et al., 2014; Kabisch et al., 2017). Song et al. (2023) examined the Millennium Ecosystem Assessment and the Economics of Ecosystems and Biodiversity (TEEB) indicators to determine the values of cultural ecosystem services of parks in cities, which also affect human health, as summarized in Table 1.

Table 1: Introduction and expression of cultural ecosystem services of parks in urban environments (based on Song et al., 2023).

Value type	Explanation
Aesthetic	A platform for enjoying aesthetic values in various aspects.
Recreation	A place for recreational activities.
Ecological	A platform for restoring natural landscapes and connecting with them
Health benefits	A platform for improving human health in three dimensions: physical, mental, and social.
Learning	A platform for learning and testing natural and human values.
Artistic inspiration	A space that inspires artistic and design expression
Place identity	A platform for creating a sense of attachment and belonging
Interpersonal relationship	A platform for creating social interaction networks
Biodiversity	A habitat for plant and wildlife biodiversity
Cultural Heritage	A platform to showcase the historical and cultural landscape of the region

This review showed that for achieving equality in physical, mental and social well-being and health, it is essential for all human societies to have direct and indirect access to the cultural ecosystem

services of urban green infrastructure such as parks (WHO, 2008; Song et al., 2023). Also, in order to achieve the Sustainable Development Goals, urban parks should be considered as key elements in the strategy for promoting healthy and sustainable cities (Pukowiec-Kurda, 2022; Menezes da Silva et al., 2023). Parks form an important and integral part of the "urban green infrastructure" that provides important ecosystem services to promote human health (Maikov, 2016; Kabisch et al., 2017; Reyes-Riveros et al., 2021; Pukowiec-Kurda, 2022; Song et al., 2023).

However, physical proximity and accessibility to parks alone may not necessarily translate into positive health outcomes, especially if residents are unable to experience the cultural ecosystem services that urban green spaces provide (Jennings et al., 2016). Also, the characteristics and amenities of the areas where people live, such as the biodiversity or naturalness of the area, aesthetic qualities, physical activity and social interaction opportunities, perceived safety and security, level of maintenance quality, integration into the surrounding urban environment, and the level of tranquility that the area offers, influence the perceptions experienced and are likely to be related to the extent of potential health benefits received from the cultural ecosystem services of parks. On the other hand, the health benefits received vary by age group, gender, family circumstances, socioeconomic status, or cultural background (Chen et al., 2019).

The interlinkages between the mental and physical aspects of human well-being related to the natural environment, such as urban green spaces, can be understood through the perspective of cultural ecosystem services (Kosanic & Petzold, 2020). The cultural ecosystem services of parks can affect three dimensions of physical, mental, and social health. The most important of these effects include: outdoor recreation can increase the level of physical activity of individuals at the community level and potentially reduce the risk of chronic diseases and lead to physical health in individuals (Bedimo-Rung et al., 2005; Coutts et al., 2010; Coutts & Hahn, 2015). Immersion in the aesthetic emotions of natural landscapes can, in addition to increasing human capacity for physical and spiritual regeneration, reduce stress and anxiety and lead to mental health in individuals (Ulrich, 1983; Kaplan & Kaplan, 1989; Ulrich et al., 1991; Van den Berg et al., 2007; Thompson et al., 2012; Coutts & Hahn, 2015; Reyes-Riveros et al., 2021) and facilitating interactions among users of different geographical and social origins can stimulate and strengthen social cohesion and lead to social health in individuals (Coutts & Hahn, 2015; Reyes-Riveros et al., 2021; Menezes da Silva et al., 2023). However, since ecosystem services, especially cultural services, are not evenly distributed across urban areas, disabilities in accessing and using parks can exacerbate health inequalities for residents in achieving appropriate levels of health (Boone, 2008; Jennings et al., 2012; Jennings & Johnson Gaither, 2015).

(A) (B) (C)

Figure 3. The salutogenic effect of urban parks on human health (A - Physical activity of children and parents in a neighborhood park in Paris, France) (B - Adolescent physical and recreational activity in a Munich city park, Germany) (C - Women's sports activity in a city park in Munich, Germany).

3. Results and Discussion

Urban areas provide tremendous opportunities for economic, social, political, and technological growth for their residents; as a result, they are home to more than half of the world's growing population for better living. This has led to the formation of dense and crowded cities, consuming resources and generating pollution, and creating numerous problems, including high rates of poverty, inequality, environmental challenges, and widespread public health, adversely affecting urban dwellers of all ages, genders, and economic status. The growth of dense urban areas has resulted in environmentally unsustainable conditions and inequality in access to urban green infrastructure, including parks (Sarkar & Webster, 2017). According to the definition of urban green infrastructure, which is defined as "an interconnected network of green spaces that maintain the values and functions of natural ecosystems and provide health benefits to human populations," it can moderate the detrimental effects of dense cities on human health by improving the accessibility and availability of parks (Coutts & Hahn, 2015), and the role of landscape architects and urban planners in achieving these goals has been highlighted (Gramkow et al., 2021).

Considering the results of extensive research conducted globally on the salutogenic benefits of parks as the most important part of urban green infrastructure in achieving quality of life and health standards for individuals, and the emphasis of global organizations on the importance of parks in solving environmental problems in cities, it has led to special attention from city managers and residents to parks and their benefits. The expression of the benefits of parks in the three health dimensions introduced by the World Health Organization (physical, mental, and social dimensions) (Wan et al., 2020) and the presentation of the health benefits of the salutogenic connection of individuals with parks based on nature-based solutions (NBS) (McPhearson et al., 2023) have led to the formation of frameworks for the relationship between parks and human health.

In this study, we propose a conceptual framework for the relationship between ecosystem services and salutogenic parks, which expresses a different perspective on the salutogenic connection of parks and human health, considering the theoretical foundations of the salutogenic connection of urban green infrastructure and human health and the results of research conducted on parks as the most important part of urban green infrastructure, and the expression of the values of cultural ecosystem services of parks on human health by Song et al. 2023. Given the urban problems of today's densely populated cities worldwide, this framework can be useful in planning, designing, and improving the quality of existing parks or planning new parks as the most important part of urban green infrastructure to improve the origin of health benefits of parks for the health of urban residents, especially in cities that are densely populated and have limited access to natural environments. Tehran, known as the capital and vital city of Iran, has long been associated with problems arising from dense growth and development and the increasing population. On the other hand, this city is constantly witnessing migration from different parts of the country, which exacerbates this problem. As a result, the densification of Tehran for people to live and work has led to the interruption of people's access to urban green infrastructure, especially urban parks; as a result, it has endangered the health of its residents. This conceptual framework, which represents the cultural ecosystem services of parks in line with human salutogenic benefits, can be a good guide for urban planners and managers in planning and designing future developments of urban parks. In fact, paying attention to the cultural ecosystem services that link parks to human health with a health origin approach can be a good guide for landscape architects and urban planners in selecting appropriate uses, functions, and environmental elements in parks in line with promoting human health. The conceptual cycle and salutogenic relationship of urban parks with human health are shown in the figure below.

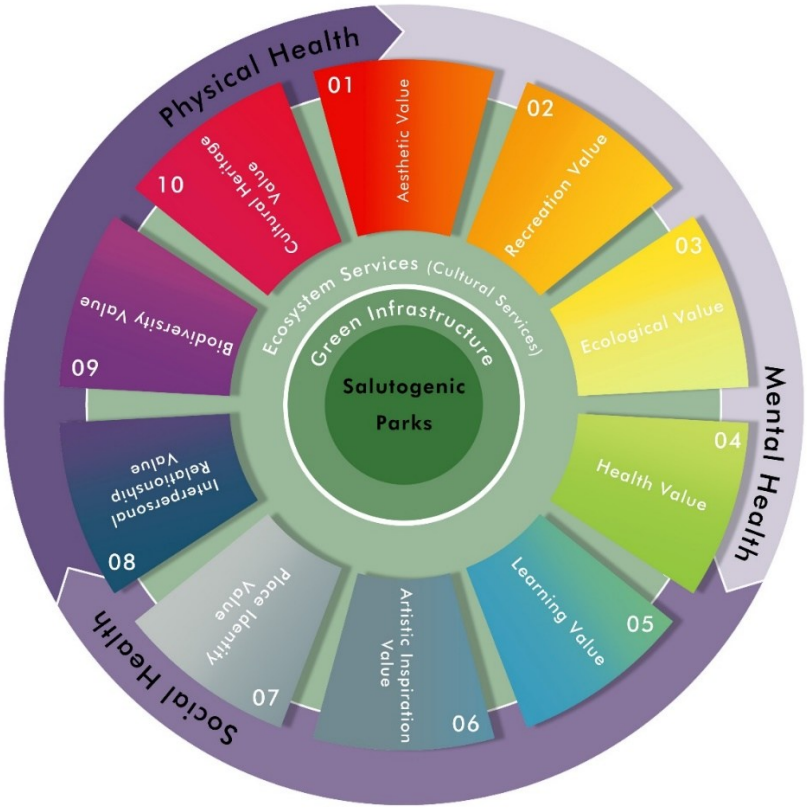

Figure 4. Conceptual framework for the relationship between ecosystem services and salutogenic parks.

Figure 4 shows a conceptual framework for the relationship between ecosystem services and salutogenic parks. This framework, which is presented in the form of a cycle, states that salutogenic parks are at the center of this cycle due to their importance in achieving human health in cities. Also, at the end of the cycle, human health dimensions are shown, which indicate the results of human interaction with salutogenic parks in achieving health. In the middle of the cycle, the dimensions of cultural ecosystem services of parks are identified as the origin of health linkers of the park with human health.

4. Conclusion

Urban green infrastructure have various and vital environmental and social benefits for urban communities. Given the current conditions of societies worldwide, one of the most important of these benefits is the improvement and promotion of the quality of life and health of city residents with a salutogenic approach (source of health). Urban parks are known as the most important part of green infrastructure, and as a result of the salutogenic with parks, the health of city residents is achieved. Access and availability to parks has a great impact on the use by individuals, so that the lack of suitability of these factors can prevent the realization of the quality of life and origin of health benefits of parks. Studies conducted in the research method section showed that access to parks and exposure to their cultural ecosystem services can support human health in three dimensions: physical, mental, and social by creating salutogenic benefits.

Meanwhile, landscape architects play an important role in achieving human health goals in cities, especially in dense and crowded cities where access to such spaces is limited, by designing spaces such as parks that enhance mental well-being, encourage physical activity, and foster social interaction. Their work is to create environments that are not only aesthetically pleasing but also have a useful function that supports various aspects of human health. In essence, landscape architects are key players in creating environments that support human health at all scales, from individual well-being to

community health and environmental sustainability. Their expertise in integrating natural and built environments is essential to creating healthy and thriving communities. Therefore, today, the quality of planning and design of urban parks in urban planning of dense cities is important for urban planners in achieving the goals of promoting and improving the quality of life and health of residents of dense cities.

The findings of this study showed that urban parks, with their beneficial function in the context of cultural ecosystem services based on the salutogenic approach, can be important resources for improving the health of city residents. Therefore, the existence of a conceptual framework for the relationship between cultural ecosystem services of parks and the salutogenic approach can be a suitable guide for the proper planning and design of urban parks in order to increase the salutogenic connection of individuals with urban parks, as a result of which it can improve and promote the quality of life and health of city residents, especially dense cities. Therefore, the conceptual framework for realizing the goals of salutogenic parks that has been introduced in this study can be a suitable guide for urban planners and managers in planning and designing future developments of urban parks in order to pay attention to the cultural ecosystem services that link parks with human health with the health origin approach in selecting appropriate uses, functions, and environmental elements in parks in order to improve human health.

The identification of the factors and sub-factors of access and availability of parks in urban green infrastructure and the results of the study of the health-promoting nature of parks based on the salutogenic approach at the global level and the inadequacy of information and research conducted on these factors and results in the cultural and geographical conditions of the dense urban Tehran, the capital of Iran, can be the basis for future research and the completion of local information in these topics. Also, using the proposed framework of the relationship between ecosystem services and salutogenic parks in order to achieve human health goals, in the planning and design of urban parks in Tehran and expressing its results can be the basis for future research, to help complete and localize this framework based on the geographical and cultural conditions of Tehran. In fact, future research should seek a more comprehensive understanding of the effects of these factors on the access and use of urban parks and their salutogenic relationship with urban residents, especially dense cities.

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Conflicts of Interest

The authors declares no conflicts of interest.

Data availability statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding authors.

CRediT author statement

All authors have contributed equally to the conceptualization, drafting, and revision of this manuscript.

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