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LIGHTING DESIGN FOR ELDERLY

BY EMPATHY

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We certify that, as the jury, we have read this thesis and that, in our opinion, it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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ABSTRACT

LIGHTING DESIGN FOR ELDERLY BY EMPATHY

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The aging process is an irreversible process that every individual will experience. Aging leads to losses in the physical and mental abilities of individuals and accordingly changes in the needs of the physical environment in which they live. It is important for the welfare of the elderly that the people who design the physical environments in which individuals live are aware of the needs of the elderly users. Therefore, designers must put the user at the focal point of the design process. In user-oriented design approaches, the most effective way of adopting the user's needs is empathy with the user. Within the scope of this thesis, the contribution of the method of being in the place to be designed and making observations, which is one of the techniques of empathy in design, to raising awareness in designing spaces for the elderly has been examined. Within the scope of the study, a survey study was applied to a participant group of 134 people and a semi-structured interview technique was applied to 5 people who participated in the survey. Participants were designers who are likely to take part in the decision mechanism regarding lighting design in institutional aged care areas, and they were divided into two groups as those who were previously in the institutional aged care area and those who were not. According to the results, it was seen that there was a 10% to 60% difference between the awareness levels of the two participant groups regarding the lighting needs and expectations of the elderly, according to the topics, and the awareness levels of the participants who were previously in the institutional elderly care areas were higher. According to the results of the interviews, it was seen that observing and empathizing increased awareness not only in lighting but also in many design decisions that are important for elderly users. In particular, an opinion has emerged that developing empathy in design by making on-site observations in order to understand the expectations and needs of

elderly users, who play a decisive role in design decisions, will create more livable spaces.

Key Words: Empathy in Design, Lighting Design, Institutional Elderly Care, Design for the Elderly, Survey Study

ÖZ

EMPATI ILE YAŞLILAR IÇIN AYDINLATMA TASARIMI

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Yüksek Lisans Tezi, Mimarlık
Danışman: Asist. Prof. Arzu Cilasun Kunduracı
Temmuz 2022

Yaşlanma süreci her bireyin yaşayacağı ve geri dönüşü olmayan bir süreçtir. Yaşlılık bireylerin fiziksel ve zihinsel yetilerinde kayıplara ve buna bağlı olarak yaşamlarını sürdürdükleri fiziksel çevre gereksinimlerinde değişimlere yol açar. Bireylerin yaşamlarını sürdürdükleri fiziksel çevreleri tasarlayan kişilerin, yaşlı kullanıcıların gereksinimlerinin farkında olması, yaşlı bireylerin refahı için önem taşımaktadır. Bu nedenle, tasarımcılar tasarım sürecinin odak noktasına kullanıcıyı koymalıdır. Kullanıcı odaklı tasarım yaklaşımlarında, kullanıcının ihtiyaçlarını benimsemenin en etkili yolu, kullanıcı ile kurulan empatidir. Bu tez kapsamında tasarımda empati kurma tekniklerinden biri olan, tasarlanacak mekanda bulunma ve gözlem yapma yönteminin yaşlılar için alan tasarlamada farkındalık yaratmaya katkısı incelenmiştir. Çalışma kapsamında 134 kişilik katılımcı grubuna anket çalışması ve anket çalışmasına katılımda bulunmuş 5 kişiye ise yarı yapılandırılmış görüşme tekniği uygulanmıştır. Katılımcılar kurumsal yaşlı bakım alanlarında aydınlatma tasarımı ile ilgili karar mekanizmasında yer alması muhtemel olan tasarımcılar olup, daha önce kurumsal yaşlı bakım alanında bulunan ve bulunmayan olmak üzere iki gruba ayrılmıştır. Elde edilen sonuçlara göre, iki katılımcı grubunun yaşlılarda aydınlatma ihtiyaçları ve beklentilerine yönelik farkındalık seviyeleri arasında konu başlıklarına göre %10 ile %60 oranında fark olduğu ve daha önce kurumsal yaşlı bakım alanlarında bulunan katılımcıların farkındalık seviyelerinin daha yüksek olduğu görülmüştür. Yapılan görüşmelerin sonucuna göre ise, gözlem yapmanın ve empati kurmanın sadece aydınlatma özelinde değil, yaşlı kullanıcılar için önemli olan birçok tasarım kararında farkındalığı artırdığı görülmüştür. Özellikle tasarım kararlarında belirleyici rol oynayan kişilerin, yaşlı kullanıcı beklenti ve ihtiyaçlarını anlamak için yerinde gözlem

yaparak tasarımda empati geliştirmesinin daha yaşanabilir alanlar yaratacağına dair görüş oluşmuştur.

Anahtar Kelimler: Tasarımda Empati, Aydınlatma Tasarımı, Kurumsal Yaşlı Bakım, Yaşlılar için Tasarım, Anket Çalışması

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Seray Üstün

İzmir, 2022

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TEXT OF OATH

I declare and honestly confirm that my study, titled “LIGHTING DESIGN FOR ELDERLY BY EMPATHY” and presented as a Master’s Thesis, has been written without applying to any assistance inconsistent with scientific ethics and traditions. I declare, to the best of my knowledge and belief, that all content and ideas drawn directly or indirectly from external sources are indicated in the text and listed in the list of references.

Seray Üstün

Signature

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September 13, 2022

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CHAPTER 1
INTRODUCTION

The aging process, which brings along many physical and mental changes, is a normal process that every individual will experience (Bahar, 2005). The spaces that will be used by the elderly should be different and special from the spaces designed for healthy individuals, because without a special disease, aging causes losses in both the body and mind of the individuals. For this reason, while making the user the focal point is an important concept for every design, it is indispensable for the spaces to be designed for elderly users. The physical and physiological regressions experienced with age also determine the space expectations of elderly users. One of the most important differences that will affect the spatial expectations between young and elderly individuals is the decline in vision. For example, in the aging process, especially in short wavelength light transmissions, decreases occur due to clouding and yellowing of the crystal lens (Chellappa, 2021). For this reason, the light level requirement of an average old eye is at least 3 times higher than an average young eye (Kunduracı, 2017). In addition, dilation of pupil size and decreased lens permeability seen in elderly individuals may cause photic inputs that may cause disruptions in sleep patterns and circadian rhythms (Chellappa, 2021).Designs made without understanding the needs of elderly individuals may cause uncomfortable situations for users, as the sensitivity of elderly individuals to glare and their adaptation period increase. For this reason, the lighting designs of the spaces to be designed for elderly users should be made specifically for elderly users.

Empathy is what pushes and inspires designers to design the space or product they designed in accordance with the user profile. Empathizing with the user has taken its place as a general acceptance in design approaches that accept the user as the focal point (Kouprie & Sleeswijk Visser, 2009). Empathic design is basically an effort to understand the conditions and experiences of users, not just to have information about the user. To support empathetic approaches and facilitate empathy, researchers use many techniques that they consider helpful (Kouprie and Sleeswijk Visser, 2009). The

method of being in the place to be designed and observing is the most recommended method to reveal the user needs in the empathic design approach (Kankainen, 2002). However, many different methods and techniques can be used in the design process (Postma et al., 2012). As designers become more knowledgeable about the basis of empathy, they can determine the methods they can use (Taştan, 2014).

1.1. RESEARCH PROBLEM AND HYPOTHESIS

Within the scope of the research, the contribution of architects and designers to the development of empathy by being in the living spaces of elderly users and observing, and the importance of this established empathy in architectural lighting decisions to be taken in corporate elderly care space designs were examined. The question that inspired the research is; Can designers or architects who design lighting in the areas where the elderly live, anticipate the needs and expectations of the elderly, and develop empathy by being in their living spaces and observing, and is this empathy effective in designing the right lighting? Before designing lighting for elderly users, designers who are in the living spaces of the elderly and interact with the elderly are expected to be more successful in making the right decision. In our study, based on this hypothesis, questionnaire and semi-structured interview methods were applied to architects and designers. According to the results of the applied questionnaire, architects and designers were divided into two groups. These groups are those who were previously in the institutional aged care areas and those who were not. Participants who had previously been in institutional aged care areas were named Group 1, and participants who had not been named Group 2. From the results obtained, the differences between the decisions to be taken by the two groups were examined. The expected result is that the participants in Group 1 are more successful in making the right decision than the participants in Group 2. By combining the quantitative results obtained with the qualitative results, semi-structured interview technique was also applied to read the general design decisions in terms of cause-effect relationship.

1.2. METHODOLOGY AND STRUCTURE OF THE THESIS

Within the scope of this study, a questionnaire and interview technique were applied to people working or training in the field of design. In addition to the questionnaire applied to 134 participants, semi-structured interviews were conducted with 5

participants who participated in the questionnaire and had previously been in institutional aged care areas and took part in a project related to these areas. By using both qualitative and quantitative research methods together, it is aimed to read the general design decisions in terms of cause and effect relationship.

Within the scope of the thesis, literature research is included in the second and third chapters. In the second chapter, the concept of design and the adopted design approaches are tried to be explained. The place of the empathic design approach among the design approaches and the methods adopted to establish empathy are explained. In the same section, besides the design approaches, the increasing rate of the elderly population in the world and in Turkey and the researches on the concept of old age are mentioned.

In the third chapter, the importance of lighting for human life and the physical, biological and physiological effects of natural and artificial lighting on users are discussed. After the effects of lighting, the lighting needs of elderly individuals are mentioned and how they differ from healthy young adults are highlighted.

The fourth part is the methodology part and the applied questionnaire and semi-structured interviews were explained and the information of the participants was given.

In the fifth section, the survey results and semi-structured interview results are analyzed and analyzes are given according to the subject headings. Finally, in the fifth chapter, the evaluation of the analyzes is given and recommendations were made.

CHAPTER 2
DESIGN-DRIVEN APPROACH FOR ELDERLY: EMPATHY IN DESIGN

1.3. EMPATHY IN DESIGN

'Design is design to produce a design.' (Heskett 2002/2013: 13)

1.1.1. CONCEPT OF DESIGN

Design is a versatile concept. Today, this concept expands and becomes more complex with the developing world. While it is possible to see the concept of design in every aspect of human life, it is not possible to talk about the limits of this concept (Akdemir, 2017). Over the years, the perspective on design has changed and many questions on this subject have been discussed. Especially nowadays, the question of what is design and what is not is frequently encountered. Although researchers come to this discussion topic with many different answers, there is one thing that is sure, that design is not just a product, and the act of designing is not just creating a product (Akdemir, 2017). This changing perception about design and designing has an important place in the world. If we look at the concept of design from a broad perspective, design is a phenomenon that every individual encounter in his/her daily life, and it is possible to see design at every point of the spaces we live in and continue our daily lives. It is impossible to think of the concept of design as one-dimensional and to attribute it to only one discipline. As Teymur stated; design is multi-variable, multi-given, multi-faceted, very rigorous and therefore multi-disciplinary and multi-environmental (Teymur, 1998). Although there are many perspectives on what design is, Alpay Er defined what design is not as follows; design is not just drawing, it is not just about image, design is art, designer is not artist. Tunalı defines the concept of design as the most basic communication tool that individuals establish with objects (Tunali, 2004). The perspective on the concept of design is no longer just about shaping the appearance of objects, but also shaping life (Yurdakul, 1988). One of the main design products

that shape our lives is the places where we live our lives. The needs of the material and spiritual world are also the most important factors in shaping a place and life. With a general definition, it can be said that design is an action of human consciousness and the impulses that direct this practice, are the needs of the material and spiritual world (Akdemir, 2017).

1.1.2. DESIGN APPROACHES

Nowadays, interdisciplinary interactions are differentiating ways of life, thought and production. Design fields also expand their resources by taking advantage of these interactions and differences. With the concept of design being so versatile and constantly expanding its boundaries, design-oriented paradigms have begun to emerge (Akdemir, 2017). There are many approaches that researchers have developed to improve the product that will emerge from the designing process. For example, participant-oriented design, design-oriented innovation, design-oriented thinking, user-centered design are the leading ones (Akdemir, 2017). While each of the design approaches puts different design elements at the focal point, the user-centered design approach puts the user, that is, the human being, at the focal point of the design and prioritizes his/her needs. It is thought that this approach, which emphasizes user needs, better supply the expectations of individuals from spatial design. At every stage of the design process, it is important to understand who will use the designed thing and how (Akdemir, 2017). Because if this understanding is not acted upon, it is not possible to increase the living standards of the users.

Empathic design, a new branch of user-centered design approaches (Postma et al., 2012), is a design approach that supports designers to develop creative solutions for users and their daily lives during the design process (Postma et al., 2012). Empathic design supports the design process with research techniques that enable designers to reach the places, products, people and their own experiences in the daily lives of users (Koskinen & Battarbee, 2003). According to Postma et al., there are 4 basic principles of empathic design approach. These principles are;

- Developing understanding of users' experiences by balancing logic and emotions.

• Making empathetic inferences about users and their likely needs.

• Collaboratively involving users in the design process.

• To give space to designers and researchers from different disciplines in the design group (2012).

Interpreting what users think, feel and imagine, together with observing their daily lives, creates the 'balance', which is the first principle of empathic design. Empathy is thought to be the most effective way to understand the feelings, thoughts and needs of the users, and therefore, the empathic abilities of the designers are applied in the second principle (Tastan, 2014). Postma et al. argue that three different stages are required to achieve empathy. First, 'observation techniques' are used to understand what users are doing in their own environment and conditions. Secondly, 'generative techniques' are applied so that users can convey their thoughts and experiences. Finally, the 'role-playing' (experience prototyping) method is used to understand user experiences (Postma et al., 2012). Kouprie and Sleeswijk Visser (2009) based the empathy practice that can be applied in the design process on the following principle; The designer enters the user's life and stays there for a while, after gaining in-depth information about the user, he leaves his life. Sanders and Dandavate (1999) argue that in order to empathize with the user, it is necessary to understand what they say, think, do and feel. What users do and say can be learned by using observation and interview techniques, and their design needs can be understood (Taştan, 2014).

One of the most important roles of architects and designers as professionals is to ensure, maintain and improve the required quality of the spaces they have designed and built (Chansomsak and Vale, 2010). Architects play a critical role in many aspects of the design and construction processes, but this critical role is often underestimated and overlooked. Architects and designers need to be involved in many professional studies during the construction phase, design and application processes, and these studies are very important in terms of meeting the physical and mental expectations of the spaces where individuals live (Chansomsak and Vale, 2010). Architects and designers shape the relationship that individuals establish with space and each other, so they should consider the user profile throughout the design process. If there is a special user profile, such as a child or an elderly person, other than the user, which is especially considered to set some standards. If the user in question is an elderly individual, many design decisions may differ. For example; A microwave machine

placed on the refrigerator to save space on the kitchen counter can cause accidents when using it due to weakened muscles of elderly users. Therefore, the problem of understanding the user and user experience has an important place for user-centered design theories (Sanders and Dandavate 1999). Researchers working on the design literature have sought various ways to incorporate contextual and sensory factors into the design process for many years (Sleeswijk et al. 2005). One of them is the 'empathetic design' approach, which has direct interaction with the user. Empathic design determines how design should be through understanding users' needs (Akdemir, 2017). In this approach, the center is the user and the most effective way to involve the user in the designing process is empathy. With this approach and empathy, designers try to increase the likelihood of meeting the user's needs and to understand the users' experiences (Koskinen et al., 2003). The empathic design approach is not only acquiring knowledge about the product or space to be designed, but also giving importance to the user's experiences and understanding why it is meaningful, making sense and relating it (Battarbee, 2004).

1.1.3. STUDIES TO UNDERSTAND ELDERLY USERS

Since 1989, the World Health Organization has considered the elderly population aged 65 and over. The age of 80 and above is accepted as the oldest of the age categories according to this acceptance. With the developing world, the concept of old age has started to have an important place for every discipline. Although the concept of old age has different definitions for each discipline, old age is commonly expressed as a period in which lifestyle is limited (Tutal, 2018). With aging, the needs of individuals also change. Health and finances are the main concerns for older people. According to previous studies, other factors that people worry about after health and financial situation are living spaces and the built environment (Rosenberg and Everitt, 2001). Therefore, the role of architects, who are the designers of living spaces and built environments, is very important in increasing the welfare of the elderly. The spatial characteristics of the spaces where individuals live contribute directly to the pleasure of living in that space. This contribution is directly related to the welfare and happiness of individuals and societies (Tutal, 2018). In its most basic sense, architecture can be defined as a tool of action that is constantly changing by reinterpreting environmental and social data every day. She examined 398 postgraduate theses on old age written in

Turkey and pointed out an important gap when she looked at the distribution of theses according to their subjects. Only 2.8% of the postgraduate theses are in the field of Architecture. Considering the distribution of these theses according to their subjects, there are only 4 doctoral theses and 16 master's theses under the title of elderly individuals and space relations (Alaydin, 2019). The rapidly increasing rate of the elderly population with the developments in the field of medicine shows that studies on the elderly should accelerate, especially in developing countries (Çevik, 2017). In particular, studies on aging in the discipline of Architecture pointed out by Alaydın can close an important gap.

1.1.4. DESIGNING FOR THE ELDERLY USER PROFILE WITH A USER-CENTRIC DESIGN PARADIGM

Architects have an important responsibility with the decisions they make in the creation of the spatial, physical and social environments of the society they are a part of. Therefore, they must interact with the profile that will use the spaces they design and build. In order to understand the user's experience when designing spaces and lives, they must empathize and integrate with the user. Especially with user profiles that may have special needs. In every place to be designed for elderly individuals, the designer must have enough knowledge to empathize with the user. The design standards established in the literature are not sufficient for specific user profiles. Corporate nursing homes are places with a special user profile. Therefore, the designers who will be involved in the construction of an institutional nursing home need to conduct a large-scale research on the user profile and integrate it with the user. Otherwise, if certain standards that are thought out specifically for healthy and young people are considered, there will be serious decreases in the quality of life of older people. In the rapidly developing world, architecture differs according to the cultures of societies and the current time. In the rapidly developing world, according to the cultures of societies and the spirit of the time, architectural approaches also differ. Although understanding the users' experiences is important for every design, it is much more important for the user profile, which may have special needs such as children and elderly individuals. Because designers cannot create solutions based on their own experience for user groups have different physical and mental characteristics than themselves (Kouprie and Visser, 2009). Every year, as in the world, there is a

significant increase in the proportion of the elderly population in Turkey. This increase leads to the need to produce various solution mechanisms for the concept of old age and the requirements of older people (Alaydin, 2019). Housing and living spaces should not be considered as closed spaces that only meet the housing needs of individuals. The need for housing is the secondary purpose of housing and living quarters. The main thing should be to create an environment that is most suitable for the user's life (Rapoport, 2004). The physical spaces where elderly people live their lives and all kinds of design products used should be available to every physical/mental competence individual. In terms of how individuals should move and behave, physical spaces have a guiding and important influence. For older users, architectural decisions made are of much greater importance. Because the availability of the structural environment in which elderly people live their lives and its compliance with the needs of the user are important for the participation and independence of individuals in everyday life (Tutal, 2018). When considering each architectural element that will be added to the spaces that will be designed for the elderly, it should be considered that the user is an elderly individual and may have a disability. Therefore, for places with a special user profile, such as corporate elderly care homes, solutions should be created to provide special needs from the very beginning of design (Tutal, 2018). Otherwise, the participation of older people in everyday life and their independence will decrease. In this thought structure, spaces designed through empathy established with the user allow the creation of a space in harmony with the expectations and needs of the user. In design approaches that accept the user as the focus, there has been a general acceptance that designers should empathize with users (Kouprie and Visser, 2009). Empathy is what pushes and inspires designers to design the spaces or products that, they designed in accordance with the user profile. Empathic design is an effort to understand the conditions and experiences of users, not just having information about the user. Quantitative research (such as packages, numerical simulations) is insufficient to meet the needs of the user, therefore, studies are carried out to understand the situation and feelings of the users (Battarbee and Koskinen, 2005). Qualitative research is needed in order to make useful designs that are compatible with the user profile and respond to the needs correctly (Kouprie and Visser, 2009). Nowadays, design approaches are moving away from practical and rational data and towards personal experiences and special contexts (Mattelmaki and Battarbee, 2002).

Battarbee stated in 2004 that it is necessary to internalize the needs of users (Battarbee, 2004). The concept of empathy, on the other hand, plays a big role in supporting these design approaches. Empathy should be established with user profiles that differ in terms of age, gender and abilities (Altay, 2017). The need for empathetic approaches in the designing process is emphasized by different researchers in many disciplines. But there is a serious lack of foundations in practice related to the concept of empathy (Kouprie and Visser, 2009).

The disciplines that create products and spaces to improve the quality of life and experience of users are design disciplines. If the designed space or product is related to an ambiguous and undefined (with little information) user profile, designers may be insufficient to create a solution (Altay, 2017). The researchers resort to three different techniques, which they call ‘observation, generative technique and role-playing’, which they consider useful to support empathic approaches and facilitate empathy (Kouprie and Visser, 2009). If it is necessary to consider these techniques in a general framework, the researchers argue that the most useful technique is the ‘observation’ technique, which is aimed at tracking and observing the user in their context. Observation requires a direct connection between designer and the users (Kouprie and Visser, 2009). The ideas and experiences gained during the observation phase should be developed and transferred between designers. Many different tools can be used while transferring this information. It is known that verbal description, visual description, scenario creation, storyboard and even theatrical role-playing tools are used in architectural literature (Go and Carrol, 2004). This method is called the ‘producer techniques’ method (Kouprie and Visser, 2009). The last method is the ’role-playing (experience prototyping)' method. This method is based on the fact that the designer creates his own experience in a field related to the user. This method is similar to simulating the user's condition. It's like wearing an eye patch and trying to understand the daily life of a person with a visual disability. Awareness centers that have been raised in recent years have been trying to direct individuals to empathize with individuals who are different from themselves, have physical and mental disabilities, using the "role-playing" method (Figure 2.1 and Figure 2.2).


Figure 2.1. and Figure 2.2. Visit of Yaşar University Architecture 3rd year students to İzmir Metropolitan Municipality Awareness Center)

The need for empathy has been recognized in many disciplines and many techniques have emerged to develop empathy skills, but there are still many shortcomings in a more conceptual and practical sense (Kouprie and Visser, 2009). Designers need to go beyond their designer identities to understand and embrace the lives of users within an empathetic design framework (Altay, 2017). Thanks to this, the designer can switch the real life of the user to design. Respecting the needs of users in a quantitative and qualitative sense can make the created designs inspiring (Dankl, 2013; McGinley and Dong, 2011).

Designed spaces can create positive or negative effects on the behavior and affections of individuals. Design decisions made affect the ability of individuals to cope with events that they may encounter in their daily lives. This effect will be much greater for elderly individuals with loss of function (Tutal, 2018). If the user of the space to be designed is individuals with different characteristics with the designer, for example, with disabilities, the elderly or children, a mismatch may occur between the designed space and the user's needs (Altay, 2017). In spaces that will be designed for elderly people with a special user profile, each architectural element considered is of particular importance for the well-being of users. Older individuals spend most of their time in living quarters. Therefore, the quality of life of elderly individuals is associated with the physical characteristics of the place where they are located. Each architectural element, not thought out in accordance with the physiology of the elderly user, complicates many actions in the daily lives of elderly people. Architects and designers need to take into account the physical, emotional, perceptual and cognitive characteristics of the elderly user and the empathy they will establish before starting

the design (Zorlu, 2017). Because making a design based only on body measurements and ergonomic measurements is not enough to ensure human and environmental harmony (Helle, Iwarsson and Brandt, 2014). Designers should not only be based on objective data, global concepts and indirectly conducted research results, but also address subjective needs and real-life knowledge (Altay, 2017). In this way, they will be able to provide the right physical environment that older people will need.

1.4. EMPATHIC ENGAGEMENT WITH ELDERLY POPULATION AND DESIGN OF CARE SERVICES

'Everything changes, nothing stays as it is.' (Heraklitos)

1.4.1. DEFINITION OF OLD AGE

There are differences between the cultural and socioeconomic conditions of each society, and therefore each society's approach and definition of aging may be different. Depending on this variable structure of societies, some societies consider the aging process as a normal process, and some societies see it as a problem (Atila, 2006). The definition of old age is made by taking a certain age as a criterion and this age is generally accepted as 60-65. The period when biological and emotional changes are experienced starting from the age range of 60-65 is called old age. Aging is not just a one-dimensional process with physical consequences. The aging process is a biological, psychological, chronological and social process that cannot be prevented (Öğüt ve diğerleri, 2017). We can divide the aging process into two different groups. The changes that occur in the structure and functions of the body with the aging process are classified as biological old age, and the changes in the lifestyle and view of life that start with the feeling of old age are classified as psychological old age (Atila, 2006).

1.4.2. THE GROWTH OF THE OLD POPULATION AND THE CHANGES IT HAS EXPERIENCED

The ratio of elderly individuals to the total population is increasing every year in the world and in our country. Depending on this increase, opportunities to meet the sensitivities and needs of individuals regarding aging have become an important issue for many disciplines (Aydıntan ve diğerleri, 2017). With the prolongation of the

average human lifespan, many things have changed in human life. Changes in the age structure of the world population have been one of the important turning points for human history since the middle of the 20th century. With the increase in the elderly population, first in developed western countries and then in developing countries, the issue of old age has become one of the most important demographic and social issues in the 21st century (Yüceşahin, 2011). According to Alaydın, we can call the age we live in as the age of aging (Alaydın,2019). These changes in the demographic structure of the world have caused the issue of old age to come to the fore more within societies and even between countries. Developed countries have been dealing with the needs and demands of the elderly population for a much longer time than developing countries. According to Alaydın, the intensity of this interest will increase according to the increasing needs of the elderly population (Alaydın,2019). The aging processes of developed countries and developing countries, including Turkey, follow a different course. The biggest reason for this difference is the inequality in the levels of development and progress. The issue of aging is still not very much on the agenda in developing countries. As it is foreseen that the proportion of the elderly population will increase in the developing countries in a short time, issues related to aging will have a significant visibility (Alaydın, 2019). This increase in the population ratio of elderly individuals will require in-depth evaluation to ensure their quality of life (Leung and Famakin, 2017). One of the main grounds for this prediction is that the proportion of the elderly population in developing countries has been on the rise in recent years, according to statistics. To give an example from our country, individuals aged 65 and over are considered as the elderly population in Turkey, and according to the data announced by the Turkish Statistical Institute in 2021, the elderly population, which was 6 million 495 thousand 239 people in 2015, will increase by 22.5% in the last five years and will reach 7 million 953 thousand 55 people as of 2020 (TÜİK, İstatistiklerle Yaşlılar, 2021). Experts predict that these rates of increase will increase further in the coming years. While the ratio of the elderly population to the total population was 8.2% in 2015, it increased to 9.5% in 2020. According to population projections, it is predicted that the proportion of the elderly population will be 11.0% in 2025, 12.9% in 2030, 16.3% in 2040, 22.6% in 2060 and 25.6% in 2080 (TÜİK, İstatistiklerle Yaşlılar, 2021). With the increasing elderly population, it is predicted that there will be a significant increase in the number of households with elderly

individuals in the future. In Turkey, in 2020, there was at least one person aged 65 and over, defined as the elderly population, in 5 million 903 thousand 324 households out of a total of 24 million 604 thousand 86 households (TÜİK, İstatistiklerle Yaşlılar, 2021).

With the developing world, societies' view of older people and their relationship with them are changing. In the past, it was thought that the experiences of the elderly individuals would bring wisdom, but the easy access to information with the developing technologies reduces the need for the experiences of the elderly individuals (Atila,2006). For this reason, the elderly individual loses his/her position and power in society. Societies are increasingly focusing on individuals who contribute to daily life and produce, and the focus of studies in most fields has started to be young individuals. However, with the developing technologies and medicine, the proportion of the elderly population in the society continues to increase rapidly and the conditions provided by the society do not meet the needs of the elderly individuals (Nirun, 1994). Especially since the position of the producing individual in the ongoing life in cities is more prominent, the spaces designed are aimed at young and healthy populations. There is a large difference between rural and urban areas regarding the location of older individuals (Nirun, 1994).

1.4.3. REQUIREMENTS FOR THE CARE AND MAINTENANCE AREAS OF THE ELDERLY POPULATION

As technology and medicine continue to develop, it is predicted that increases in the proportion of the elderly population will continue. However, long life will bring many different consequences and problems (Kalınkara, 2013). Aging can take a different course for each individual, and each individual's needs may differ from the next. The main problems that may occur with the increase in the elderly population are housing and health problems. In line with these needs, which will increase with aging, solutions should be produced and these solutions should be implemented (Dalrymple, 2000). Strategies followed to increase the welfare of older people have generally progressed to financial issues such as the cost of the health system and improvements in the retirement income of older people. Spatial factors, which have a great impact on the welfare of older people, are generally given less attention (Rosenberg ve Everitt,

2001). The word well-being is a multifaceted concept and does not simply refer to happiness, which is a state of mental health (Kalınkara, 2013). Physical disability is also one of the important factors affecting well-being. It is generally thought that aging in place would be more beneficial for the well-being of older individuals. Aging in place means older people age in their own homes without having to change their environment (Kalınkara, 2013). Most people want to age in their own homes as much as their physical and psychological changes allow. This desire is a very basic desire that also depends on the culture of societies (Öğüt, 2017). Because when individuals get old, they want to be together with their family members and be in a familiar environment. In previous survey studies, it has been noted that many of the elderly individuals staying in institutional nursing homes want to grow old in their own home (Öğüt, 2017; Dörter, 2014; Kaptan, 2017). But built environments generally focus on the active and healthy individual. For this reason, the physical conditions of the houses, apartments and neighborhoods where the elderly people live may not be enough to meet their needs. Along with the aging process, individuals undergo psychological, biological and sociological changes. It can be said that the individual in the aging process will gradually become 'disabled individuals' due to the changes that the person will experience, such as visual problems, auditory losses, decreased mobility and cognitive problems (Kalınkara, 2013). However, instead of defining aging individuals as disabled people, it would be more accurate to say that living spaces are physical environments with disabilities and are not suitable for sustainable life. The decrease in physical and mental functions that come with aging causes a decrease in the ability to live independently in elderly individuals. Elderly individuals may not even be able to perform their daily life activities without support, and this affects the aging process in situ (Atilla, 2006). Aging in situ becomes more difficult due to the fact that residences and their surroundings do not meet the needs of elderly individuals.

Another factor that makes aging in suti difficult and directs elderly individuals to institutions is the change in family structure. If we think for our own society, in the traditional Turkish family structure, there is an understanding of taking care of the elderly family member in need and meeting their needs. This task is usually undertaken by female family members. However, with the social change, the family structure and the roles of the individuals in the family have changed (Atilla, 2006). With the increase in the nuclear family structure and especially women starting to play an active role in

business life, the care of the elderly or needy family member has become a current problem.

Due to the fact that the physical environments in which we live are not suitable for the use of elderly individuals and the changes in the family structure in modern society, many tasks undertaken by women are transferred to institutions. For all these reasons, the need for institutional elderly care homes is increasing day by day. It is important that these spaces, which will appeal to the elderly user profile, are designed in line with the needs of elderly individuals. According to some design principles, although it is tried to ensure that the designed thing can be used by different user profiles, it is not possible to make the design for everyone (Tutal, 2018). However, it cannot be avoided that the design is inclusive.

It is important for every individual that the places they live in provide all the necessary conditions at the qualitative and quantitative level. For elderly individuals who may have special needs, it is much more important that the spaces they live in can meet their needs. However, it is known that the places where most of the elderly individuals live cannot meet these needs, and therefore the physiological and psychological needs of the elderly individuals cannot be met (Aydıntan ve diğerleri, 2017). One of the most important criteria to be considered in space design for the elderly is to meet the needs of the elderly individuals in order to continue their independent lives in the place where they are located (Boylu, 2013). In particular, in order for elderly users to continue their daily activities without assistance or with a little help, the areas and environments where they stay should be designed according to the needs of elderly users (Lino ve diğerleri, 2005). According to Aydıntan, the principles that should be considered in the design of suitable spaces for the elderly are; physical environmental factors (visual comfort, thermal comfort, auditory comfort), space organization, equipment and equipment designs. It is important that each element to be designed should be designed in ergonomic conditions suitable for the physiology of the elderly user, as well as to meet the non-physical subjective needs. Therefore, architects and designers who shape their living spaces need to understand their needs more deeply with the empathy they will establish with older individuals.

Within the scope of this thesis, visual comfort, which is one of the important factors

affecting the welfare level of elderly individuals, will be discussed. Decreases in eyesight increase with the age of individuals. This decrease makes it difficult for individuals to read text and numbers, distinguish colors and shapes, and causes the need for more illuminance due to the decrease in the field of view (Zorlu, 2017). Therefore, the lighting quality of the spaces to be designed in institutional nursing homes is important. It is important that architects and designers involved in the design of corporate aged care spaces have a deep understanding of their requirements in order to be able to design lighting in accordance with the changing visual conditions of elderly people. The most effective way to make sense of needs is to resort to empathetic design techniques.

CHAPTER 3
VISUAL COMFORT IN RESIDENTIAL CARE FACILITIES

The physical environment is the active environment that surrounds and affects people. The main elements of the physical environment, which are defined by humankind and whose elements are effective on individuals, are sound, light, colour, heat, humidity, smell and other vibrations and air movements that affect people. Among these listed elements, light is the most important (Şirel, 1996), so every individual wants to provide visual comfort in their living spaces. One of the most important factors affecting visual comfort is the lighting design of the space. Lighting design covers both daylight and artificial lighting sources, as well as integrated situations where both are combined. Situations such as improper use of artificial lighting or insufficient natural lighting can harm human health physically, physiologically and psychologically. In this section, the effects of lighting design on elderly people will be given and suggestions will be made about the lighting needs they need.

3.1. IMPORTANCE OF LIGHTING FOR ELDERLY

3.1.1. PHYSICAL EFFECTS OF LIGHTING

In order to understand the physical effects of light on humans, first of all, it is necessary to understand how the sense of sight is formed. There is a three-stage energy conversion in the visual process, from the light falling on the eye to the sense of sight. First, the radiation energy absorbed by the light-sensitive substances in the eye is converted into chemical energy by the breakdown of these substances. This chemical energy is then converted into electrical energy that generates current pulses in optic nerve fibers that connect the eye with the brain context (Çelebi et al., 2019). In our daily life, we can consider the light that enables us to perceive our environment as natural light and artificial light. Both natural light and artificial light have physical effects on older individuals. Natural light is our environmental energy source and it has been seen in studies that it is necessary for human health with a certain intensity

and duration (Çelebi et al., 2019). The rays that individuals are exposed to with natural light help prevent diseases such as anemia, anorexia and rheumatism (Özsungur, 2019). Misused natural and artificial light balances in lighting design can cause health problems such as dry eyes, eye pressure, headaches and migraines (Çelebi et al., 2019). For the visual efficiency of elderly individuals, the environments they are in should not be too bright or too dark. In dark environments, pupils dilate as a physical reaction, which can cause eye pressure in some individuals. Light affects our sense of sight and perception, and in an insufficiently illuminated environment, the eye's vision decreases, eye disorders occur, attention deficit increases, accidents occur and productivity decreases. On the contrary, exposure to too much light causes the pupils to shrink, which triggers headaches and migraines (Ansari, 2013).

One of the most important physical effects that lighting design can cause is the glare problem. The problem of glare is a physical problem arising from the inconsistency of the quantity of light intensity (luminance value) observed within 1 unit area of the light coming from a certain source and in a certain direction to a surface (Öztürk & Kazanasmaz, 2017). Glare problems can occur due to natural lighting and artificial lighting. Glare problems caused by natural lighting can be eliminated by considering variables such as day, hour, meteorological condition, sun’s position and building location and orientation, window sizes and position, surface reflectance values and color characteristics, since daylight is variable (Kazanasmaz, 2015). Glare problems caused by artificial lighting can be caused by problems in lighting element selection and layout. If the placement of the elements providing direct lighting is incorrect, users can often be exposed to the problem of glare. In institutional elderly care centers, the placement of lighting elements and the location of window openings and spatial settlements should be done by considering the glare problem. The visual field of the users is examined in three groups: the object being viewed, the immediate environment, and the general environment. For a smooth and comfortable lighting, the 'brightness and contrast ratios' between these three parts should be within certain limits, very dark backgrounds or eye-catching, very bright surroundings should be avoided. Properly provided contrast distributions make it easier to understand the shapes of objects (Kazanasmaz, 2015). If the limits are exceeded, problems such as headache and fatigue are inevitable.

Studies have shown that the use of appropriate lighting can have positive results on dementia patients (TCPI, 2017). Dementia is a disease with no chance of progressive regression and causes personality changes and decreased mental abilities. This disease can cause their environment to become increasingly complex for older individuals. With specially designed lighting setups, solutions can be produced to problems such as time and place orientation, as well as difficulties such as recognition and perception. According to a study conducted by the United States Department of Energy, custom tinted lighting systems resulted in a 41% reduction in problems such as shouting, agitation, and crying in dementia patients in institutional aged care centers (TCPI, 2017).

While the changes in the visual, auditory, neurological, cardiovascular and musculoskeletal systems of elderly individuals cause problems in terms of balance, wrong design decisions taken regarding environmental factors also increase the risk of falling. We can list a few of these faulty design decisions as follows; inadequate lighting, poorly secured furniture, slippery floors, improperly adjusted bed height, lack of grab bars (Rubenstein et al., 1994). Although there are many factors that increase the risk of falling, especially decreased vision and inadequate lighting have been closely associated with the risk of falling (Lord, 2006).

3.1.2. PHYSIOLOGICAL EFFECTS OF LIGHTING

With the help of many researchers conducted in recent years, in addition to the physical properties of lighting, it has been understood that the quantity and quality of light are also effective on the circadian rhythm, biological system, and perception mechanism, (Aktaş, 2012). Changes in the physiological and biological processes of living things for about 24 hours are expressed as circadian rhythm (Akıncı and Orhan, 2016). The most basic circadian rhythm in humans is the sleep and awakeness cycle (Zee and Manthena, 2007). The hormone called melatonin has an effect on the circadian rhythms of individuals. The production of melatonin hormone secreted by the pineal gland begins in dim or no light, and this hormone affects the sleep-wake cycle, core body temperature, eating and drinking behaviors, mood and alertness. (Zee and Manthena, 2007). With the increase in light level in the morning, the human body receives the signal about the start of its biological clock and the body responds to this signal with the production of serotonin, adrenaline and cortisol. In this way, body

temperature rises, metabolism level rises. With the decrease in sunlight intensity, the biological clock sends a signal to the pineal gland to convert the serotonin hormone to the melatonin hormone, thus reducing the body temperature (Şahin, 2017). Considering the effect of light and dark cycles on individuals' circadian rhythms, lighting design should be synchronized with these systems (Avcı and Akbay, 2021). The biological clock is basically the process by which cells wake up and move and then slow down. The circadian rhythm is regulated by an internal biological clock in the suprachiasmatic nucleus located in the anterior hypothalamus of the brain (Memiş, 2019). Due to incorrectly constructed lighting designs, the biological clocks of individuals may be disrupted or rhythm changes, and this situation changes the secretion of the hormone melatonin (Manav, 2007). Changes in the secretion of the hormone melatonin can cause sleep disorders, stomach and digestive problems (gastrointestinal), blurred memory, fatigue, and difficulty in adaptation (Brainard and Glickman, 2003). Depending on external factors, recurrent circadian sleep disorders may cause insomnia, excessive sleepiness or both, and this may cause social, daily activities, occupational or other functional losses (Sevim, 2011).

Studies have revealed that ipRGC (intrinsically photosensitive retinal ganglion cells), a third photoreceptor found in the human retina, are directly related to the non-physical effects of light (Memiş, 2019). Parameters such as the amount of light, the power distribution of light, the duration of exposure to light, the timing, the spatial distribution, and the history of exposure to light affect the circadian rhythms of individuals' biological clocks accordingly.

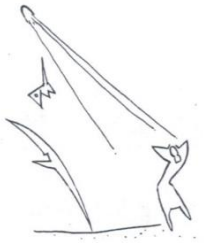
3.1.3. PSYCHOLOGICAL EFFECTS OF LIGHTING

The psychological effects of lighting design play an important role in human life as well as its physical effects. The range of exposure to a lighting source and color that stimulates the emotional states or behaviors of individuals can excite the individual, increase the level of movement, affect, communicate, heal and keep healthy (Özkum, 2011). The quality, color and brightness level of the light are among the most important factors affecting the performance and comfort conditions of individuals in daily activities. Lighting designs that will not disturb the users and even relieve them psychologically should be preferred in places where you will spend a long time

(Özkum, 2011). Accommodation rooms of institutional elderly care centers are the places where elderly individuals spend the most time and substitute them as their homes. This is why the use of correct lighting is important in institutional aged care areas (Abay and Ünver, 2017).

The light, which has a structure that affects the form of the architectural space and gives meaning to the space, combines with the meaning of the darkness formed in its existence and non-existence and creates a composition. These compositions can impose some psychological effects on users such as likes or dislikes, fear, joy, respect, emotionality, relaxation and tension (Özkum, 2011). Color temperature, which is a characteristic of light, also has psychological effects on users. Red and yellow hues, which we usually call warm colors, have a more relaxing effect on users. Blue-toned light colors, which we call cold colors, give a feeling of spaciousness to the users (Manav, 2007). When choosing the color temperatures to be used in institutional aged care areas, it should be taken into account that the sensitivity to blue wavelength light decreases in people over 60 years old. In a well-lit space, users feel good, enthusiastic and cheerful, and feel peaceful. On the contrary, a poorly lit space can cause people to be restless, pessimistic and quiet. For this reason, while making design decisions, the lighting of the spaces should be arranged according to the actions that form the basis of the desired visual and psychological perceptions of those spaces (Bilgi, 2007) Simonds, in his study, defined the emotional and psychological responses of different lights as various emotional states; these are tension, comfort, fear, joy, pensive, dynamic movement, emotional love, divine love (Simonds, 1961)(Figure 3.1).

Feeling of Tension



Feeling of Comfort

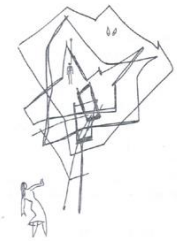
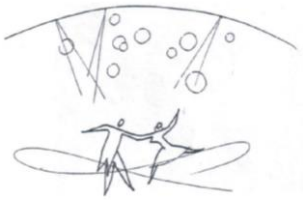
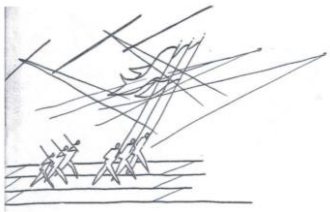
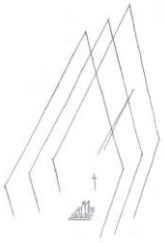
Feeling of Fear	
Feeling of Joy	
Feeling of absent-mindedness	
Sence of Movement	
Feeling of Sacred Respect	

Figure 3.1. Depictions of Simon

Effects of light on human psychology; It changes according to the quantity and quality of light, seasons, and the day-night relationship. Especially the lack of daylight causes diseases such as depression in individuals. For this reason, individuals feel less fit during the winter months, their concentration decreases and their reaction slows down, they start to eat more, their blood sugar rises as their body weight increases, they feel more irritable and may also have a malignant nature (Fördergemeinscheft, 2010). The disease, known as SAD (Seasonal Affective Disorder) and commonly known as the

effect of light on the endocrine system, is more commonly seen in people in northern latitudes where daylight is less (Şahin, 2017). According to Hesselgren, most people feeling unhappy in insufficient and abnormal light can be seen in our daily lives. The diminution of daylight, even in a very short time, can have a depressing effect on people. The psychological pain caused by the light being too strong for a long time and the pain caused by staying in the dark for a long time are almost the same (Hesselgren, 1960). In the treatment of this psychological disorder caused by the effect of lack of daylight, light therapy is applied to patients at high illumination levels and at varying periods (Manav, 2007).

The effect of lighting takes up a lot of space in the daily life of each individual, and light plays an important role in daily life. While lighting design is so effective on the physical and mental health of individuals, it is more important than expected for elderly individuals. For this reason, the importance of lighting on elderly individuals should be addressed and the spaces to be designed for them should be designed consciously. Neurological research by Figueiro et al. has concluded that with light, periodic depressions are controlled, performances are improved, brain activities are regulated, and the melatonin hormone secreted by the body is regulated (Figueiro, 2001).

3.2. VISUAL COMFORT AND DISCOMFORT CONDITIONS FOR ELDERLY

Nowadays, due to the development of design tools and the known benefits of light, it is seen that natural and artificial lighting setups in building designs attract more and more attention (Kazanasmaz, 2015). Designers focus on the needs of the users of each space, but the users of some spaces are more specific and their needs differ. For this reason, designers should focus more on the needs of their users in places such as hospitals, examinations, nursing homes, nursing homes and rehabilitation clinics. Spatial needs of elderly individuals are different, and their needs for lighting are also different. Both natural lighting and artificial lighting should be handled with care in institutional aged care areas. Architects and designers should pay attention to both natural lighting and artificial lighting preferences in the places they will install for elderly users, because lighting installations that are not designed properly and correctly can cause risky results for elderly individuals. (Celebi et al., 2019). The changes that

come with aging negatively affect the living conditions of individuals and these changes support many risk factors. The risk of falls increases with aging, and this increase in falling risk can be associated with the physical changes that come with the aging process. Falling is an important risk situation that can cause disability and death due to these injuries in elderly individuals. Inadequate lighting and loss of vision are the leading causes of falls in elderly individuals. (Lord, 2006). Depending on improper lighting design, results such as lack of vision, glare, and adaptation problems that may occur in elderly individuals, may increase the risk of falling. In addition to these, some of the factors that increase the risk of falling, such as dementia, the drugs used by the person, the inadequacy of the number of people working in nursing homes, and shift change hours. One of the negative changes that develop due to the aging process is the loss of vision, which is generally seen in the earliest period (Abay and Ünver, 2017). There are significant differences between the eyesight of an elderly individual and a healthy and young individual (Kunduracı et al., 2020). Visual disturbances in elderly individuals begin in the eye, which is a part of the visual system. Disturbances are seen in the eye, first in the lens, then in the retina, and then in the vitreous fluid. The most common problems in these regions are; reduction in pupil diameter, loss of coherence (weakening of the muscles and change in the shape of the lens), decrease in the transparency of the lens (yellowing, crystallization) (Schirez, 2011). For example, in cataract disease, which is an eye disease frequently seen in elderly individuals, it is difficult to see short wavelength (blue) lights, while long wavelength (yellow and orange) lights are more dominant. (Dalke et al., 2004). So, sensitivity to blue-toned lights decreases in older individuals. The reduction in pupil diameter seen in elderly individuals causes problems in seeing at low light levels and in dark-light harmony. These problems cause the problem of near vision (Presbyopia), which is frequently seen in individuals over the age of 40 and develops due to age. The yellowing of the lens of the eye, losing its transparency and decreasing its transmittance, causes a decrease in contrast sensitivity in color perception. Reduced pupil size and loss of transparency of the lenses, which are among the vision problems experienced with old age, cause a decrease in light transmission, so low light and glare conditions may become problematic in individuals aged 50 and over. Studies show that older individuals need brighter lighting to achieve similar visual acuity as younger individuals (Bieniek et al., 2013; Boyce, 2014; Owsley, 2011). For example, an 80-

year-old individual with an average healthy eye need 10 times higher luminance level to achieve similar vision levels with a 20-year-old individual with a healthy eye (Figueiro, 2001). In his article published in 2011, Owsley argued that an elderly individual would need three to four times the brightness level and 2.5 times the contrast level to perform the same task as a 20-year-old individual. As a result, researchers argued that older individuals have different lighting needs compared to younger individuals in order to increase vision performance due to different diseases and disability caused by aging.

3.3. LIGHTING RECOMMENDATIONS FOR RESIDENTIAL CARE FACILITIES

In the aging process, individuals undergo biological, physiological, spiritual and functional changes, and the aging process can bring many physical limitations. Loss of our eyesight is one of these physical limitations (Owsley, 2010). Visual impairments experienced during the aging process can lead to consequences that negatively affect the well-being of individuals, such as falling, loneliness, depression, anxiety, and disturbances in the sense of control (Leung et al., 2017). Accurate lighting designs can eliminate or reduce the problems caused by visual impairment, so it is important that both natural and artificial lighting choices are made according to the needs of elderly individuals. It is necessary to give examples of visual disorders that occur during the aging process; cataracts, reduction of the size of the pupil and loss of transparency of the lenses can be cited among the examples. Color perception becomes difficult in cataract disease, so the color temperature of the lighting element is became important. As the pupil shrinks and the lenses lose their transparency, light transmission decreases and individuals may experience difficulties at low light levels. In addition, the sensitivity to glare increases among individuals aged 50 and over, and loss of ability occurs in functions such as contrast sensitivity, harmony and adaptation of the eye (Abay and Ünver, 2017). Along with these changes, elderly individuals have difficulty in reading text and numbers, distinguishing shapes, perceiving colors, and therefore they need different lighting design solutions (Zorlu, 2017). One of these solutions is high illuminance levels. Standard illumination values prepared for healthy eyes are insufficient for elderly users (Tutal, 2018). Especially in places where daily work that will require focus is carried out, in order for elderly users to get a healthy vision, 3

times more than the level of illumination that is considered appropriate under normal conditions should be provided (Savut, 2007). It should be noted that the lighting element preferences used when providing a high level of illumination do not cause glare. Therefore, it is recommended to remove the light source from the field of view, direct the lighting element to the ceiling, and the light reflected from the ceiling (indirect lighting) illuminates the space (Zorlu, 1996). In addition, the eyes of older people may have adaptation problems in the face of rapidly changing illumunance levels. To prevent this, it is recommended to use dimming lighting (dimmer set) (Hedge and Rhodes, 2010). Another important element for older people is the color rendering index, which is a measure of how faithfully the lighting element creates the colors of the object it illuminates (CRI). The color rendering index value of daylight is considered to be one hundred, and artificial lighting is recommended to be at this performance.

Natural lighting design is as important as artificial lighting design in institutional aged care areas. The use of daylight is an important element for the physiological and psychological well-being and circadian rhythms of the elderly. Therefore, in institutional aged care areas, it is an important criterion that the spaces receive plenty of daylight when deciding on the building orientation. (Leung et al., 2017). Along with the building orientation, the window-wall ratios of the spaces should be such as to support the use of daylight, but should be improved with shading elements against visual and thermal discomfort that may occur. Shading components are an important element in lighting design. In particular, individuals aged 50 and over can turn off the shading element, as there is an increased sensitivity to glare. Although this action due to glare sensitivity may lead to the conclusion that elderly individuals do not prefer daylight, the situation is the opposite. Elderly individuals usually only try to prevent the glare problem, so it is recommended to use shading elements that will prevent the glare problem and create a home feeling for the elderly and can be easily intervened (Brawley, 2001). Living space installations in the interior should also be carried out according to the amount of daylight required by the actions done by individuals. For example, tables and chairs should be positioned approximately 1 to 3 meters from the window for adequate daylight use. Television areas, on the other hand, should be positioned as far away from the window and in dark corners as possible in order to avoid unwanted reflections and to achieve contrast (Sinoo, Hoof and Helianthe, 2011).

Many issues that were ignored in the studies on lighting in the past appear as health problems experienced by the individual today. Therefore, while designing lighting, people working on the development, production, sale, application and design of light should know the requirements of healthy lighting (Turgay & Altuncu, 2011). While designing institutional elderly care areas, both natural and artificial lighting designs developed for the needs of elderly users are important for the health and welfare levels of individuals. When lighting spaces, designers are asked to make conscious design decisions and to anticipate their possible effects on older users. In such areas where designers are not direct users, providing empathy in design should be one of the primary goals. In this study, the effect of acquiring empathy in design through observation on designers' understanding of elderly user expectations was investigated. (Table 1)

Table 3.1. Lighting scenarios suitable for elderly rooms

LIGHT SCENARIO	ILLUMINATION INTENSITY E(LX)	LIGHT COLOR	TYPE OF LIGHTING
day lighting close to floor (10 cm above floor) eye level (140-160 cm above floor)	200-300 Lux 500 Lux (cylindrical)	warm white/daylight white	direct/indirect
night lighting, close to floor	20-50 Lux	warm white	direct/indirect
day lighting close to floor (10 cm above floor) table height (75 cm above floor)	200-300 Lux 500 Lux	warm white/daylight white	direct/indirect
care light bed level (85 cm above floor)	300-500 Lux	warm white	direct/indirect depending on care case two-component lighting
reading light, work light bed level/reading level (if necessary, separate additional lighting.)	300-1000 Lux	warm white	direct/two component lighting
living area light, close to floor	100-500 Lux	warm white	direct/indirect
night light, close to floor monitoring lights for care staff at night, close to floor	50-100 Lux approx. 5 Lux	warm white	indirect
For residents: basic lighting close to floor, mirror lighting, accent ligting at face level	200 Lux 200-500 Lux	warm white	direct/indirect

CHAPTER 4
MEYHODOLOGY

4.1. SURVEY DESIGN AND PARTICIPANTS

In this study, survey and in-depth interview methods are used. The survey was applied to a group of 134 architects, interior architects and design professionals on the online platform. The in-depth interview method was applied one-on-one to a group of 5 people who had been in nursing homes before and had the chance to observe the life of elderly individuals in institutional nursing homes. The purpose of using, these two methods, is to obtain a more understandable result by integrating qualitative and quantitative research with each other. The main purpose of the semi-structured interview study, which is done in addition to the survey study, is to obtain more detailed results and outputs related to causality.

The survey was shared between March 10, 2022 and March 30, 2022 via the invitation link created via Google Forms and applied online to the participants. Microsoft Excel program was used to analyze the survey results. The images used in the creation of the survey questions were prepared using DialuxEvo, Lumion and Archicad programs.

60% of the 134 participants who participated in the survey study are architects, 17% are interior architects, and the remaining 23% are other (academics, architecture students, designers, electrical engineers, lighting engineers, lighting product suppliers, contractors, etc.) consists of individuals belonging to occupational groups. The reason why these occupational groups are preferred for the survey study is that they can have a say in the lighting design in the institutional aged care areas. The survey study was structured in two parts. The survey study was structured in two parts. The first part is the "Professional Roles" part, which is based on understanding the professional position and experience and seeing the relationship of the participants with the institutional aged care fields (Table 2). The second part was designed to measure the

awareness of the participants about the lighting design decisions in institutional aged care areas; It is the "Lighting" section with multiple choice, visual content or a mix of misleading/correct expressions to measure the knowledge of the participants. In order to avoid confusion in the narrative, misleading questions are given by turning them into correct expressions. The purpose of the questions asked in the first part is to try to see the empathy that the participants may have developed according to their presence in institutional aged care areas. According to the results obtained in the first part, the participants were divided into 2 groups. These groups are those who have been in the institutional aged care field and those who have not. The answers given by the participants to the questions posed in the second part were examined under the headings of these groups. In line with the results to be obtained, it is aimed to examine the differences that will occur in the design decisions between the two participant groups. In this way, the effect of designing with empathy, which will be developed by being on the spot and observing, on making the right decisions will be seen.

Table 4.1. Personal information of survey participants

	Architect		**Interior Architect**		**Others**	
	count	%	count	%	count	%
Professional Experience						
0-2 Year	22	27,5	5	21,8	13	42
2-5 Year	44	55	11	47,8	13	42
5-10 Year	11	13,75	5	21,8	4	12
10-15 Year	2	2,5	2	8,6	0	0
15 Year and above	1	1,25	0	0	1	4
The right to speak in the project						
Yes	67	83,75	16	69,5	23	74,2
No	13	16,25	7	30,5	8	25,8
Availability in the institutional care area						
Yes	42	52,5	16	69,5	22	71
No	38	47,5	7	30,5	9	29
Involvement in institutional care space design						
Yes	52	65	4	17,4	3	9,7
No	28	35	19	82,6	28	90,3

In addition to the survey, the participants were informed about confidentiality before the semi-structured interview applied to the 5 participants and publication approval

was obtained from all participants. Audio and video recordings taken during face-to-face and Zoom interviews with the participants were deciphered by the first author. In the semi-structured interviews, opinions on other architectural factors, including lighting design, were also taken. Of the interviewed participants, four are architects and one is an interior designer, and they are individuals with different professional experiences. All participants continued their graduate education after their bachelor's degree. Participants A and E (one self-employed, the other one own a business) take the design decisions of the projects themselves. Participants B work as an academicians, participants C and D work as salaried personnel in the private sector. In the daily life of each participant, there are individuals aged 60 and over, while participants B, C, D and E have individuals aged 65 and over. The main purpose of the questions asked to the participants in the interviews is to try to understand the awareness change in the architectural decisions that the designers, who have been in institutional elderly care areas, have made spatial observations and had the chance to observe the daily life of the elderly, will take by developing empathy. In this respect, attention was paid to the fact that each of the participants was a person who had visited the institutional elderly care areas before. Participants A and B visited institutional aged care areas within the scope of Tübitak project, participants C and D within the scope of concept project design and participant E within the scope of school project. The personal information of the participants is given in "Table 4.2".

The result tried to be obtained from the results of the questionnaire and semi-structured interviews, does being in the space to be designed and making observations before starting the design contribute to the development of empathy and does this contribution increase the awareness level of the designers? Is the increase in awareness levels an inspiration for designers to make the right decision about lighting? It is thought that designing with empathy, which will be developed by being in the place to be designed and observing, will be more beneficial in making the right decision. As a result of our survey and interview studies, this hypothesis will be tested.

Table 4.2. Personal information of in-depth interview study participants.

	PARTICIPANT A	PARTICIPANT B	PARTICIPANT C	PARTICIPANT D	PARTICIPANT E
PROFESSION	INTERIOR ARCHITECT	ARCHITECT	ARCHITECT	ARCHITECT	ARCHITECT
WORKING PLACE	SELF-EMPLOYED ARCHITECT	ACADEMICIAN	PAID EMPLOYEE IN ARCHITECTURAL OFFICE	PAID EMPLOYEE IN ARCHITECTURAL OFFICE	ARCHITECTURAL OFFICE OWNER
PROFESSION EXPERIENCE	3 YEAR	12 YEAR	4 YEAR	4 YEAR	3 YEAR
INDIVIDUAL OVER 65 IN THE FAMILY	NO	YES	YES	YES	YES
PURPOSE OF BEING IN THE FIELD OF CORPORATE ELDERLY CARE	TÜBİTAK PROJECT	TÜBİTAK PROJECT	CONCEPT DESIGN PROJECT	CONCEPT DESIGN PROJECT	SCHOOL PROJECT

CHAPTER 5
ANALYSIS OF RESULTS

5.1. EVALUATION OF QUESTIONNAIRE RESULTS

Participants were divided into two groups according to their previous presence in institutional elderly care areas. Participants who were previously in institutional elderly care areas were named Group 1, participants who were not, Group 2, and the results were presented by comparing the two groups.

Awareness of the Needs of Elderly Users

According to the results of the survey, the awareness that the elderly need more lighting than the young is higher in the Group 1 than in the Group 2 (Group 1; 63%, Group 2; 37%)(Figure 5.1). Similarly, it is known by the participants of both groups, especially in Group 1, that insufficient lighting conditions will increase the risk of falling (Group 1; 60%, Group 2; 40%) (Figür 5.2) and that cataract, one of the most common visual disorders among the elderly, makes color perception difficult (Group 1; 59%, Group 2; 41%) (Figür 5.3).

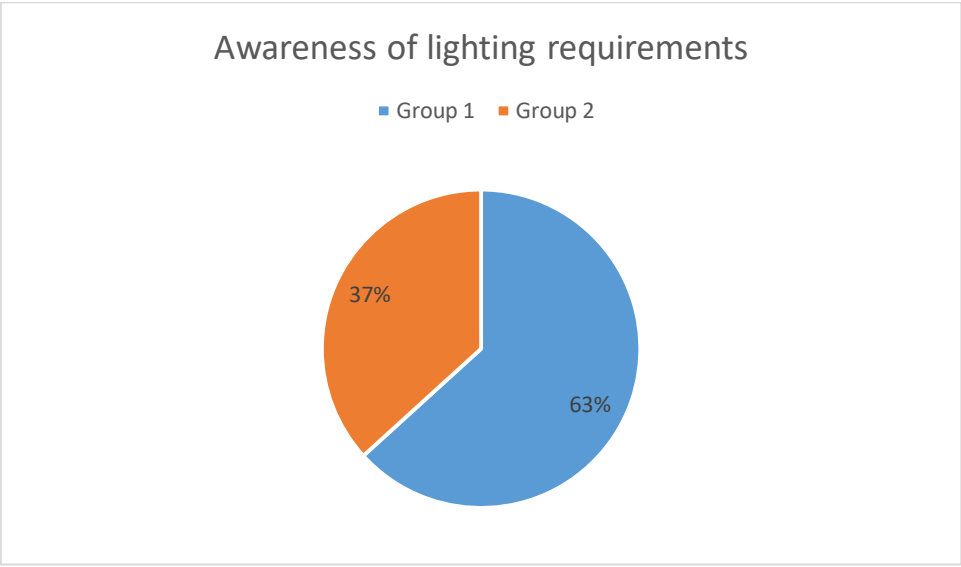


Figure 5.1. Participant's awareness of lighting requirements

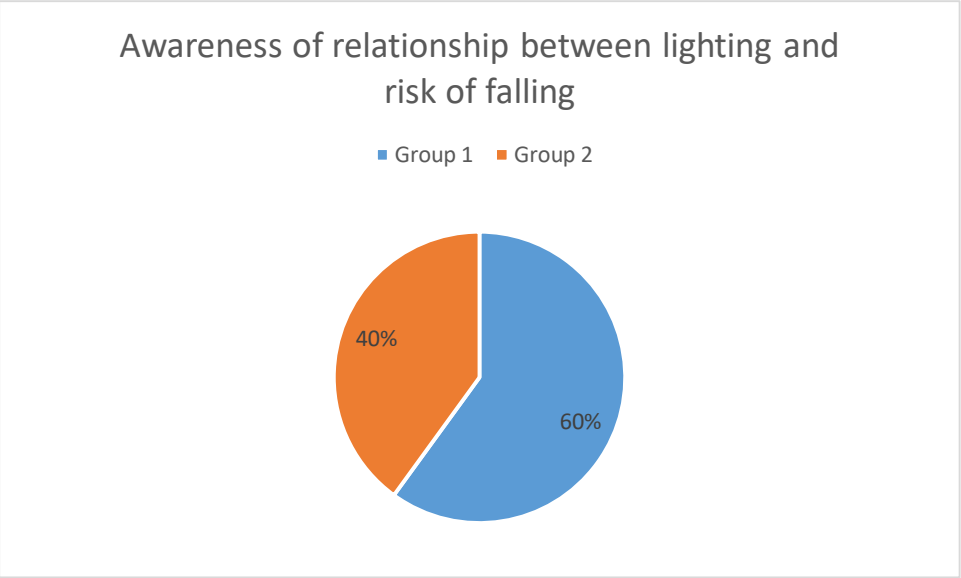


Figure 5.2. Participant's awareness of relationship between lighting and risk of falling

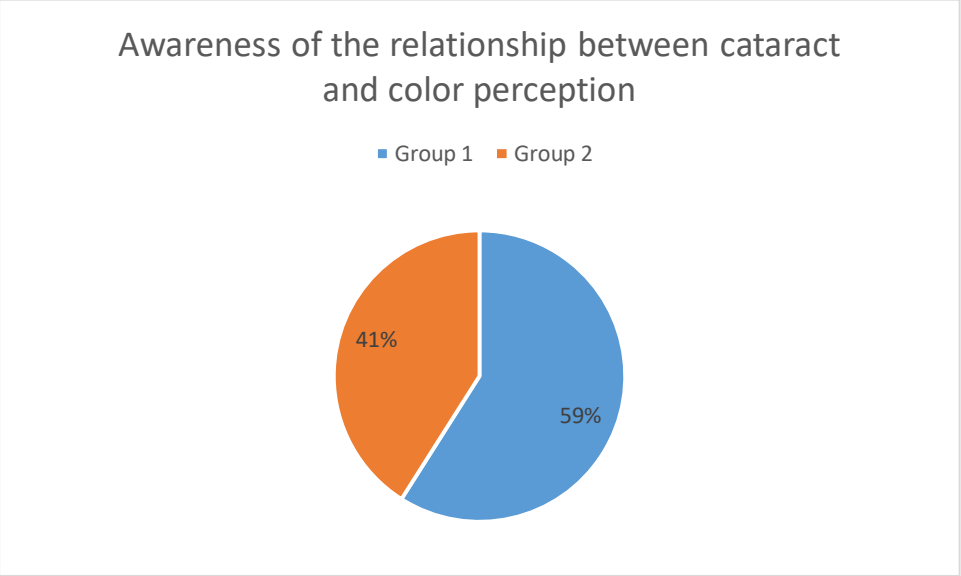


Figure 5.3. Participant's awareness of the relationship between cataract and color perception

Daylight and Daylight Control

90% of the participants in both groups regarding the use of daylight think that the orientation of the elderly rooms should be such that they receive plenty of daylight (Figure 5.4). The rate of participants who stated that they thought that daylight would not cause psychological disorders in elderly individuals was 69% in Group 1 and 61%

in Group 2. The rate of participants who think that they have no idea about the use of daylight or that it may have negative effects is 39% in Group 2.

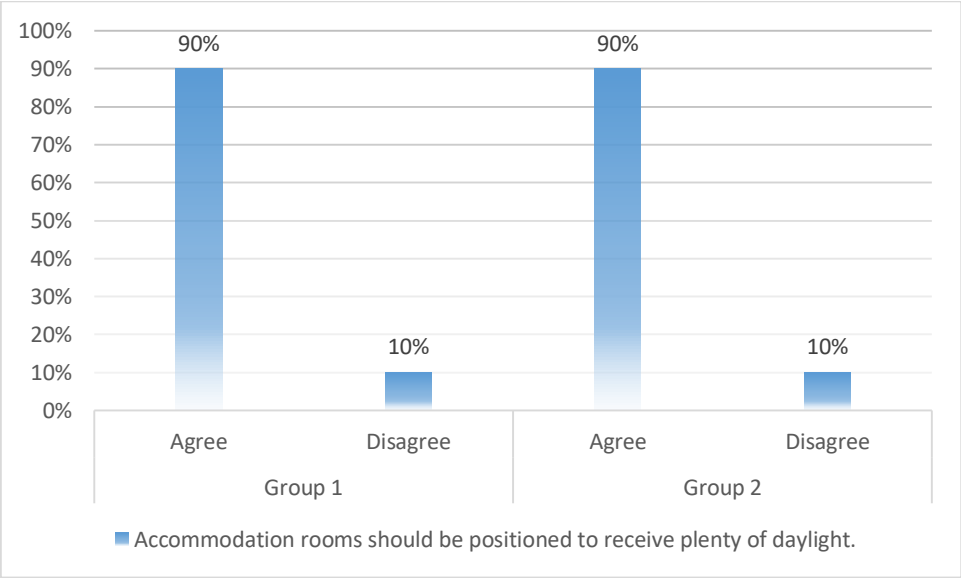


Figure 5.4. Opinions of the participants about the use of daylight

Based on the different window-to-wall ratios presented visually, it was seen that 67% were preferred the most in both groups (Group 1; 43,75%, Group 2; 37%), while 13% and 25% were the least preferred ones.

In both groups of participants, the majority of the participants support the easy intervention of shading elements by elderly users (Group 1; 82%, Group 2; 87%) and the preference of shading elements that will give a feeling of home (Figure 5.5). In both groups, 13% in the 1st group and 25% in the 2nd group, the least preferred shading element was the manual-operated shutter, blinds and fixed sunshade systems.

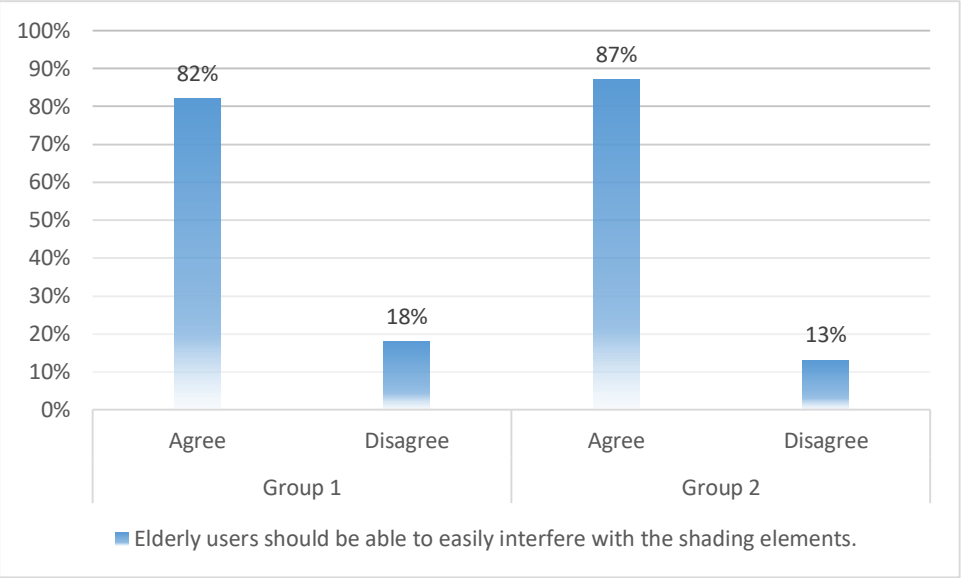


Figure 5.5. Opinions of the participants about the use of the sunshade system

Features of Lighting Element and Glare Problem

81% of the participants who preferred the sodium vapor lamp option with low color rendering instead of the high color rendering lamp types that should be used to provide the values closest to the daylight values are in Group 2. In the question in which different color temperature options were presented, the majority of the participants preferred warm white (2000-3300 K) (Group 1; 38,75%, Group 2; 59,25%), while the second preference was neutral color temperature (3300-5000 K) (Group 1; 51,25%, Group 2; 33%). Cool white color temperature (5000 K and above) was not preferred more in both groups (Figure 5.6).

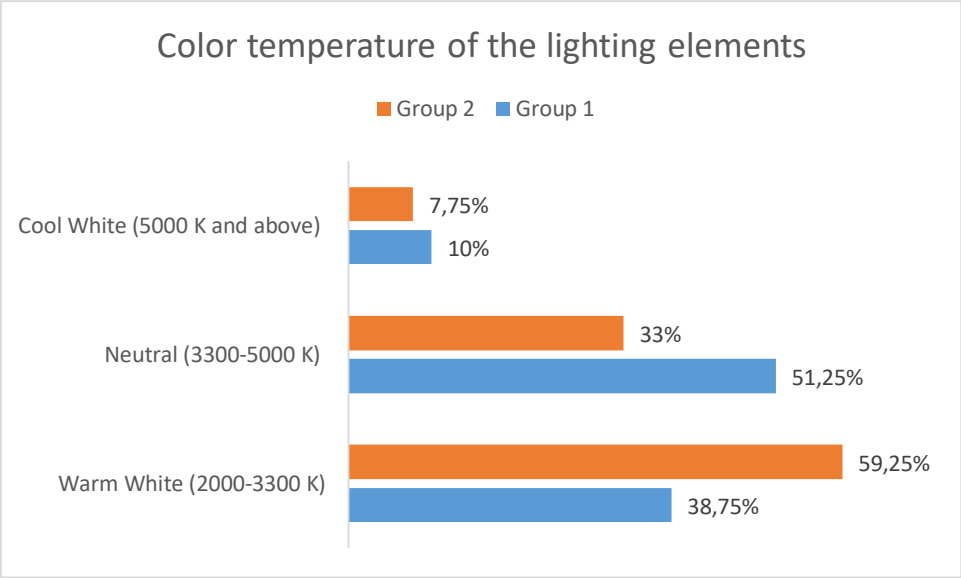


Figure 5.6. Opinions of the participants about the color temperature of artificial lighting

To the question about the increased sensitivity of elderly individuals to glare, especially caused by artificial lighting, 31% of the 1st group and 41% of the 2nd group answered that they have no idea. Although, 53% of the participants of Group 2 knew that the use of indirect lighting would prevent the glare problem, they preferred the arrangement with direct lighting elements that could cause glare among the room lighting schemes presented with visuals. The rate of participants who knew that direct lighting would make eye adaptation difficult was 65% in Group 1 and 52% in Group 2. (Figure 5.7).

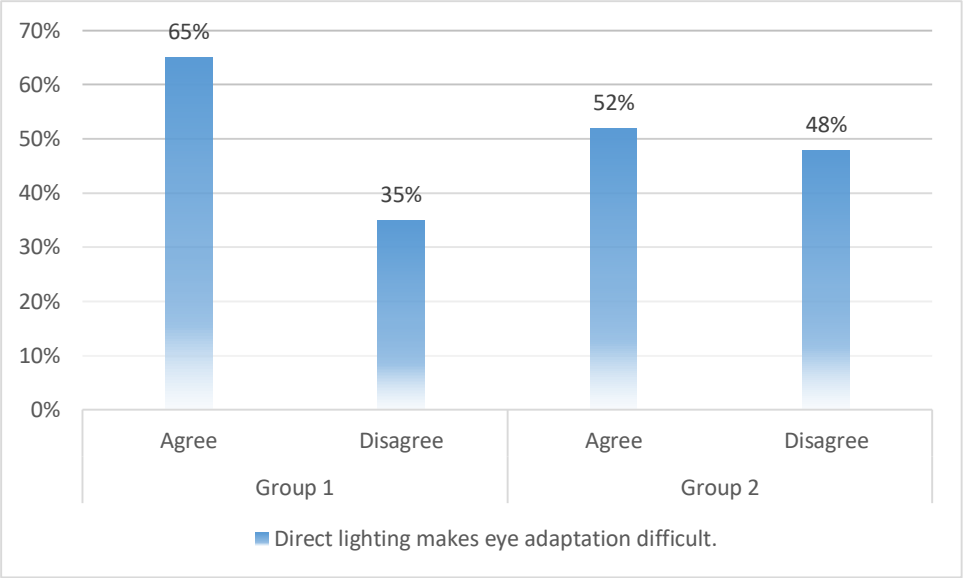


Figure 5.7. Opinions of the participants about the use of direct lighting and eye adaptation

Circadian Rhythm and Psychological Effects

About the relationship between exposure to a regular pattern of light and dark, and the circadian rhythm, 54% of the 2nd group answered that they have no idea, while 67% of the participants who thought that they supported the circadian rhythm were in the 1st group (Figure 5.8).

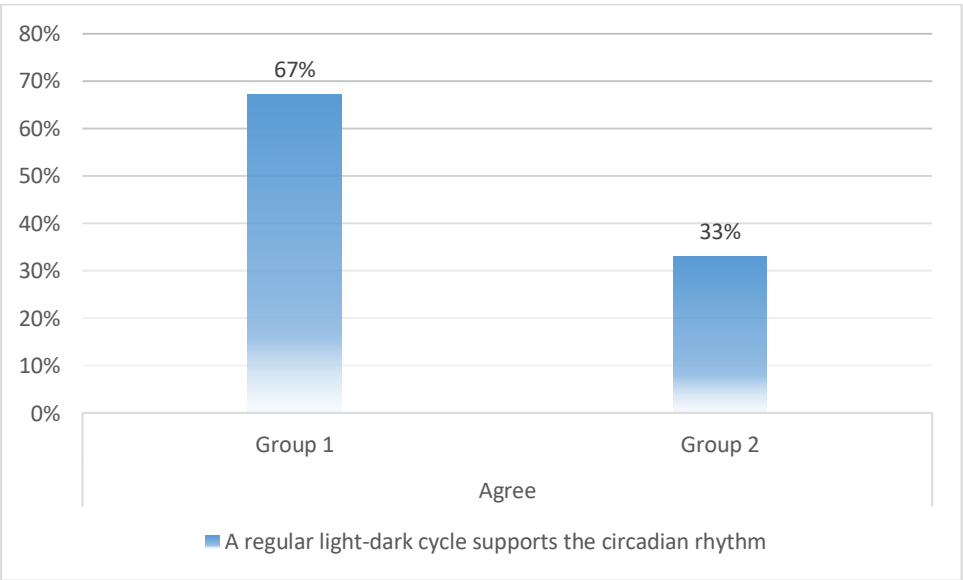


Figure 5.8. Participants' thoughts on the relationship between circadian rhythm and light

In both groups of participants, the rate of participants who think that lighting has an effect on confidence, comfort, health and the performance of the user is high. (Group 1; 88%, Group 2; 78%). 60% of the participants who think that lighting does not contribute to these factors are in the 2nd group. In the table below, the correct/wrong/no idea answers given by both groups to the questions on different topics are shown in detail (Table 5.1).

Table 5.1. Distribution of the answers of the participants according to the topics

	GROUP 1 Previous experience in institutional aged care						GROUP 2 Not previously in institutional aged care					
	Correct answer		Wrong answer		No idea		Correct answer		Wrong answer		No idea	
	count	%	count	%	count	%	count	%	count	%	count	%
Daylight use and building orientation	75	93,7	5	6,3	0	0	48	88,9	5	9,3	1	1,8
interior layout	65	81,3	11	13,7	4	5	45	83,3	4	7,4	5	9,3
Use of indirect lighting	66	82,5	4	5	10	12,5	41	76	7	13	6	11
Controllable (dimmer adjustable) lighting element preference	70	87,5	7	8,7	3	3,8	47	87,2	1	1,8	6	11
Glare sensitivity	43	53,8	12	15	25	31,2	20	37	12	22,2	22	40,8
Visual disturbances due to window placement	57	71,3	6	7,5	17	21,2	29	53,8	8	14,8	17	31,4
Shading element preference	74	92,5	2	2,5	4	5	51	94,5	2	3,7	1	1,8
Biological clock and lighting relationship	68	85	3	3,7	9	11,3	42	78	6	11	6	11
Visual comfort requirements of older and younger individuals	73	91.3	4	5	3	3,7	52	96,4	1	1,8	1	1,8
Controllable shading element preference	66	82,5	4	5	10	12,5	47	87,2	4	7,4	3	5,4
Eye adaptation and direct lighting	52	65	7	8,7	21	26,3	28	51,8	8	14,8	18	33,4
Glare and indirect lighting	62	77,5	5	6,3	13	16,2	41	76	1	1,8	12	22,2
Light and dark field relationship	34	42,5	17	21,3	29	36,2	19	35,2	14	26	21	38,8
Effects of insufficient lighting	77	96,3	1	1,2	2	2,5	52	96,3	0	0	2	3,7
Illuminance level requirements of old and young individuals	43	53,8	9	11,2	28	35	26	48,2	5	9,3	23	42,5
Cataract and color perception	40	50	11	13,8	29	36,2	27	50	6	11	21	39
Psychological effects of lighting	70	87,5	6	7,5	4	5	42	78	9	16,6	3	5,4
Daylight use	40	50	14	17,5	26	32,5	28	52	6	11	20	37
Shading element usage preference	57	71,3	15	18,7	8	10	37	68,5	10	18,5	7	13
Lighting element properties	15	18,7	47	58,8	18	22,5	12	22,2	23	42,6	19	35,2
Circadian rhythm and lighting	35	43,8	11	13,7	34	42,5	17	31,5	8	14,8	29	53,7
Lighting element properties	15	18,7	17	21,3	48	60	8	14,8	11	20,4	35	64,8
Lighting element properties	11	13,7	35	43,8	34	42,5	4	7,4	18	33,3	32	59,3
Daylight and psychology	55	68,8	7	8,7	18	22,5	33	61,1	9	16,7	12	22,2

5.2. EVALUATION OF SEMI-STRUCTURED INTERVIEW RESULTS

In this section, the results obtained from the five people who applied the semi-structured interview technique will be given separately according to the subject headings.

Participants' Experiences on the Concept of Old Age

It was recorded that each of the 5 people who were interviewed individually had a family member over 60 years of age. However, the aging processes of the elderly individuals in each participant's family are different from each other. For this reason, it was seen that the perspectives and age awareness of the participant about elderly individuals were different from each other before the visits they made to the institutional elderly care areas. The participants, who have elderly individuals in their families who have undergone the aging process in a healthy way, stated that they could not make enough sense of the negativities experienced, before their visits to the institutional elderly care areas. Participants C and E, who have individuals with physical disabilities due to the aging process, are more aware of the negative effects that elderly individuals may experience before their visit. Participant E stated that the places, streets and neighborhoods they lived in during the aging process of their grandfather did not provide suitable conditions for elderly individuals, and therefore they had to make a lot of spatial changes in the house where they spent their lives. Participant E stated that the design of the residences was not suitable and they had a lot of trouble in terms of accessibility. All of the participants stated that their perspectives on elderly individuals and the concept of old age changed after their visits to institutional elderly care areas. These changes are discussed separately under the following headings.

Participants' Perspectives on Empathy in Design

All of the participants stated that their empathy skills were developed and they acted by empathizing with people in their daily lives. Four of the participants considered empathy with the user as one of the sine qua none of the design process. Participant E, on the other hand, stated that before her grandfather's aging process and her visits to institutional aged care areas, he did not emphasize the issue of empathy so much in design, but now, she argued that the design should not be started without empathy. Each participant argues that the spaces they will design for users with different

physical and mental conditions than themselves should not be designed without experiencing and understanding the life of the user group in question. All of the participants stated that they tried to empathize by observing in institutional elderly care areas and talking with elderly individuals, by understanding their feelings, thoughts and expectations. During these visits, they argued that they thought that they could not acquire the knowledge they had acquired through observation and experience through any other learning method. In particular, they think that the information to be obtained from written sources will not meet the needs of elderly individuals, therefore there will be a decrease in the welfare level of the users. They agreed that they could not reach this conclusion in depth without observation and there would be deficiencies. They stated that the fact that they have experienced the lives of elderly individuals will improve themselves not only in the design of the institutional elderly care area, also in trying to make a deep sense of the needs of the user profile in every design they will make, and will make a difference in the design decisions they will take.

Field Visit and Experiences of Participants

The participants stated that as a result of the observations they made in the institutional elderly care areas and the interviews they made with the elderly individuals, they could now make sense of many problems that they did not pay attention to or could not make sense of before. Contrary to the general opinion of the society, all of the participants stated that they found institutional elderly care areas more beneficial for the socialization and activeness of the elderly. It was emphasized by each participant that elderly individuals who are not bedridden and in good health are happy to spend time with their peers in institutional elderly care areas. The topics that the participants stated that their awareness increased during the interviews and that they especially focused on are given in Figure 9. Apart from the lighting issue, each of the participants focused on many architectural decisions that are important for elderly users. Among these architectural decisions, topics such as spatial layout and dimensions, color and material selection are important in lighting design. For example, the materials to be used are glossy surfaces or light and dark, which can change the perception of space for elderly individuals or cause glare problems. The fact that the participants observed these potential problems on site will help them to make more appropriate decisions for elderly users in many choices in addition to lighting design. Each participant expressed that being in the daily lives of elderly individuals and having the chance to observe

have created positive changes in the design decisions they will take. Participant E stated that before the visits she made, had difficulties in understanding even the wishes expressed by the elderly from time to time, and that she could understand their needs more clearly after observing their daily life and approached them with a solution-oriented approach.

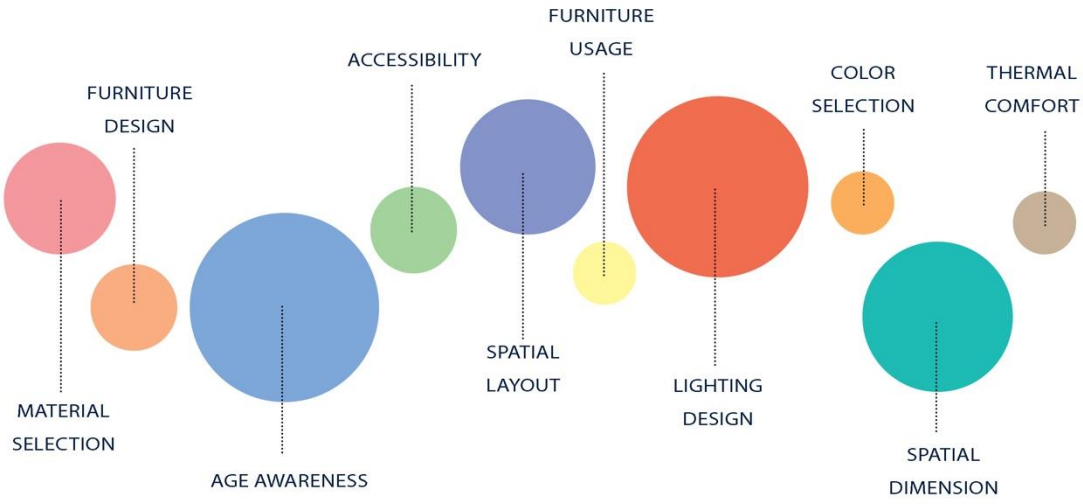


Figure 5.9. Topics on which the awareness of the participants has increased and that they especially focus on.

Awareness of Spatial Needs of Elderly Individuals

All of the participants argued that after their visit to the institutional elderly care areas, their awareness of the spatial needs of the elderly increased and stereotyped design standards were for active and healthy adult individuals, but they were not sufficient for user profiles that might have special needs such as children and the elderly. They also stated that they believed that even the standards prepared specifically for elderly individuals could not provide suitable conditions for every elderly individual. In addition to lighting design, spatial layout and dimensions are among the topics that the participants especially focus on. One of the most important tasks undertaken by the architect in the design or construction of the institutional elderly care area is the design of the space setups in a way suitable for the users. Participants A, B and D mentioned that elderly users feel small and lonely, especially because the common areas are designed as large areas. They stated that elderly individuals try to create defined and smaller spaces in common areas, therefore they see a need for spatial dimensions that they cannot predict. Participant B stated that if she had not made her visit, she could

have built large and empty spaces for elderly individuals to feel themselves in a more comfortable and spacious environment. Participant B, paying attention to the fact that each of the elderly individuals want to design their own spaces in almost every place, including accommodation rooms, emphasized that it is necessary to create areas that users can personalize in accommodation rooms. Participant B, who adopted the idea of designing a space within a space as much as possible, stated that she would not have guessed this need without her visits. Participant E, who advocated making an arrangement according to the disability status of the users, found the institutional elderly care areas she visited complex. Participant E argued that this would create a problem especially for users with dementia.

Building Orientation and Use of Natural Lighting

Participants A, C and E stated that the use of natural lighting in the institutional elderly care areas they visited was sufficient and healthy. Participant B stated that the amount of daylight is high, especially in the common areas, but that this situation may adversely affect thermal comfort and cause glare problems, especially in summer. Participant D, on the other hand, observed that users are in different satisfaction levels depending on the building orientation, some users are satisfied with the use of natural lighting in their rooms, but some users complain that they find it too bright or dark. He stated that the users staying in the north-facing rooms do not like to spend time in their rooms during the day and they often prefer the common areas. Participant D also stated that in İzmir conditions, especially the users staying in west-facing rooms could not be found in their rooms in the afternoon due to glare and thermal comfort problems. He also stated that there is a chance to observe the glare problems that occur as a result of the wrong positioning of the television corners according to the window openings. Participant E, on the other hand, stated that each user likes to see the daylight at different times of the day, and therefore, she observed that some users were not satisfied with the rooms in the mansions. Participant E, who expressed that users with physical disabilities have difficulties in rooms where home-type curtains are used in general, argued that shading elements can be used according to the physical condition of the users. She thinks that home-type curtains give the feeling of being at home to users who do not have physical disabilities, but it is necessary to prefer automatic and remote use shading elements for users with physical disabilities.

Artificial Lighting Design

All of the participants are aware that elderly individuals need different lighting needs than young and healthy individuals. Participant A argued that during her visits, she saw that elements such as lighting element preference, placement and color temperature were used in a uniform manner in all accommodation rooms, but the needs of elderly individuals could be different. In particular, she stated that the lighting designs that can be adjusted according to the personal needs of the users staying in double rooms should be preferred. She thinks that the use of regional lighting should be increased because elderly users who spend time in the accommodation rooms may have difficulties in activities such as reading books, solving puzzles and knitting due to the insufficient level of illumination. Participant D stated that elderly individuals have glare problems due to incorrectly positioned lighting elements. Participant E observed that there were problems in the lighting design in the elderly care areas she visited, such as the use of blue LED concealed lighting, the preference for pendant lighting and spot lighting, and the darkening of some areas. Participant E argued that the use of direct lighting disturbs the elderly users, therefore the use of indirect lighting should be increased. On the subject of night lighting, she argued that the bedside lampshades used in the accommodation rooms give the elderly users a feeling of home, but there should also be floor lighting with sensors. Participant E stated that some of the users she interviewed stated that they found the bedside lampshades too light, but they hesitated to turn it off.

Suggestions of Participants for Lighting Design

Participant A, after visiting the institutional elderly care areas, suggested solutions such as using dimmed lighting systems in the spaces, increasing the number of switches, and focusing on regional lighting. Participant B suggested designing climate-appropriate solar shading systems in order to improve the balance of daylight use and thermal comfort. Participant E stated that she would definitely do in-depth research and consult experienced people in the design decisions she would take on issues such as luminous intensity, lighting element placement and color temperature. At the same time, she argued that the use of sensored floor lighting in addition to night lighting at the bedside would reduce the risk of falling. Participant D thinks that the lighting elements and space layout should be carefully considered, especially in the bedroom and television viewing areas, the lighting elements should be placed in a way that does

not cause glare problems.

5.3. EVALUATION AND DISCUSSION OF RESULTS

According to the results of the survey, it was seen that all participants had a high level of awareness that inadequate and incorrectly constructed lighting design could cause significant problems for elderly users. However, it has been observed that there is a lack of awareness about how visual comfort requirements differ, why these differences arise, or how to solve the problems. Particularly, it was observed that the awareness of the participants (Group 2), who were not previously in the institutional aged care field, was lower than the other group. Particularly, the rate of participants who answered "No idea" to questions asked about the technical characteristics of artificial lighting such as color rendering, illuminance level, light source, color temperature was 10% higher in Group 2 compared to Group 1, and the rate of incorrect answers was 20% higher. Considering the importance of the characteristics of the lighting elements to be preferred in institutional aged care areas, the benefits of on-site observation on the level of awareness cannot be ignored.

According to the survey results, the rate of those who think that accommodation rooms should receive plenty of daylight is high in both participant groups. Although the window to wall ratio of 67% is the most preferred among the room visuals presented, this preference may result in glare and thermal comfort problems. These problems can be reduced or eliminated with the use of appropriate shading elements. The choice of shading element was in the form of using shading elements that could be easily intervened by elderly users and that would give a feeling of home in both participant groups (82% in Group 1, 87% in Group 2). However, in the 2nd group, 13% of the participants preferred manual-operated shutters, blinds and fixed sunshade systems that elderly users cannot easily interfere with. The fact that these systems were preferred in Group 2 shows that designers who do not have the chance to observe may be inexperienced in shading element usage scenarios.

When the level of awareness about the lighting needs of the elderly and their place in the decision-making mechanism were compared, it was seen that 60% of the participants in both groups, who did not know that the sensitivity of the elderly individuals to glare would increase, took part in the decision mechanism in the design

process. Among the different lighting options offered, the majority of those who choose the alternative that provides direct lighting that may cause glare are involved in the decision mechanism during the design process (75% in the 1st Group, 80.6% in the 2nd Group). The low awareness of artificial lighting and glare problems makes it possible that the needs of elderly individuals cannot be met when choosing a lighting element.

According to the different window-to-wall ratio (WWR-window to wall ratio) images presented, 66% of the participants in the 1st Group and 33% in the 2nd Group have a say in the design decisions, who preferred 67% of the window-to-wall ratio. 77.7% of the participants, who do not know that the lighting needs of the elderly users are different, stated that they had been in the design processes of the institutional elderly care area before. In the 2nd group, 39% of the participants are not aware of the positive effects of daylight use on the psychology of elderly individuals, and the majority of these people (72%) are involved in the decision mechanism in the design process. The knowledge and awareness of the designers involved in the decision mechanism is important, as the lighting design decisions to be taken without being aware of the specialized lighting needs of the elderly can cause many physical problems such as vision problems, headaches, and falls in the elderly.

According to the results of the survey, it was understood that there was an awareness that the lighting design has an effect on the health and well-being of the elderly in both groups of participants. However, 40% of the participants who do not think that lighting contributes to these factors are in the 1st Group and 60% are in the 2nd Group. The 20% difference in awareness levels shows that making on-site observations increases awareness levels. Knowing that regular exposure to light and darkness supports the circadian rhythm, and when the circadian rhythm is disrupted, it can cause many consequences such as insomnia, excessive sleepiness, loss of appetite, and attention deficit, 67% of the participants were in Group 1 and 33% in Group 2. Wrong decisions about the light and dark patterns of the participants, who did not have the chance to observe, may cause many consequences such as insomnia, excessive sleepiness, loss of appetite, lack of attention, depending on the disruptions in the circadian rhythm.

In the interview technique applied to 5 participants in order to support the results obtained from the survey study with a qualitative research, it was noted that after the visits they made to the institutional elderly care areas, all of the participants increased

their age awareness and thought that they could now make sense of the problems that they could not make sense of before, and that they could be more efficient in solution mechanisms. Although four of the participants did not work on lighting, all of the participants made positive or negative criticisms on the subject of lighting and were able to approach the lighting problems in a solution-oriented manner. Among the solutions they offer are the use of dim lighting for eye adaptation, creating balanced light levels; excessive use of keys for ease of use; regional lighting uses for personal preferences; use of indirect lighting elements for glare problems; preferring color temperatures at values closest to daylight values. Other participants, except for Participant A, who are interested in the subject of lighting, focused more on spatial setup and dimensions and accessibility. All of the participants stated that they understood better that stereotyped design standards are not sufficient for the well-being of elderly individuals, and they argued that even the needs of each of the elderly users may be different.

According to the quantitative and qualitative results obtained from the survey and semi-structured interview studies, it was seen that the awareness levels of the designers who were able to empathize with the user by having the chance to observe and interview the users, increased by 10% to 60% according to the subject distribution. It has been concluded that the empathy established increases the awareness in the lighting design decisions that will be constructed against the biological, physiological and psychological needs of the elderly individuals. Designers will be able to construct more suitable spaces for users with the help of empathy they will establish with them, especially before they design for user profiles with different physical and mental characteristics. Therefore, focusing more on the requirements of specific user profiles and encouraging designers to design with empathy can produce inspiring results.

CHAPTER 6
CONCLUSION

The architectural requirements of the elderly individuals, whose ratio to the population is increasing day by day in the world and in our country, are different from those of healthy and adult individuals. One of the functions in which elderly individuals first experience disability is the sense of sight. Therefore, the lighting decisions to be taken by the designers are very important for the well-being of the elderly. Designers may not foresee the problems that elderly individuals may experience in lighting design. However, decisions such as high illuminance levels, designing lighting element placement that will not create glare, use of indirect lighting, creating buffer zones that will facilitate eye adaptation, and use of daylight are important for the well-being of elderly individuals. For this reason, it is inevitable for designers who will take part in the design and construction of spaces designed for elderly individuals to empathize with elderly individuals in order to make sense of their needs.

Empathic design is a branch of user-oriented design approaches and is an approach that integrates designers and users in the design process. Designers can use many different techniques to develop their empathy skills, and one of these techniques is to be in the space to be designed and to observe. In this study, the differences in architectural lighting decisions to be taken between designers who have been in institutional aged care areas and have had the chance to empathize with the observation technique and those who have not had this chance have been examined. As a result of the questionnaire study applied to As a result of the questionnaire study applied to 134 people and the results of semi-structured interviews applied to 5 people, it was concluded that being able to empathize with the technique of being in place and making observations increased the awareness of designers on many issues. It has been observed that there are differences in awareness between the two groups between 10% and 60% according to the subject headings in the decisions regarding lighting design.

Awareness levels between the two groups are similar on issues such as elderly individuals may have different lighting needs and incorrect lighting use may cause falls in elderly individuals. However, it has been observed that there are serious differences between the two groups in terms of the effect of lighting on the circadian rhythms of elderly individuals and what consequences it may cause on elderly individuals in case of disruption of this rhythm. In order to meet such special lighting needs of elderly individuals correctly, it is beneficial to be present and to observe. If the user group in question is the group other than healthy and adult individuals on which design standards are based, the concept of empathy stands out as one of the inevitable thing of the design process, according to the results obtained. Although the results obtained in the study are inspiring, the fact that a limited number of people can be reached for the survey and semi-structured interviews can be made with a small number of people are some of the obstacles that stand in the way of the study. To obtain more reliable results, more people can be reached or a focus group study can be set up. In the focus group study, interviews can be made with designers who were not previously in institutional aged care areas, and then a field visit can be made. After the observations made by the designers during the field visits, interviews can be made again and the results obtained after two meetings can be discussed. Survey studies and interviews can also be applied to contractor companies that were previously involved in the construction of the institutional aged care area. The management of institutional aged care areas is as important as its design and construction. In order to provide the necessary comfort conditions for the elderly, studies can also be carried out with the institutional elderly care area management unit and technical team, and the elderly staying in the institution can be educated about the use of existing mechanical (ventilation, lighting, air conditioning) systems. However, despite all this, this study is important in terms of drawing attention to the issue of lighting for institutional elderly care areas and creating a roadmap.

According to the results obtained in this study, it has been concluded that being in the space to be designed and making observations, thus being able to empathize, is beneficial not only in the architectural lighting decisions to be taken, but also in many other architectural decisions that will affect the comfort of elderly individuals. In addition to the lighting decisions to be taken, it has been concluded that being able to empathize by observing, many architectural decisions to be taken also increase

awareness, and these awareness pave the way for inspiring results. According to the results obtained from this study, the concept of empathy, which is not really emphasized by the designers, should be emphasized more and the user profile should be fully understood before starting the design action. I hope this study will inspire us to guide the designers to design with the empathy they will establish with the technique of observing by being in the space to be designed.

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APPENDIX A – THE QUESTIONNAIRE

Tasarımcıların Yaşlı Odaları İçin Mimari Aydınlatma Tercihleri

Sayın Katılımcı,
Aydınlatma, yaşlıların yaşam kalitesini etkileyen önemli mimari faktörlerden biridir. Bu çalışma son yıllarda sayıları hızla artan kurumsal yaşlı bakım evlerinin (huzurevi) yaşlı odalarında kullanılan aydınlatma ile ilgili tasarımcıların tercihleri hakkında bilgi edinmeyi amaçlamıştır. Bu çalışma Yaşar Üniversitesi Lisansüstü Eğitim Enstitüsü Mimarlık Tezli Yüksek Lisans Programı'nda Dr.Öğr.Üyesi Arzu Cılasun Kunduracı'nın danışmanlığında, yüksek lisans öğrencisi Mimar Seray Üstün tarafından hazırlanmakta olan 'Tasarımda Empati: Tasarımcının, Kurumsal Yaşlı Bakım Evlerinde Aydınlatma Kararlarına Etkisi' başlıklı tez çalışmasının bir parçası olacaktır. Tutumlarınız ve görüşleriniz, çalışmamızın başarısı için kritik bir öneme sahiptir. Bireysel yanıtlar anonimdir ve tüm kişisel veriler gizli tutulacaktır. Yaklaşık 5 dakika sürecek bu anketi doldurup çevrim içi olarak göndermenizi rica ediyoruz. Değerli zamanınızı ayırdığınız için teşekkürler.

* Gerekli

1.BÖLÜM: MESLEKİ ROLLER

1. Mesleğiniz nedir? *

Yalnızca bir şıkkı işaretleyin.

- ◯ Mimar
- ◯ İç Mimar
- ◯ Diğer: _____

2. Mesleki tecrübeniz nedir? *

Yalnızca bir şıkkı işaretleyin.

- ◯ 0-2 yıl arası
- ◯ 2-5 yıl arası
- ◯ 5-10 yıl arası
- ◯ 10-15 yıl arası
- ◯ 15 yıl ve üzeri

3. Güncel olarak çalışmakta olduğunuz iş yerinde, projelerin karar mekanizmasında aldığınız rol nedir? *

Yalnızca bir şıkkı işaretleyin.

- ◯ Söz hakkım yok
- ◯ Nadiren söz hakkım var
- ◯ Bazen ben karar veriyorum
- ◯ Genellikle söz hakkım var
- ◯ Asıl kararları ben veriyorum
- ◯ Şu anda çalışmıyorum

4. Kurumsal huzur evleri ile ilişkiniz aşağıdaki seçeneklerden hangisine daha yakın? *

Yalnızca bir şıkkı işaretleyin.

- ◯ Proje tasarım aşamasında bulundum
- ◯ Proje uygulama aşamasında bulundum
- ◯ Teknik gezi şeklinde bulundum
- ◯ Ziyaret amaçlı bulundum
- ◯ Hiç huzur evinde bulunmadım

5. Daha önce huzur evi tasarım veya uygulama aşamasında yer aldınız mı? (Cevabınız hayır ise alttaki soruyu cevaplamayınız.) *

Yalnızca bir şıkkı işaretleyin.

- ◯ Evet
- ◯ Hayır

6. Cevabınız evet ise, hangi aşamasında yer aldınız? (Birden fazla seçenek işaretleyebilirsiniz)

Uygun olanların tümünü işaretleyin.

- [ ] Konsept ve etüt çalışmalarında bulundum.
- [ ] Ruhsat proje çizimi ve takip aşamalarında bulundum.
- [ ] İç mekan tasarım çalışmalarında bulundum.
- [ ] Uygulama ve takip aşamalarında bulundum.
- [ ] Malzeme seçim ve tedarik işlerinde bulundum.

Diğer: [ ] _____

7. Daha önce herhangi bir mimari projede aydınlatma tasarım veya uygulama aşamasında yer aldınız mı? (Cevabınız hayır ise alttaki soruyu cevaplamayınız.) *

Yalnızca bir şıkkı işaretleyin.

- ( ) Evet
- ( ) Hayır

8. Cevabınız evet ise, hangi aşamasında yer aldınız? (Birden fazla seçenek işaretleyebilirsiniz)

Uygun olanların tümünü işaretleyin.

- [ ] Tasarım aşamasında yer aldım.
- [ ] Uygulama aşamasında yer aldım.
- [ ] Ürün tedarik aşamasında yer aldım.

Diğer: [ ] _____

2.BÖLÜM: AYDINLATMA

9. Bir huzurevi tasarımında, güneş ışığının günün hangi saatlerinde yaşlı odalarına daha yoğun gelmesini tercih edersiniz? *

Yalnızca bir şıkkı işaretleyin.

- ◯ Gün ışığının sabahları gelmesini (doğuya bakmasını) tercih ederim.
- ◯ Gün ışığının gün boyu gelmesini (güneye bakmasını) tercih ederim.
- ◯ Gün ışığının akşamüstü gelmesini (batıya bakmasını) tercih ederim.
- ◯ Yaşlı odalarının genellikle doğrudan gün ışığı almamasını (kuzeye bakmasını) tercih ederim.
- ◯ Fikrim yok.

10. Bir huzurevi tasarımında, aşağıda verilen pencere boyutlarının ve konumlarının, yaşlı odalarında kullanımı açısından tercihinizi lütfen belirtiniz? *

Yalnızca bir şıkkı işaretleyin.

Yerden Yükseklik: 0 cm, Pencere oranı %35

Yerden Yükseklik: 0 cm, Pencere oranı %67

Yerden Yükseklik: 90 cm, Pencere oranı %13

Yerden Yükseklik: 90 cm, Pencere oranı %25

Yerden Yükseklik: 150 cm, Pencere oranı %13

Yerden Yükseklik: 150 cm, Pencere oranı %25

11. Bir huzurevi tasarımında, aşağıda verilen güneş kırıcı sistemlerinin, yaşlı odalarında kullanımı açısından tercihinizi Kullanılmalı/Kullanılmamalı ya da Fikrim Yok olarak lütfen belirtiniz. *

Her satırda yalnızca bir şıkkı işaretleyin.

	Kullanılmalı	Kullanılmamalı	Fikrim Yok
Pencere 'dışına' monte edilmiş, 'manuel' kullanımlı 'kepenk' sistemi.	◯	◯	◯
Pencere 'dışına' monte edilmiş, 'manuel' kullanımlı 'panjur' sistemi.	◯	◯	◯
Pencere 'dışına' monte edilmiş, 'otomatik' kullanımlı 'panjur' sistemi.	◯	◯	◯
Pencere 'dışına' monte edilmiş, 'sabit güneş kırıcı' sistemi.	◯	◯	◯
Pencere 'dışına' monte edilmiş, 'hareketli güneş kırıcı sistemi.	◯	◯	◯
'İç mekanda' kullanılmak üzere konumlandırılmış 'ev tipi perde.'	◯	◯	◯
'İç mekanda' kullanılmak üzere konumlandırılmış 'jaluzi.'	◯	◯	◯
'İç mekanda' kullanılmak üzere konumlandırılmış, 'manuel kullanımlı panjur'.	◯	◯	◯

12. Bir huzurevindeki yaşlı odasında kullanmak üzere aşağıda verilen renk sıcaklıklarından hangisini tercih ederdiniz? *

Yalnızca bir şıkkı işaretleyin.

- ◯ 2000-3300 K (Sıcak Beyaz)
- ◯ 3300-5000 K (Nötr)
- ◯ 5000 K ve üzeri (Soğuk Beyaz)
- ◯ Fikrim yok.

13. Aşağıda verilen görsellerde huzurevi yaşlı odaları için kullanılabilecek 4 farklı genel aydınlatma alternatifi verilmiştir. Her bir alternatif için oda içerisinde bulunan ortalama aydınlık düzeyi 300 lux'tür ve 4000 Kelvin renk sıcaklığı uygulanmıştır. Bu doğrultuda tercihiniz hangi genel aydınlatma alternatifinden yana olurdu? *

Yalnızca bir şıkkı işaretleyin.

Gizli LED aydınlatma

Sıva üstü panel LED aydınlatma

Sıva üstü spot aydınlatma

Sarkıt aydınlatma

14. Bir huzurevi tasarımında, yaşlı odalarında kullanılacak olan aydınlatma elemanlarında ışık kaynağı tercihiniz aşağıdakilerden hangisi olurdu? (Birden fazla seçenek işaretleyebilirsiniz) *

Uygun olanların tümünü işaretleyin.

- [ ] Halojen Ampul
- [ ] Floresan Ampul
- [ ] LED
- [ ] OLED
- [ ] Fikrim yok.

Diğer: [ ] _____

15. Bir huzurevi tasarımında, yaşlı odalarında kullanılacak olan alternatif gece aydınlatmalarını Kullanılmalı/ Kullanılmamalı ya da Fikrim Yok olarak işaretleyiniz. *

Her satırda yalnızca bir şıkkı işaretleyin.

	Kullanılmalı	Kullanılmamalı	Fikrim Yok
Yatak başında kullanılacak olan abajur gece lambası.	◯	◯	◯
Prize takılan ve sürekli bir aydınlatma sağlayan gece lambası.	◯	◯	◯
Zemini aydınlatacak şekilde konumlandırılmış sensörlü gece lambası.	◯	◯	◯
Odanın genelini sürekli aydınlatacak şekilde konumlandırılmış gece lambası.	◯	◯	◯

16. Aşağıda doğru ya da yanıltıcı bazı ifadeler verilmiştir. Bu ifadeleri Katılıyorum/Katılmıyorum ya da Fikrim Yok seçeneklerinden birini seçerek değerlendiriniz. *

Her satırda yalnızca bir şıkkı işaretleyin.

	Katılıyorum	Katılmıyorum	Fikrim Yok
Yaşlı odalarının yerleşimi yapılırken bol miktarda güneş ışığı almasına dikkat edilmelidir.	◯	◯	◯
Huzurevlerindeki ortak alanlarda, pencereye uzak ve az güneş alan bölge TV köşesi olarak kullanılmalıdır.	◯	◯	◯
Yaşlı odalarında dolaylı (endirekt) aydınlatma tercih edilecek ise açık renk tavan ve duvar yüzeyleriyle kullanılmalıdır.	◯	◯	◯
Yaşlı odalarında kontrol edilebilir (dimmer ayarlı) aydınlatma elemanı tercih edilmelidir.	◯	◯	◯
50 yaş ve üzeri kişilerde kamaşmaya hassasiyet azalır.	◯	◯	◯
Dar bir koridorun sonunda tasarlanan pencere açıklığı, doğrudan gelen gün ışığı ile silüet etkisi oluşturarak görme problemi yaratabilir.	◯	◯	◯
Yaşlı odalarında ev hissi verecek perde gibi gölgelendirme elemanları kullanılmalıdır.	◯	◯	◯
Kullanılan aydınlatmanın özellikleri, yaşlıların biyolojik saatini etkilemez.	◯	◯	◯
Yaşlıların görsel konfor gereksinimleri gençlerden farklıdır.	◯	◯	◯
Yaşlı odalarında kullanıcı tarafından kolaylıkla kontrol edebilecek, tercihen otomatik güneş kırıcı sistemleri tercih edilmelidir.	◯	◯	◯
Direkt aydınlatma kullanmak gözün adaptasyonunu kolaylaştırır.	◯	◯	◯
Kamaşma problemini önlemek için dolaylı aydınlatma kullanılmalıdır.	◯	◯	◯

Görsel konfor için, yaşlı bireylerin baktıkları alan, çevresindeki alandan daha karanlık olmalıdır.			
Yetersiz aydınlatma, yaşlılarda düşme riskini artıran önemli çevresel etkenlerden biridir.			
80 yaşında ortalama görüşe sahip bir yaşlı, 20 yaşındaki ortalama görüşe sahip bir gençten yaklaşık 10 kat fazla aydınlık düzeyine ihtiyaç duyar.			
Yaşlılarda sıklıkla görülen bir göz rahatsızlığı olan katarakt hastalığında, renk algısı zorlaşır.			
Yaşlı odalarında kullanılan aydınlatmanın güven duygusu, sağlık, konfor ve kullanıcıların performansına etkisi yoktur.			
Yaşlıların uzun zaman geçireceği alanlarda kamaşma yaşanmaması için günışığı önerilmez.			
Yaşlıların yaşayacağı alanlarda gölgeleme sistemleri sadece bakım veren kişiler tarafından kontrol edilmelidir, yaşlılar müdahale etmemelidir.			
Yaşlı bireylerin kullanacağı alanlarda, sağlıklı görüşe sahip yetişkinlere oranla %10 fazla aydınlık düzeyi sağlanması yeterlidir.			
Gözün ışığa adaptasyonu kullanılan lambanın renksel sıcaklığı ile ilgilidir.			
Düzenli bir aydınlık ve karanlığa maruz bırakılma, yaşlılarda biyolojik ritmi destekler.			
Yaşlı bireyler için kamaşma problemi yüksek renksel geriverimli lamba ile giderilebilir.			
Yaşlı bireyler için gün ışığı değerlerine en yakın olan aydınlatma elemanları daha faydalıdır. Bu nedenle sodyum buharlı lambalar tercih edilmelidir.			
Yaşlı odalarında gün ışığı kullanımının artması psikolojik rahatsızlıkları tetikler.			