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# Architectural Perception and Fear of Falling in the Elderly

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## Abstract

*Old age is a period of increased dependency, increased risk of accidents and decreased physical abilities. With the increase in the elderly population and falls, the necessity of a holistic approach to the problems of the elderly has become even more important. Falls, which are an important cause of injury in older adults, are caused by the interaction of individual and environmental factors. The most common cause of falls in the elderly is physical factors including the architectural features of houses, gardens, social environment areas and other structures or the internal design features of the spaces. An individual's physical perception of a space determines the knowledge of the experience associated with that space and plays an important role in the evaluation of the space. These evaluations affect the mobility of the person in the space or environment. Fear of falling, which occurs after a fall or the possibility of a fall, is the emergence of a state of anxiety that causes avoidance and reduction of activity in the elderly. We will present an overview of the expansions and meaningful interaction of perceived and designed space, the relationship between spatial perception and fear of falling, and living spaces that support the elderly's participation in the social environment. In this article, the importance of functional and usable spaces in public or private spaces will be discussed in the context of the spatial perception of the elderly in the context of reducing the fear of falling and therefore the fear of falling, and the importance of never falling will be emphasized. In improving the quality of life of the elderly, the perception of the past about the space can have an impact on the future and strategies can be created to support this positively.*

**Keywords:** Accessibility, falls, space design, older people, fear of falling

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## Yaşlılarda Mimari Algı ve Düşme Korkusu

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### Öz

Yaşlılık, bağımlılığın arttığı, kaza riskinin yükseldiği ve fiziksel yeteneklerin azaldığı bir dönemdir. Yaşlı nüfusun ve düşmelerin artmasıyla birlikte yaşlıların sorunlarına bütüncül bir yaklaşımın gerekliliği daha da önemli hale gelmiştir. Yaşlı yetişkinlerde önemli bir yaralanma nedeni olan düşmeler, bireysel ve çevresel faktörlerin etkileşiminden kaynaklanmaktadır. Yaşlılarda düşmelerin en yaygın nedeni, evlerin, bahçelerin, sosyal çevre alanlarının ve diğer yapıların mimari özelliklerini veya mekanların iç tasarım özelliklerini içeren fiziksel faktörlerdir. Bireyin bir mekâna ilişkin fiziksel algısı, o mekanla ilgili deneyim bilgisini belirler ve mekânın değerlendirilmesinde önemli bir rol oynar. Bu değerlendirmeler kişinin mekân ya da ortamdaki hareket kabiliyetini etkiler. Bir düşme ya da düşme olasılığı sonrasında ortaya çıkan düşme korkusu, yaşlılarda kaçınma ve aktivitenin azalmasına neden olan bir kaygı durumunun ortaya çıkmasıdır. Algılanan ve tasarlanan mekânın açılımları ve anlamlı etkileşimi, mekânsal algı ve düşme korkusu arasındaki ilişki ve yaşlıların sosyal çevreye katılımını destekleyen yaşam alanlarına genel bir bakış sunacağız. Bu makalede, kamusal ya da özel alanlarda işlevsel ve kullanılabilir mekânların önemi, yaşlıların mekânsal algısı ve dolayısıyla düşme korkusunun azaltılması bağlamında ele alınacak ve hiç düşmemenin önemi vurgulanacaktır. Yaşlıların yaşam kalitesinin artırılmasında geçmişin mekânla ilgili algısı geleceğe etki edebilir ve bunu olumlu yönde destekleyecek stratejiler oluşturulabilir.

**Anahtar Kelimeler:** Erişilebilirlik, düşme, mekân tasarımı, yaşlılar, düşme korkusu

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## **Introduction**

Aging is one of a series of developmental stages from birth to death. Aging, on the other hand, is a state of gradual loss of mental, physical and perceptual abilities in such a way that they will never be restored, and it is a period of interaction and transformation that includes different forces in which many physical, mental and social changes occur (ASHB, 2015). According to the World Health Organization (WHO), aging is the gradual accumulation of damage at the molecular and cellular level at the biological level and the decrease in physiological reserves over time (WHO, 2015). In other words, this process, which is a state of aging, is a state of existence that includes rebuilding and repair mechanisms, although it includes wear and deterioration (Beğer & Yavuzer, 2012, p.1).

The world is getting older. According to WHO, between 2015 and 2050, the world population over the age of 60 will increase from approximately 12% to 22% (WHO, 2018). In Turkey, which is in the process of “demographic transformation” referred to as the global aging process, the proportion of the elderly in the total population has increased due to the decrease in fertility and mortality rates, developments in the field of health, and the increase in the standard of living, welfare level and life expectancy at birth. According to population projections, the proportion of elderly population is projected to be 11.0% in 2025, 12.9% in 2030, 16.3% in 2040, 22.6% in 2060 and 25.6% in 2080 (TİK, 2021).

Aging population, urbanization rates and holistic approaches to aging have introduced the concept of active aging (Taş et al., 2023). Active aging can be defined as the process of ensuring that individuals are able to meet their needs in the best way possible to enable them to maintain their quality of life as they age. Active aging, which is a marker of participation in social life that ensures physical, mental, psychological and social well-being, is to be self-sufficient as they age (Akyıldız & Akbaş, 2020, p.85).

Prevention and management of falls and accompanying injuries, which are common in the aging world population, is a global challenge. WHO defines a fall as a person lying on the ground or at a lower level than oneself due to carelessness or accident (WHO, 2021b). Falls, a public health problem, cause high rates of morbidity and mortality in the elderly and increase with age. Falls negatively affect individuals physiologically and

psychologically and can cause loss of confidence and independence (Kozak, Bahar, Faruk, Kılıç & Başbüyük, 2021, p.12). The accompanying social and economic consequences are also important, as fall-related expenditures are included in health care costs in developed countries (Montero-Odasso et al., 2021, p.1501).

The majority of falls in the elderly occur due to the interaction of individual and environmental factors. Age, gender, loss of postural control, use of assistive devices, abnormal gait pattern, decreased reaction time, muscle weakness, arthritis, cerebrovascular disease, peripheral neuropathy, Parkinson's disease, dementia, vision problems, blackouts (syncope, hypoglycemia, postural hypotension, cardiac arrhythmia, epilepsy, alcohol, drugs, vertebrobasilar insufficiency), Menier's disease, use of four or more medications are among the intrinsic, that is, individual factors. Factors that cause falls such as lack of adequate lighting, stairs without handrails, non-ergonomic designs in the home, sidewalks not having smooth floors or being too high, steep ramps, slips in winter, etc. are called extrinsic or environmental factors (Atay & Akdeniz, 2011, p.13).

The fall experiences in the life of the elderly individual and the events he/she sees around him/her cause him/her to see the fall event as a sign of fear and weakness for his/her next life. This problem is defined as "fear of falling" in the literature. It is emphasized that older adults with fear of falling perceive the built environment as dangerous when they cannot meet their needs for safety, accessibility and comfort (Rico & Curcio, 2022, p.88). Ramps or high stairs, high sidewalks, steep sidewalks, steep ramps, pedestrian crossings without lights and audible warnings, and high overpasses with steep stairs, which are very common in Turkey, can cause the elderly, especially those with fear of falling, to be unable to leave their homes. The relationship between personally perceived characteristics of neighborhoods and fear of falling underlines the need for improvements in urban infrastructure, especially in public spaces, to reduce fear of falling in older adults (Canever, Danielewicz, Leopoldino & de Avelar, 2021).

In increasing the quality of life of the elderly and supporting their independent life, the perception of the past related to the space may have an impact on the future, and architectural designs that support and facilitate this positively gain importance. Cities are spaces that enable the realization of designs that enable equal and fair use of spaces with the diversity and richness that each individual needs. It is essential to increase the level of participation of all aging individuals in daily social life and to provide

equal participation opportunities in spatial life planes to improve their quality of life (Akyıldız & Akbaş, 2020, p.5). The Age-Friendly Cities project, according to WHO's criteria, is built on eliminating the obstacles and restrictions faced by the elderly, especially during their active participation in social life. Designing age-friendly cities is to provide a space where every aging individual can realize themselves, in other words, to provide opportunities and opportunities for active, equal and fair aging. Providing an environment for the integration of all individuals living in the city with the society will also enable the maintenance of equality, security and welfare in the society (WHO, 2007a; Akyıldız, 2020, p.11). Defining the relationship established with space in old age and interpreting the different forms of this relationship can offer supportive possibilities for urban planning for the elderly to use more active and healthy living spaces. While designers are generally concerned with the contribution of housing to the physical environment, researchers believe that the psychological well-being of the individual is the most important indicator of successful aging. Accordingly, in addition to the design features of the physical environment, it should also have features that support the friendship, socialization and relationships of the elderly. For this reason, it is important for designers to closely monitor the multifaceted relationships between the elderly and the environment for success. Characterizing the physical environment that supports active aging in its setting can serve as a good starting point for designing environments conducive to active aging and further developing future research (Portegijs, Lee & Zhu, 2023).

While people make sense of the space and environment they live in through cognitive processes, designs related to space are also formed in their minds in this process. These processes allow universal spaces to be perceived with certain characteristics and stored in memory (Akyıldız, 2017, p.19). People's perceptions of space determine their level of knowledge about the physical characteristics of the space they live in and play an important role in their evaluation of that space. Briefly; it determines the mobility of the person in or around the space. Depending on the short or long term experiences of the person in or around the space, the inclusion of falls in the process of remembering the space may create difficulties in the use of those spaces. Associating spatial perception with the fear of falling in older adults may cause limitations in the living space. In this article, the place of falling in the process of remembering the space

depending on the short or long term experiences of the elderly in or around the space, what is the relationship between the fear of falling and the perception of space.

We will present an overview of the expansions and meaningful interaction of perceived and designed space, the relationship between spatial perception and the fear of falling, and the living spaces that support the participation of the elderly in the social environment. In this article; the importance of functional and usable spaces in public or private spaces will be discussed in the context of the spatial perceptions of the elderly in the context of reducing the fear of falling and therefore the fear of falling, and the importance of never falling will be emphasized.

## **Method**

In this study, a literature review was conducted within the scope of qualitative research method. National and international sources were scanned and the needed data were collected. In this context, firstly, the perception of falling and space were investigated separately. The links between the perception of space and fear of falling were related and the results were interpreted.

### **Physical Space Design and Accessibility**

An individual's disability is directly proportional to the restrictions they face in daily life. Accessibility can be achieved by ensuring that inter-related actions in daily life can continue without interruption. In order to establish an equal, healthy social and cultural life, accessibility decisions should be made for all users (disabled, elderly, pregnant women, children, strollers, very tall or very fat people, animals and others) in all private, semi-public and public spaces (Enginöz, 2015, p. 49).

Founded in 1989 by Ronald L. Mace and renamed The Center for Universal Design at North Carolina State University in 1996, the Center published 7 principles in 1997 to clarify and guide the concept of "universal design". Universal design is an approach to design and thinking that aims to ensure that physical spaces and different products can be used by people of all ages and levels of competence (Dostoğlu, Şahin & Taneli, 2009, p.25). In environments designed with this approach, safety, health and

comfort conditions have been improved and efficiency and productivity have increased (Demirkan, 2015).

In Turkey, Law No. 5378 on Persons with Disabilities (2005) stipulates that public institutions and organizations shall take necessary measures to ensure that all kinds of buildings, roads, sidewalks, pedestrian crossings, open and green areas, sports fields and similar social and cultural infrastructure areas and public transportation services open to the public are suitable for the accessibility of disabled people. In Turkey, although solutions are produced for the access of disabled people in architectural designs depending on regulations and legal sanctions, accessibility in the built environment has not been fully achieved in practice. Legal sanctions are tried to be met by considering only the walking disabled within the categories of disability. However, equally accessible design solutions should be developed for everyone, not only for people with walking disabilities or people with disabilities.

### **Accessibility and Physical Space Design for the Elderly**

Due to factors such as advances in science and technology, birth rates are decreasing and life expectancy is increasing. As a natural consequence of this, the world population is aging at an increasing rate and the proportion of elderly population in the total population is increasing.

Architectural design includes the art of designing structures in which people, who are a value in society, can live their lives in line with the principles of aesthetics and usefulness (Akyıldız, 2017, p.69). In this context, the Active Aging Policy Framework was published by WHO in 2002 to support developing countries and to strengthen health and social policies in the aging world. Afterwards, the concept of age-friendly city was developed by WHO in order to create suitable physical and social environments in the city for active and healthy aging. The components of this concept are; Outdoor spaces and buildings, Transportation, Housing, Social participation, Inclusion in social life and respect of society for the elderly, fulfillment of civic duty and participation in the workforce, Information and communication, Community support and health services (WHO, 2007b).

In 1991, the United Nations General Assembly adopted the United Nations Principles on Aging. According to the principle of independence, the social environment should provide opportunities for older persons to develop their capacities, older persons should live in their own homes and

social environments as much as possible, and older persons should be able to work in income-generating jobs. In accordance with the principle of participation, older individuals should be able to maintain their relationships in the social sphere, be active at every stage in the development of policies in this field, share their experiences with younger generations and contribute to society in line with their interests (Buz et al., 2018, p.391). The necessary condition for ensuring an aging process in accordance with these principles is the creation of suitable physical and social environments and age-friendly cities.

### **Perception of Physical Space by the Elderly**

The sensory information we receive about the abstract/concrete objects of the external world that surround us turns into perception (İnceoğlu, 2010, p.67). This sensory information is obtained through our five sense organs consisting of the senses of hearing, tasting, seeing, smelling and touching, and in addition to these, with the help of the sense of feeling. Perception is an active process that takes place in the form of reading the environmental information received through the senses with a mental process (Özen, 2006) and in this process, the senses transfer the objective world to subjective consciousness (Köktürk, 2010). In addition, the needs of the individual and the motives arising from them, knowledge and experiences also significantly affect the perception process (İnceoğlu, 2010, p.86). In addition to these, the relationship of the architectural space with the environment and other spaces are also important parameters that affect the perceptual process. Spatial perception or environmental perception emerges when the space starts to be defined with the senses beyond the three dimensions that constitute its concrete existence.

Spatial perception determines people's level of knowledge about the physical characteristics of space and spatial perception has an important role in people's evaluation of that space. These evaluations affect and shape the behavior of the person in that space. Spatial perception is related to the recollection of the space depending on the person's short or long-term experiences in or around the space (Özen, 2006). In this direction, spatial perception determines the environment-human interaction. It becomes a precursor to the person's behavior in that space (Solak, 2017, p.18).

The human being is an entity that performs its actions in space. Physically and psychologically, space integrates. His feelings, thoughts, expe-



periences and experiences are shaped by space. He makes the conceptualization of space based on himself. Mapping the space in his/her mind creates memory. Experiences in space, when combined with these indicators, form 'spatial memory' in the mind. Therefore, 'spatial memory' is formed as a result of individuals' emotional and semantic experiences of those places (Avcıoğlu & Akın, 2017, p.427). Memory is the ability to recall past experiences, experiences and experiences. In other words, it is the power to recall the experiences in which oneself existed, to visualize them in the mind and to preserve the past in the present (Cevizci, 2000, p.111). Images, memories and experiences in human memory cannot be considered separately. Space and memory are in a communication that feeds, shapes and makes sense of each other (Arslan, 2021, p.1867).

Memory processes consist of mental operations of encoding, storage and retrieval. Encoding is the mental representation of information perceived from the external world. This process of perception is followed by the process of comprehension and evaluation of the information in our minds. In this process, called memorization, information is stored for short or long periods of time. Recalling and using information in experiences constitutes the recall process (Edgü, 2021, p.224).

Societies produce spaces suitable for their own needs and lives. Spatial practices are the spaces that encompass the daily life of the individual (Palabıyık, 2012, p.572). While the spaces where daily life takes place are constructed as places where the subjective and psychological processes of life take place, where perceptions and experiences turn into consciousness, personality and memories, they are shaped by the different identities that people attribute to the space. The space where daily lives take place is the perceived space. It is the symbols in the images of those who use or live there. It is the moment lived automatically (Lefebvre, 1991b, p.39).

Perceived space, that is, spatial practice, is the use of space by individuals and the daily practices and perceptions they encounter in space. Therefore, daily life activities include behaviors such as owning or avoiding a space (Wanka et al., 2018, p.28). For older individuals, survival instinct is the state of adapting to the living spaces necessary for them to exist in modern life, personally or socially. Individuals evaluate and participate in the environment and the objects in it in terms of their usefulness and move away from environments that they perceive as harmful or threatening (Edgü, 2021, p.223). Therefore, the space perceived sensually and

mentally takes place in the memory of the person and maps of the space are drawn, which the person keeps for future use (Solak, 2017).

The elderly, who exists in the space, perceives, learns and memorizes the space with their senses; a memory of the space is created with the benefit / loss calculation process of the experiences and emotions that are constantly being done in the background, whether they are realized or not. How the elderly behave in space will be related to how they define and comprehend space.

The relationships established with the space in elderly individuals affect their old age practices according to their experiences. The meaning of space in the perception of the elderly, the interaction of the elderly with space and the limiting or facilitating factors of space gain importance.

### **Space-Identity Interaction: A Conceptual and Theoretical Perspective**

In describing the process of perceiving and comprehending space, Leland explains the process of sensing architecture as follows: "The pleasure we derive from architecture finds its value in the way we perceive it" and continues: "This value is related to how the eye and consciousness (mind) perceive and interpret the visual data of architectural experience. Perhaps the most basic concept is that consciousness is programmed to seek meaning in all the information sent to it, depending on the communication between the senses. This is undoubtedly linked to the survival instinct. Consciousness tries to fit the information given to it into a meaningful pattern. When the incoming data is meaningless, consciousness cannot recognize it. Even when given completely random visual or auditory phenomena, consciousness preinterprets them on the basis of previously stored evaluative cognition. Therefore, what we perceive is based on what we already know" (Leland, 2006, p.91).

The mechanism of perception is not only the collection of external data with our five senses, but also the use of psychological influence mechanisms such as "time", "continuity", "awareness", "cognition". Psychic evaluations, "cultural accumulations and experiences, economic, functional social and cultural tendencies" are involved in the definition of space. Just as the actions in the perception process of the senses cannot be separated from each other, the mental perception process, which develops sequentially, cannot be separated from sensory perception. In the mental

process, the person can continuously experience the space with the information about the space remaining in his/her mind. In this process, the person uses past experiences of space and time. This experience changes and develops depending on the concept of time and the psychology of the user of the space (Gezer, 2012, p.9)

We rely on our senses to recognize the environment and to know if there is any danger to us. The most dominant of our senses is undoubtedly our sense of sight. Our brain devotes a large part of itself to processing the information that comes through vision, and accordingly people rely most on their sense of sight (Ramachandran, Blakeslee & Dolan, 1998, p.54) defining the environment and the objects in it as the responses that the environment offers us. These offerings can be vital, biological, economic, social and so on; they can even be harmful as well as beneficial. How we make use of them depends on our survival instinct. So, when we perceive such objects or environments, we do not primarily try to understand their qualities, but whether they are usable or not. Of course, as one can easily imagine, this survival instinct is now associated with the ability to adapt to social and work environments, not in the sense of fighting in the wild, but in the sense of being able to exist in modern life, in society, in the city. Therefore, considering that humans evaluate the environment and the objects in it in terms of their usefulness and that our brain uses its resources in the most efficient way, we can say that we do not take into account environments or objects that are not useful; moreover, we move away from environments that we perceive as harmful or threatening (Edgü, 2021, p.218).

### **Elderly and Falls**

In general, old age is classified as young old between the ages of 65-74, old old between the ages of 75-84, and old aged 85 and over (WHO, 2015). The age of 65 is considered to be the threshold of old age, when morbidity and mortality rates begin to show a significant increase compared to previous years (Sanderson & Scherbov, 2019, p.31).

At the biological level, aging is a process in which molecular and cellular damage associated with the gradual accumulation of a wide variety of substances leads to a gradual decrease in physiological reserves over time, an increase in the risk of disease and a decline in the capacity of the individual (WHO, 2015). With aging, physiological changes occur in the res-

piratory, cardiovascular, gastrointestinal, neurological, endocrine, immune, musculoskeletal and excretory systems, as well as in the senses such as skin, vision, hearing, taste and smell. The appearance of multiple chronic systemic diseases and polypharmacy increase with age. Therefore, loss of function in tissues and organs occurs (Ağar, 2020, p.348) The variables that constitute and affect aging are neither linear nor consistent. It can be affected by personal and environmental factors (WHO, 2015). With the aging process, it can be seen that the functionality of the elderly is affected by the decline in physical activity and functionality, as well as activity limitation, with a decrease in strength, endurance and flexibility (Uzun et al., 2018, p.267).

Although falls are not an inevitable consequence of aging, they are experienced more frequently, especially in older individuals, due to the risk factors that increase with age (WHO, 2021d). Falling can be defined in different ways as a concept. According to the Turkish Language Association (TDK, 2023), it is defined as “falling down from above by leaving the place where one stands, stands, holds on or by losing one's foothold and balance”. According to the World Health Organization, a fall is defined as a person lying on the ground or at a lower level than oneself due to carelessness or accident (WHO, 2021b). Falls are one of the most common and important problems faced by elderly individuals. In particular, injuries due to falls are increasing due to the inadequacies of old age, obstacles and risks posed by the environment. WHO recognizes falls as one of the four major problems of old age. (WHO, 2007a). Although falls can be seen in all age groups, they occur more frequently among older adults due to risk factors that increase with aging. One third of individuals aged 65 years and older and about half of individuals aged 80 years and older are reported to fall at least once every year. It is known that people who fall once are two to three times more likely to fall again (WHO, 2021d; SB, 2021). Fall-related injuries are one of the most important causes of morbidity and mortality with the risks of disability loss and death (Lee et al., 2018, p.1066).

It is stated that home or environmental risk factors play an important role in more than half of the falls (NCOA, 2022). It has been reported that 60% of fatal falls in the elderly aged 65 years and over occur at home, 30% occur in public places and 10% occur in health institutions (ASHB, 2007, p. 6-15).

Older people with weak functional capacity are more vulnerable to health problems and environmental conditions. Accordingly, unsafe environments are risk factors that expose them to events such as falls, increase morbidity and mortality rates, and jeopardize the lifestyle of this population (Echeverría, Astorga, Fernández, Salgado & Dintrans, 2022, p.1).

### **Fear of Falling**

The fall experiences in the life of the elderly individual and the events he/she sees around him/her cause him/her to see the fall event as a sign of fear and weakness for his/her next life. This problem is defined as “fear of falling” in the literature. Fear of falling is defined as “the perception of low self-efficacy in avoiding falls while performing basic activities that are not dangerous in daily life” (Tinetti, Richman & Powell, 1990, p.240). According to another definition, fear of falling is defined as 'anxiety about falling that leads to avoidance and reduction in activity'. Reduction in activities leads to changing conditions, weakness and abnormal gait and may increase the fear and risk of falling in the long term. Thirty percent of older people living in the community fall every year and 15% fall more than once (Hausdorff et al., 2001, p.1051). It has been emphasized that fear of falling causes more restrictive results in daily physical activities than falls and fall-related injuries (Pereira et al., 2020, p.2). Activity restriction due to fear of falling may increase the risk of falling (Friedman et al., 2002, p.1330). Many elderly individuals do not report their falls or do not seek medical attention unless they are injured. Fear of falling, which is considered among the risk factors for falls in the elderly, has been defined as the psychological and behavioral consequences of a fall experienced by an elderly person. It has been stated that patients admitted to the hospital due to falls show a series of symptoms that constitute post-fall syndrome after four months of follow-up and the most common symptom is falling (Murphy, 1982, p.269). In WHO's Global Report on the prevention of falls in old age, it is emphasized that the fear of falling increases the risk of falling among older people who have already fallen and triggers a decline in functional capacity (WHO, 2007b).

In terms of falls; it was stated that the presence of a history of old falls was also determined as one of the risk factors and accordingly, the frequency of assistive device use increased, the individual's going out on the street decreased with a decrease in mobility and the rate of domestic falls

increased (Gökçek, 2019, p.218). It has been emphasized that elderly individuals with fear of falling have fallen at a high rate in the last year and that elderly individuals with fear of falling have a higher risk of falling (Caner & Avcı, 2022, p.196). Fear of falling can occur even in a near-fall experience, is associated with a decrease in activities of daily living, and is associated with anxiety and depression. This condition is also known as post-fall anxiety syndrome and is more common in older people living alone, those with cognitive and movement disorders, poor balance and a history of falls. It is a risk factor for future falls (Ang, Low & How, 2020, p.116).

It has been emphasized that the experience of falling in different time periods does not affect the presence of fear of falling and that the fear of falling continues for at least one year (Chen, 2021, p.2). Therefore, the preventive approach can be much more effective if the elderly never experience falls and therefore are not affected by the fear of falling. In order to prevent falls, it is necessary to evaluate the space where the elderly live and use, observe the movements of the elderly, and determine the fall risk levels (Çubukçu, 2018, p.51).

Considering the changes associated with aging, the need for environments and spaces that increase the ability of individuals to maintain their daily lives comfortably, safely, independently and support their deficiencies is gradually increasing over the life span. The changes seen throughout the process cause people to decrease their ability to adapt to the environmental conditions in which they live and to experience various difficulties in places (Azak, 2020). In another dimension, the importance of this situation is not known before the fall event occurs in most elderly individuals and they do not take precautions to prevent it from occurring. However, after experiencing a fall-related negativity, they take measures to protect themselves from falling (Swift, 2006, p.65). Many older people are 'silent fallers' who do not report their falls and do not seek medical attention unless they are injured. 'Silent fallers' often ignore falls as part of aging (Ang et al., 2020, p.116). Therefore, the need for safe environments for older people is even greater.

### **Elderly and Ergonomic Environment**

One factor that significantly influences the likelihood of a person falling and/or being injured due to a fall is the physical environment and its structure (Iamtrakul et al., 2021, p.2). Environmental and other risks, such

as poorly lit roads and unsafe sidewalks, significantly increase the likelihood of falls among older people (Clemson, 2008, p.382). There are also many risk factors that increase the risk of falls in homes where older people live. Home safety visits have proven to be effective in identifying environmental risk factors that increase the risk of falls. Especially in developing countries, most of the elderly individuals live with their relatives and they have to live in the environmental arrangement preferred by their relatives without their own choice. Therefore, the need to identify environmental risk factors is important (WHO, 2007a).

The presence of appropriate designs in every area open to the use and interaction of elderly people to support and facilitate their active participation determines the ergonomic environment (Pinto et al., 1997, p.339). In addition to being considered as a spatial fiction, architecture exists by alluding to both the architectural product and the intellectual infrastructure under that service. This important architectural product also serves the use of the individual and society (Sözen & Tanyeli, 1986, p.162). The level of sensitivity to the problems and demands of the elderly in the design process affects the design, and the design of the spaces of use in the city for the elderly is of special importance.

The designed space is the understanding of space of scientific perspective and disciplines, namely geographers, urban planners, architects, engineers, etc. (Lefebvre, 1991b, p.39). The ability of the elderly to lead an active and independent life is directly related to the suitability of the social and physical environment offered to them for their perceptual, mental and physical capacities (Zorlu, 2017, p.43).

Like every individual, the elderly have the right to live in a comfortable, appropriate, safe and healthy environment. The equipment and arrangement of the dwelling and the immediate environment can be adjusted to solve or minimize the problems of the elderly. Environmental conditions affect outdoor mobility, especially in older adults, by facilitating or restricting participation in activities outside the home (Rantanen et al., 2012, p.2). A study showing that the perception of barriers to outdoor mobility precedes reduced mobility among older people living in the community emphasizes that environmental conditions are a risk factor for functional limitations (Rantakokko et al., 2012, p.119; WHO, 2021a).

According to the theory that there is a reciprocal effect between a person's physical and social environment and their behavior, and that the poorer their behavioral skills, the more their environment influences them

(Lawton & Simon, 1968, p.108), older adults can be particularly affected by their environment. A safe outdoor environment can encourage older adults to participate in health-promoting outdoor activities in the neighborhood. Fear of falling outdoors may increase when the environmental pressure of the neighborhood's architectural structure exceeds individual capacity (Lee et al., 2018, p.1071).

It is emphasized that older adults with fear of falling perceive the built environment as dangerous when it does not meet their needs for safety, accessibility and comfort (Curcio, 2022, p.84). It has been stated that the risk of falls can be reduced by 21% with appropriate environmental interventions (Clemson, Mackenzie, Ballinger, Close, & Cumming, 2008, p.969), and the risk can be reduced by 41% with changes made at home (Karlsson, Magnusson, Von Schewelov & Rosengren, 2013).

Ramps or high stairs, high sidewalks, steep sidewalks, steep ramps, pedestrian crossings without lights and audible warnings, high overpasses with steep stairs, which are very common in Turkey, can cause elderly people with mobility difficulties and fear of falling to be unable to leave their homes. The human being at every point of architectural design is the most decisive factor. Disciplinary perspectives on planning the physical environment in line with analyses that take into account the needs of elderly individuals, analyzing the impact of the design on the individual and making revisions when necessary can ensure the active and healthy participation of elderly individuals in life. The combination of what is perceived and what is designed reveals the lived space. The harmony of this trio can result in the mastery of living the space (Lefebvre, 1991b, p.39).

## **Conclusion**

Aging is a natural process in which many physiological, psychological and social changes occur. The aging of the world population brings along many problems related to the aging period. One of the most common problems encountered in old age is falls. Falls and the subsequent fear of falling are public health problems and can cause anxiety and fear depending on their occurrence, cause restrictions in physical mobility in the elderly and reduce the quality of life. Old age, which should be addressed with a holistic approach, is not limited to individuals over the



age of 65. It is a situation that is inevitable for every individual to experience and includes the whole society. Therefore, the necessity of a holistic approach to falls in old age has become even more important.

Falls, which are an important cause of injury in older adults, are caused by the interaction of individual and environmental factors. The most common cause of falls in the elderly is physical factors including the architectural features of houses, gardens, social environment areas and other structures or the internal design features of the spaces. The place in the mental memory of the fear of falling, which may be caused by a minor fall, can be reflected in the spaces and may cause restrictions in the use of the spaces by the elderly. Spaces where a fall has occurred or is likely to occur can maintain its continuity in the mind and negatively affect the use of physical spaces as a reflection of the fears and anxieties of the elderly. This situation may impair the quality of life of the elderly by preventing their socialization and active participation. Space designs that will facilitate the physical activities of older people; It is emphasized that it has an impact on improving functional capacity, increasing autonomy in performing activities of daily living, and reducing frailty and fall risk in older people (Tornero-Quiñones et al., 2020, p.2).

In order to facilitate the participation of elderly individuals in life and to continue their active participation in living spaces, it is of great importance that all disciplines and especially spatial designers are professionally aware of the transformative and constructive features of their own powers. The power of a space to transform its inhabitants can be utilized. The contribution of space designs where falls are never experienced to the life of the elderly is very great. Elderly individuals' meaningful and positive experience of spaces ensures the sustainability of their quality of life. WHO aims to create age-friendly cities and communities that maximize the capabilities of all people in general, with strategies that involve multiple sectors (health, social protection, transport, housing, workforce) and stakeholders (civil society, older people and their organizations) (WHO, 2021c). In this context, the recommendations emerged from our article;

- In the design of spaces; it should be ensured that falls are never experienced by architectural designs that support the physical and perceptual active and healthy participation of elderly individuals in the space. It can be facilitative and supportive in preventing the fear of falling.

Great gains can be achieved by designing spaces where falls will never occur in the elderly.

- With functional and usable spaces, physical mobility can be ensured and increased by creating spatial perceptions equipped with positive reinforcements in the elderly.
- In increasing the quality of life of the elderly, the perception of the past related to the space can have an impact on the future and strategies that support this positively can be created.
- Spaces with richness and diversity can be designed to contribute to the adoption of active lifestyles by elderly individuals.
- In policies to be developed for the elderly, the most important of forward-looking multifaceted planning is the planning and realization of age-friendly cities that mediate the protection of the quality of life of the elderly.
- The partnership of multidisciplinary perspectives should be ensured in urban designs, especially in planning for elderly individuals.

It should not be forgotten that urban spaces are in a position to significantly affect the quality of life of individuals, and holistic approaches that include the physical, perceptual, social and psychological dimensions of each individual candidate for aging should be exhibited in the creation of designs.

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