



# Ruh ve Sinir Hastalıkları Hastane Bahçesinde Kullanıcı Davranışına Bağlı Kişisel Alan Tercihleri

## Personal Space Preferences Depending on Behaviour at A Psychiatric Hospital Garden

Çiğdem Sakıcı<sup>1</sup> , Mustafa Var<sup>2</sup> 

### Öz

Bu çalışma yardımıyla ruh ve sinir hastalıkları hastane bahçelerinde kullanıcıların alanda gerçekleştirilen etkinliğe bağlı olarak farklı mekânlardaki doğallık ve kapallık kriterlerine göre alan tercih farklılıklarının ortaya konulması amaçlanmıştır. Bu nedenle 11 farklı aktivite alanı için doğallık ve kapallık kriterleri dikkate alınarak dört farklı seçenek üretilmiştir. Bu farklılığı belirleyebilmek için Ataköy Ruh ve Sinir Hastalıkları Hastanesinde yatan 101 hasta ve karşılaştırma grubu olarak ta 101 zihinsel hastalık öyküsü bulunmayan gönüllü (34 ziyaretçi, 33 peyzaj mimarı ve 34 psikiyatri stajı almış tıp fakültesi öğrencileri) olmak üzere toplam 202 hastane bahçesi kullanıcısı üzerinde araştırma yürütülmüştür. Hastaların tamamı hastanede ilaçlı tedavi gören ve hastane bahçesini bizzat kullanan hastalardır. Çalışmada, hastaların kendilerine ait kişisel alan sınırlarının diğer kullanıcı grubundan farklı olup olmadığına, hastalık tipinin ve cinsiyet farklılığının kişisel alan sınırları üzerinde etkili olup olmadığına bakılmıştır. Kullanıcıların hangi mekân ve hangi etkinlik için hangi kapallık ve doğallık indekslerini tercih ettikleri ve bu mekânları tercih etme nedenleri sorgulanmıştır. Sonuç olarak hastaların diğer kullanıcı grubuna göre kişisel mekân sınırlarının daha geniş olduğu ve daha çok kapalı mekânları istedikleri ve ayrıca her iki grubun da doğal olan seçenekleri tercih ettiği çalışma sonucunda ortaya çıkmıştır. Etkinlik alan sınırları belirlenirken hastaların kendilerini rahat ve konforlu hissedecekleri çözümlerin üretilmesinin gerekliliği çalışma sonucunda ortaya konmuştur.

**Anahtar Kelimeler:** Kişisel Alan, Peyzaj Tercihi, Çevre ve Davranış, Hastane Bahçesi, İyileştirici Bahçe

### ABSTRACT

This study aimed to reveal differences in choices according to natural and enclosed criteria for spaces linked to activities done by users in the garden of a psychiatric hospital. Therefore, four different selections were developed in line with natural and enclosed criteria for 11 different activity area. The study was completed with a total of 202 users, including 101 inpatients and 101 healthy volunteers without history of mental disorders (34 visitors, 33 landscape architecture and 34 medical students receive training in psychiatry) as comparison groups in Ataköy Psychiatric Hospital garden. All patients were treated with antipsychotic drugs in an unchanged manner throughout the study. The study examined whether there were differences in personal space boundaries of the patients themselves compared to other user groups and whether disease type and gender were effective on personal space boundaries. Users were questioned about their choice according to enclosed and natural indexes for which space and which activity and their reasons for choosing these spaces. In conclusion, patients wanted larger personal space boundaries and more enclosed spaces compared to other user groups and additionally, the study revealed that both groups preferred natural choices. The study revealed the need to produce solutions which will make the patients feel at ease and comfortable when determining the boundaries of activity areas.

**Keywords:** Personal space, Landscape preference, Environment and behaviour, Hospital garden, Healing garden

<sup>1</sup> Corresponding Author: Kastamonu Üni. Müh. ve Mim. Fak. Peyzaj Mimarlığı Böl., [csakici@kastamonu.edu.tr](mailto:csakici@kastamonu.edu.tr), 0000-0001-5369-4876

<sup>2</sup> Yıldız Teknik Üniversitesi Mimarlık Fakültesi Şehir Bölge Planlama Bölümü, [mvar@yildiz.edu.tr](mailto:mvar@yildiz.edu.tr), 0000-0002-3996-2608



## INTRODUCTION:

Just as in all stages of life, people have social, psychological and physical expectations about the spaces they occupy. This may be defined as the environment not being uncomfortable for the user and providing conditions appropriate for activities. While the environment gives the person freedom, it should not limit people's activities; however, it should provide opportunities to exceed these boundaries (Gür, 1996). When organizing a space, it is necessary to identify who the users will be, what their expectations from this part of the space are or what their open space requirements are as a priority. One of the most important determinants of space design is the needs of people. In creating spaces, there is a requirement mainly to meet physical needs, followed by social and psychological needs. It is impossible for a space which does not meet the physical needs of people, does not protect them from external factors and does not provide trust to successfully achieve its other functions (Alp, 1993).

People determine different privacy levels for each space they pass through in their minds and have an ideal level of privacy according to the space. The concept of privacy, playing a central role in the adjustment between people and their environment, means the demands and rights of a person to control interaction and communication when interacting with other people (Gür, 1996). According to this situation, people identify their ideal privacy level mentally. It is necessary to keep the desired interaction levels at this ideal level. Protecting the desired interaction levels of an individual can be ensured by protecting the personal space boundaries of an individual. The architectural space inhabited by people assists in drawing the dimensions of the personal space belonging to an individual. Just as the individual's personal space boundaries are linked to the properties of the space, they vary linked to the degree of closeness of the person entering the individual's personal space, status differences between people and cultural factors (Nechamkin et al., 2003). In short, personal space can be depicted as an envelope creating the individual's mobile space and surrounding them.

Researches have shown that environmental setting preferences among people depend on the type of behaviours those setting are perceived to support. Yet little is known about how users will behave in setting or how those settings support preferred behaviours (Barnhart et al., 1998). The level of preference for a space is an indicator of the use of that space in accordance with purposes. A space is adopted by the users of that space to the degree to which it abides by the criteria required by the activity or function to be performed in that space. Patients develop fears about their environment and people due to their disease and have a need to be protected and feel safe due to these fears. For this reason, they need to feel secure within the spaces they occupy. Otherwise, patients may need to leave the space without using it. For this reason, when organizing activity areas for patients, it is necessary to determine the personal space boundaries required by patients for that activity and to decide on criteria to be used in the design accordingly.

Although previous studies have investigated the relationships between setting preference and varying behaviours, the evidence is less than conclusive in distinguishing between simple attractiveness judgments and setting preference as determined by behaviour (Purcell et al., 1994). This research explores the relationship between preferred behaviours and preferred settings for patients and others at psychiatric hospital. Study utilizing simülasyonları photographs of different fields of activity found that different activities caused different personal space preferences.

Within the scope of this study, four different selections were developed in line with natural and enclosed criteria for each activity area in order to include activity areas appropriate for personal space boundaries of users in a design proposal for an open space therapy unit considered to create positive effects on treatment and improve the health and strength of users in Ataköy Psychiatric Hospital

gardens. The aim was to determine which of these selections would make users feel comfortable and peaceful and whether patients had different personal space needs compared to other users.

## 1. Description of The Survey

In order to determine whether there were differences on a personal space basis for different activity areas in the hospital garden among people using the garden of a psychiatric hospital, four different selections were produced for each activity area using enclosed and natural criteria. The decision was made for users to assess space differences with the aid of images of these selections. Within the scope of this study, being enclosed was accepted as a person protecting themselves; in other words, avoiding being viewed by others in their current position, and personal space was positioned according to the environment being enclosed or open. If the personal space limit is above eye level, it is considered as enclosed, if it is below it, it is considered as open. While producing selections, natural proposals were created with plants and artificial proposals were created with structural elements.

Ataköy Psychiatric Hospital garden was chosen as the study area and a design proposal for an open space therapy unit was developed for this garden. In order for users to assess the garden on the basis of activity areas, the ARC CAD program was used to create three-dimensional images of the area (Figure 3). In order to be able to determine what personal space boundaries are required for users to feel comfortable and safe, 4 different selections of natural-enclosed, natural-open, built-enclosed and built-open were produced for each activity area in the open space therapy unit. In total, users were presented with 44 selections for 11 different activity areas for assessment. These selections were prepared with the ARC CAD program and with the PHOTOSHOP program on an area basis for the open space therapy unit design proposal. Many studies reveal that simulation studies can be used to determine the visual effect of the area and positive effect on user (Akçayır & Akçayır, 2017; Barnhart et al., 1998; Bitter & Corral, 2014; Bower et al., 2014; Kerr & Lawson, 2020; Liu & Huang, 2020; Lotfi et al., 2020; Pasini et al., 2014; Piga, 2017; Purcell et al., 1994; Purcell & Lamb, 1984; Suresh et al., 2011; Torbati, 2018; Uzunboylu & Yıldız, 2016; Zhao, 2021). The study by Barnhart et al. (1998) was used in the stage of determining selections in the study and for the method of interrogating users. Environment types based on naturalness or being enclosed are frequently used in landscaping (Barnhart et al., 1998; Purcell & Lamb, 1984; Purcell et al., 1994; Sakıcı, 2009; Whitehouse, 1999). Users were questioned about their choice according to enclosed and natural indexes for which space and which activity and their reasons for choosing these spaces. Reasons for choosing spaces were assessed with the aid of concepts like being spacious, attractive, inviting, sheltered, joyful, beautiful, peaceful and simple. Before beginning the questionnaire, users were reminded of the current state of the space both with photographs and verbally, and then the proposed activities and changes to the spaces were communicated to users with the aid of the design images. There are also number of studies proving that photographs have representative validity on assessing landscape qualifications and these studies demonstrate that there is a high coherence and parallel responses between photography based perceptual decisions and directly perceived landscapes (Clay & Daniel, 2000; Hull & Stewart, 1992; Lotfi et al., 2020; Nasar & Lin, 2003; Palmer & Hoffman, 2001; Sakıcı & Var, 2014). The survey questions were very clear and understandable. Before asking questions, subjects were explained the purpose of each stage of the survey and the scenarios created and later questions were asked. Surveys were applied in groups of five to seven patients indoors with people assigned to help each patient who knew the topic and marked the patient's choices on the survey. In order for patients not to become bored or to be comfortable, they were permitted to take a break whenever they wanted; for this reason, each survey study applied to patients lasted nearly two hours. Surveys for non-patient groups were applied in groups and lasted 30-45 minutes.

The chi-square ( $\chi^2$ ) test was used to determine whether there were statistically significant differences in the distribution of choices related to what was liked and disliked by the user groups among the four different selections created according to natural and enclosed criteria for each activity area. According to responses, the situations of users choosing natural or built elements for enclosed selection on a space basis linked to the activity area were determined.

### 1.1. Study Area

The hospital is located in the south of Çaykara county in Trabzon province, in a town called Ataköy 6 km from the county centre (Figure 1). Operating since 2003 and accepting its first patient in June of that year, the hospital is currently used as a regional hospital for the Eastern Black Sea and includes 10 services. The main building is four stories tall with patient rooms located on the top two floors. Patients can use the garden for 2 hours in the morning and afternoon for a total of 4 hours. The garden contains two pergolas, a canteen and seating benches. Patients perform activities like sitting, eating-drinking, strolling, walking, running and sports for 1-1.5 hours in the morning accompanied by nurses.



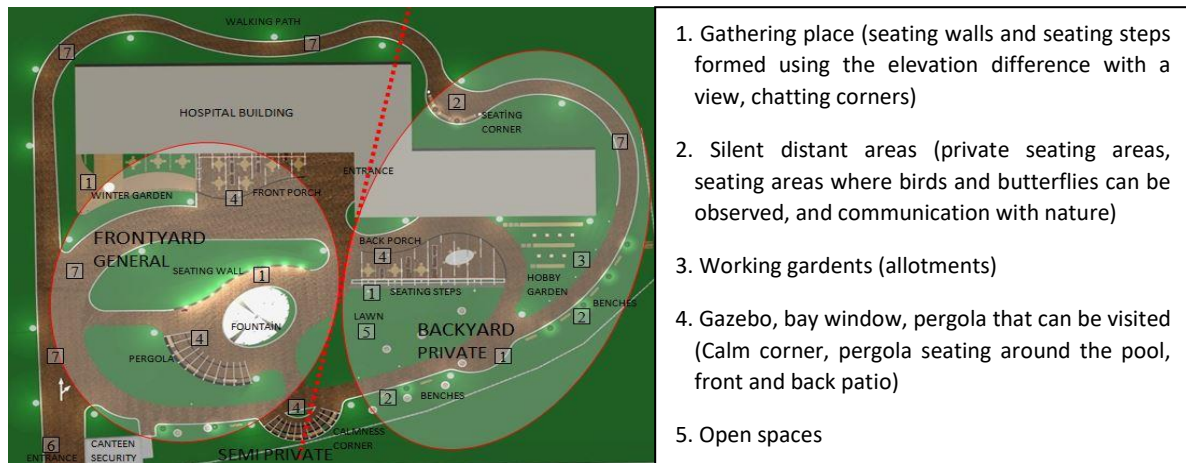
Figure 1. Location within Turkey and general appearance of the study area

Taking note of the present state of the hospital garden, advantages and disadvantages of the space, user desires and needs, design features for open space therapy units and area data, a design proposal was developed to transform this hospital garden into an open space therapy unit which will have positive effects on the treatment of patients (Figure 2). When developing this design proposal, the area was divided in two as front yard and back yard, and care was taken that areas in the front yard included activity areas for all user groups, while the back yard contained activity areas for use mainly by patients. The distribution of activity areas by divisions can be seen in Table 1.

Table 1. Distribution of areas in front and back gardens of the proposed open space therapy unit

<b>FRONTYARD General</b>	<b>BACKYARD Private</b>	<b>FRONT-BACK semi private</b>
1. SPACE (seating nearby pool)	3. SPACE (open lawn area-seatin steps)	2. SPACE (calmness corner)
6. SPACE (entrance and main road)	4. SPACE (back porch)	11. SPACE (walking path)
8. SPACE (winter garden)	5. SPACE (private seating corner)	
9. SPACE (seating wall)	7. SPACE (working garden)	
10. SPACE (front porch)		





1. Gathering place (seating walls and seating steps formed using the elevation difference with a view, chatting corners)
2. Silent distant areas (private seating areas, seating areas where birds and butterflies can be observed, and communication with nature)
3. Working gardens (allotments)
4. Gazebo, bay window, pergola that can be visited (Calm corner, pergola seating around the pool, front and back patio)
5. Open spaces

Figure 2. Open space therapy unit proposed for hospital garden

In accordance with the desires and needs of users, 11 different activity areas that will have positive effects on treatment, removing users of the open space therapy unit from the stressful hospital environment, abiding by personal space boundaries and which can be used safely were created (Figure 3). These activity areas were created to include active, passive and mixed activities based on the study by Bernhart et al. (1998). The features of these activity areas and the 4 different selections created according to natural and enclosed criteria for each activity are explained as follows (Figure 4).

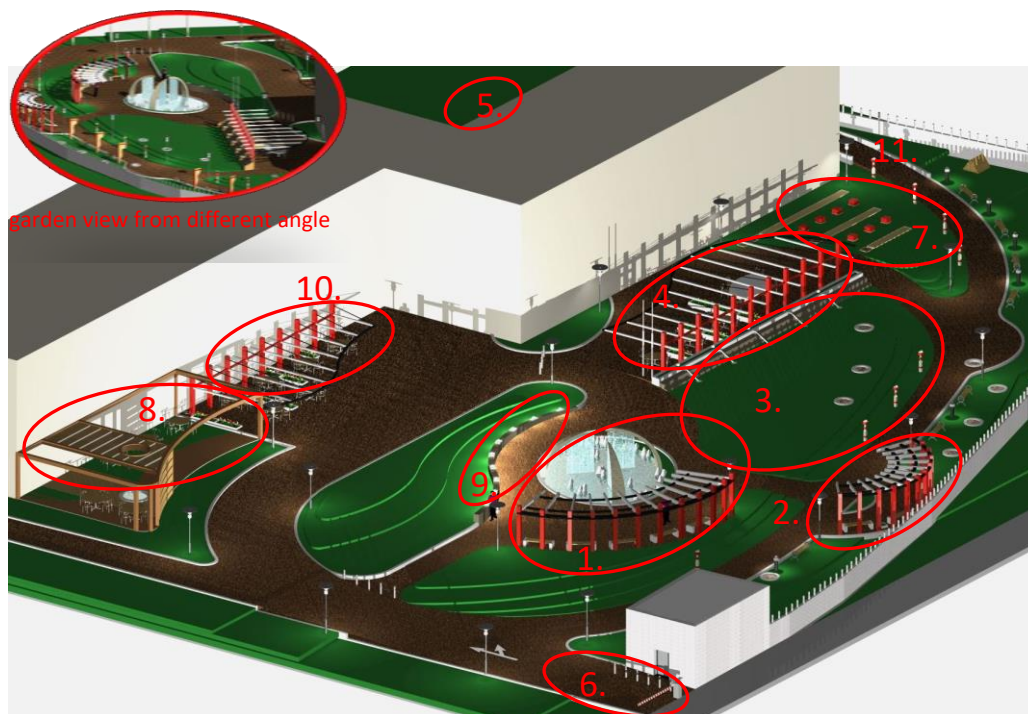


Figure 3. Open space therapy unit and 11 different activity areas proposed for Ataköy Psychiatric Hospital Garden

*1st Space (seating near pool):* This is an area where patients can enjoy themselves with visitors from outside in rainy and sunny weather, allowing them to watch the water, think, and eat and drink food and drink obtained from the canteen.

*2nd Space (Calmness corner):* Located at the intersection of two different paths, this space was organized to allow groups to have sessions in negative weather conditions, to sit and chat with visitors or to tell each other stories. Additionally, it allows the opportunity to watch other people as it is beside the pathway.

*3rd Space (Open lawn area-seating steps):* This area was designed to allow the opportunity for many activities like spending time alone or getting the know the environment, lying on the grass, reading while listening to birdsong, resting, feeding birds, communing with the wildlife, sitting, strolling, completing collective activities and holding shows, and physical activity.

*4th Space (back porch):* This is an area distant from visitors with covered tables, chairs and chaise longue where patients can come together to sit, chat, participate in group activities, complete indoor activities, watch the garden and the view, and also meet with doctors.

*5th Space (private seating corner):* This was arranged as a quiet calm seating area where patients who want to avoid being in the same environment as others can spend time, where more severe patients who spend most of their time indoors can avail of outdoor therapy activities for activities like being alone, thinking, sitting and smoking.

*6th Space (entrance and main road):* This area was created to separate pedestrian and vehicle traffic, emphasize the entrance, ensure safe and controlled entry and ensure a warm welcome for patients attending the hospital while being afraid.

*7th Space (working garden):* This area was created with the aim of allowing users to create relationships with plants, to continue their social roles or to gain interest in new hobbies and skills, to provide a way to pass time nicely and to feel useful.

*8th and 10th Space (front porch-winter garden):* With the aim of allowing use of the garden in four seasons, these areas were designed for sitting, reading books, eating-drinking, strolling, thinking, sunbathing and chatting activities and include the enclosed winter garden and front porch containing fish ponds, flower pillows and pots, table and chairs providing transition between the hospital building and garden.

*9th Space (seating wall):* This wall due to the slope of the garden will be transformed into a seating wall with textural features and allow users the opportunity to watch the water and the view.

*11th Space (walking path):* This continuous path was created to be simple and not confusing and allow easy access to the spaces, can be easily used by users who want to walk, allows resting opportunities with benches and seating corners along the pathway, contains chat corners and openings, and surprises encouraging movement of users like bird houses.



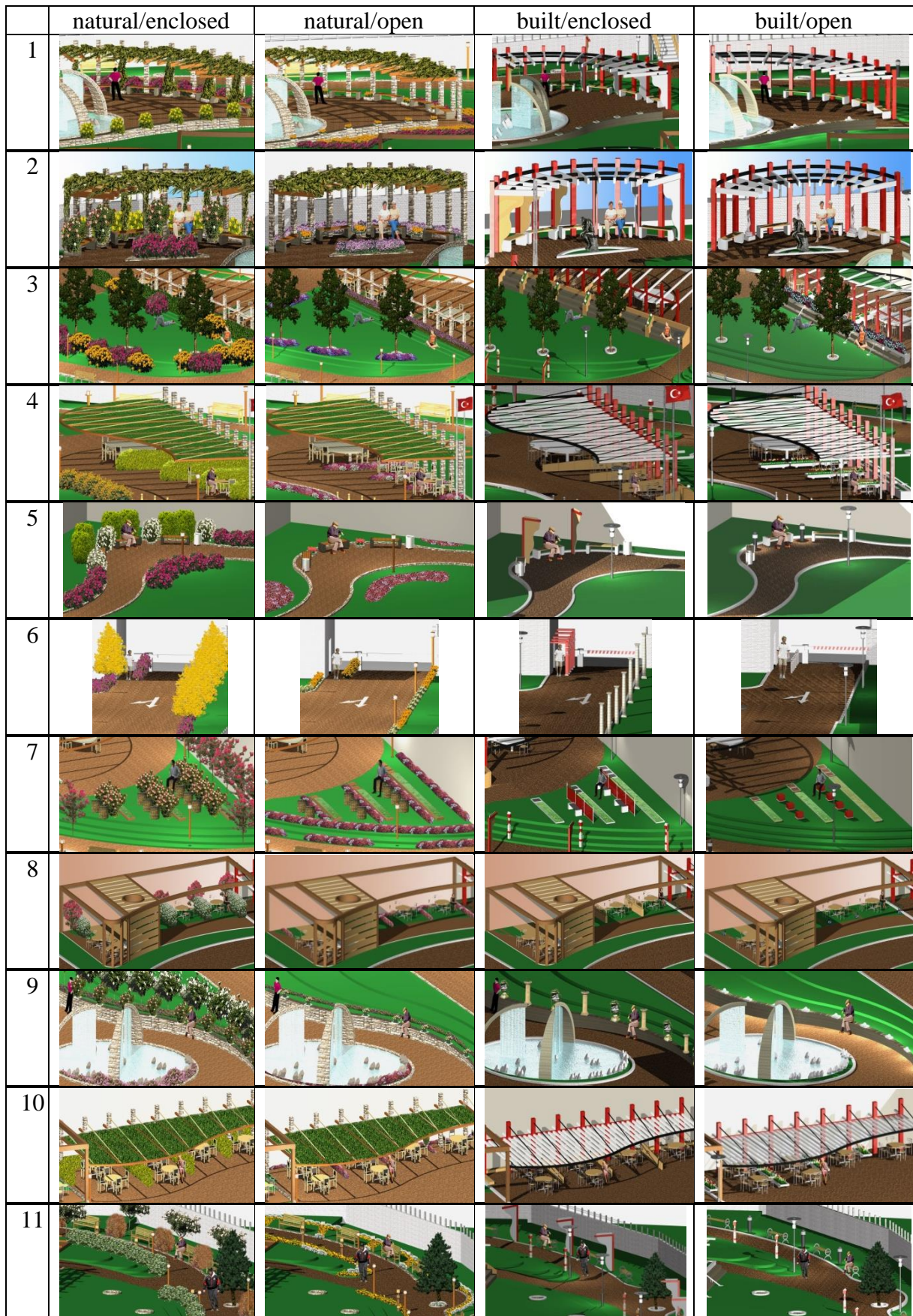


Figure 4. Four different design selections proposed on the basis of space for the hospital garden

## 2. Results

### 2.1. Demographic Structure of Hospital Garden Users

In order to determine whether there were differences in personal space linked to activities among users of the psychiatric hospital garden, a total of 202 people were surveyed including 101 inpatients and 101 healthy volunteers. All patients were treated with antipsychotic drugs in an unchanged manner throughout the study. Of patients, 75.2% had schizophrenia and 24.8% had mood disorder. The Mann-Whitney U test was used to examine whether there was a statistical difference between choices of the proposed selections for the spaces in terms of the patients' diagnoses. The result revealed that disease was not effective on choices and from this stage of the study, disease differences were ignored and patients were assessed in a single group. As the study was an interdisciplinary study at the intersection of landscape architecture and psychiatric branches, for 101 healthy volunteers, 34 were visitors living in and around Ataköy, 33 were students from the landscape architecture branch and 34 were students from a medical faculty who had successfully completed psychiatric internships. The demographic features of all users participating in the survey can be seen in Table 2.

Table 2. Demographic structure of hospital garden users participating in the survey

User Group	Patient		Healthy Group					
			Visitor		Landscape Architecture		Medical faculty student	
Demog. struct.	n	%	n	%	n	%	n	%
<b>Gender</b>								
Female	27	26,7	13	38,2	23	69,7	15	44,1
Male	74	73,3	21	61,8	10	30,3	19	55,9
<b>Age</b>								
10-20	3	3,0	2	5,9	-	-	-	-
20-30	23	22,8	17	50	27	81,8	34	100
30-40	32	31,7	1	2,9	6	18,2	-	-
40-50	31	30,7	3	8,8	-	-	-	-
50-60	10	9,9	1	2,9	-	-	-	-
60-	2	2,0	10	29,4	-	-	-	-
<b>Marital status</b>								
Merried	43	42,6	15	44,1	7	21,2	-	-
Single	58	57,4	19	55,9	26	78,8	34	100
<b>Education</b>								
Not education	6	5,9	-	-	-	-	-	-
Primary	67	66,3	7	20,6	-	-	-	-
High school	25	24,8	14	41,2	-	-	-	-
University	3	3,0	13	38,2	21	63,6	34	100
Postgraduate	-	-	-	-	12	36,4	-	-
<b>Residence</b>								
Rural	56	55,4	11	32,4	-	-	1	2,9
Urban	45	44,6	23	67,6	33	100	33	97,1

### 2.2. Results Related to Scenarios on Spaces Basis for Hospital Garden

With the aim of revealing the relationship between space and behaviour, different enclosures were created with natural and built elements on the basis of activity area and then users were requested to determine the appropriate choice for their personal space boundaries. Thus, the aim was to reveal the difference in enclosure levels chosen based on the activity completed in the garden by patients and non-patient users. Four different selections created linked to enclosed and natural criteria for each activity area were assessed by users and then choices were grouped according to natural-built and open-enclosed criteria. Thus, the reasons for each user group choosing a selection for each activity area and additionally differences between the groups were compared.



For the 1st space (seating near pool), patients chose the natural-enclosed selection as it was peaceful (66.1%) and interesting (55.9%), medical faculty students chose it because it was more peaceful (72%) while landscape architects found it joyful (58.8%) and choices of visitors were not different from the patient choices ( $\chi^2=2.941$ ,  $p=0.086$ ). For the 2nd space (calmness corner), the natural-enclosed selection was found to be beautiful (65.4%) and interesting (63.5%) by patients, medical faculty students found it peaceful (44.1%), landscape architects found the natural-open selection spacious (71.4%) and visitors found the natural-enclosed and natural-open selections peaceful (87.5%). For the 3rd space (open lawn area-seating steps), patients chose the natural-enclosed selection because they found it interesting (76.8%) and beautiful (62.5%), visitors found it peaceful and joyful (76.2%), while landscape architects found the natural-open selection spacious (78.6%) and medical faculty students found the natural-enclosed and natural-open selections peaceful (60%). For the 4th space (back porch), the natural-open selection was chosen by patients due to being beautiful (70.7%) and spacious (68.3%), while landscape architects found it spacious (76.2%), medical faculty students chose the natural-enclosed selection because it was peaceful (56.3%) and visitors chose natural-enclosed and natural-open selections because they were beautiful (87.5%). For the 5th space (private seating corner), choices were natural-enclosed by patients due to being peaceful (72.2%) and beautiful (64.8%), while visitors and medical faculty students found it peaceful (72%; 45.5%) and landscape architects found it secluded (56.5%). For the 6th space (entrance and main road), choices were natural-enclosed chosen by patients due to being beautiful (71.1%) and interesting (60%), natural-open chosen by landscape architects due to being spacious (66.7%), natural-enclosed and natural-open chosen by visitors due to being beautiful and secluded (75%) and choices of medical students were not different from the patients ( $\chi^2=2.235$ ,  $p=0.525$ ). For the 7th space (working garden), choices were natural-enclosed chosen by patients due to being beautiful (70%) and secluded (64%), while medical faculty students found it joyful (50%), natural-open selection was chosen by visitors due to being spacious (78.3%) and the choice of landscape architects was statistically similar to patient choices ( $\chi^2=3.727$ ,  $p=0.292$ ). For the 8th space (winter garden), the natural-enclosed selection was chosen by patients due to being beautiful (63.3%) and interesting (58.3%) and by medical faculty students as it was beautiful (48.3%), while the natural-open selection was chosen by visitors and landscape architects as they found it spacious (64.7%; 87.5%). For the 9th space (seating wall), the natural-enclosed selection was chosen by patients who found it beautiful (78.6%) and interesting (67.9%), while visitors, landscape architects and medical faculty students chose it because it was interesting (70.6%; 60%; 35.3%). For the 10th space (front porch), the natural-enclosed selection was chosen by patients as it was peaceful (66.7%) and interesting (57.1%) and by medical faculty students as it was spacious (36.4%), local people chose the natural-open selection as it was beautiful (80%) and landscape architects chose the built-open selection as it was spacious (75%). For the 11th space (walking path), the natural-enclosed selection was chosen by patients as it was both interesting and beautiful (65.9%), and by medical faculty students as it was peaceful (45%), while the natural-open selection was chosen by visitors and landscape architects due to being spacious (68.2%; 70.6%).

Generally, on the basis of space the choice distribution linked to natural-built distinction and open-enclosed distinction for all participants can be seen in Table 3. Table 3 also shows the  $\chi^2$  and p values determined with chi-square analysis of the statistical significance within this distribution. The bold figures in the table ( $p>0.05$ ) do not show statistically significant differences, while the others show significant differences between choices.

Table 3. User preferences for activity areas

	Patient				Healthy Group								
	Evaluation method	Preference %	$\chi^2$	p	Visitor			Landscape Architecture			Medical faculty student		
					Preference %	$\chi^2$	p	Preference %	$\chi^2$	p	Preference %	$\chi^2$	p
1. SPACE	General	N/E 58.4	79.475	0.000	N/E 64.7	2.941	<b>0.086</b>	N/E 51.5	26.030	0.000	N/E 73.5	44.353	0.000
	Natural/Built	N 90.1	64.960	0.000	N 100			N 93.9	25.485	0.000	N 91.2	23.059	0.000
	Enclosed/Open	E 64.4	8.327	0.004	E 64.7	2.941	<b>0.086</b>	E 54.5	0.273	<b>0.602</b>	E 76.4	9.529	0.002
2. SPACE	General	N/E 51.5	52.861	0.000	N/E-N/O 47.1	11.529	0.003	N/O 63.6	27.242	0.000	N/E 50	23.647	0.000
	Natural/Built	N 83.2	44.446	0.000	N 94.1	26.471	0.000	N 75.8	8.758	0.003	N 91.2	23.647	0.000
	Enclosed/Open	E 62.4	6.188	0.013	O 52.9	0.118	<b>0.732</b>	O 81.8	13.364	0.000	E 55.9	0.471	<b>0.491</b>
3. SPACE	General	N/E 55.4	57.297	0.000	N/E 61.8	27.412	0.000	N/O 42.4	9.545	0.023	N/E-N/O 44.12	7.118	0.028
	Natural/Built	N 81.2	39.297	0.000	N 85.3	16.941	0.000	N 75.8	8.758	0.003	N 88.2	19.882	0.000
	Enclosed/Open	E 66.3	10.782	0.001	E 73.5	7.529	0.006	O 51.5	0.030	<b>0.862</b>	E 55.9	0.471	<b>0.493</b>
4. SPACE	General	N/O 40.6	36.149	0.000	N/E-N/O 47.1	26.471	0.000	N/O 63.6	28.455	0.000	N/E 47.1	20.353	0.000
	Natural/Built	N 79.2	34.465	0.000	N 94.1	26.471	0.000	N 75.8	8.758	0.003	N 88.2	19.882	0.000
	Enclosed/Open	O 55.4	1.198	<b>0.274</b>	E-O 50	0.000	<b>1.000</b>	O 84.8	16.030	0.000	E-O 50	0.000	<b>1.000</b>
5. SPACE	General	N/E 53.5	52.703	0.000	N/E 73.5	45.529	0.000	N/E 69.7	20.364	0.000	N/E 64.7	28.824	0.000
	Natural/Built	N 81.2	39.297	0.000	N 94.1	26.471	0.001	N 90.9	22.091	0.001	N 79.4	11.765	0.001
	Enclosed/Open	E 63.4	7.218	0.007	E 76.5	9.529	0.002	E 69.7	5.121	0.024	E 73.5	7.529	0.006
6. SPACE	General	N/E 44.6	31.158	0.000	N/E-N/O 35.3	9.529	0.023	N/O 45.5	19.242	0.000	N/O 32.4	2.235	<b>0.525</b>
	Natural/Built	N 76.2	27.812	0.000	N 70.6	5.765	0.016	B 51.5	0.030	<b>0.862</b>	N 58.8	1.059	<b>0.303</b>
	Enclosed/Open	E 56.4	1.673	<b>0.196</b>	E 61.8	1.882	<b>0.170</b>	O 54.5	0.273	<b>0.602</b>	O 58.8	1.059	<b>0.303</b>
7. SPACE	General	N/E 49.5	51.911	0.000	N/O 67.6	36.353	0.000	N/O 39.4	3.727	<b>0.292</b>	N/E 47.1	11.647	0.009
	Natural/Built	N 83.2	44.446	0.000	N 91.2	23.059	0.000	N 57.6	0.758	<b>0.384</b>	N 76.5	9.529	0.002
	Enclosed/Open	E 52.5	0.248	<b>0.619</b>	O 73.5	7.529	0.006	O 60.6	1.485	<b>0.223</b>	E 58.8	1.059	<b>0.303</b>
8. SPACE	General	N/E 59.4	65.772	0.000	N/O 50	15.176	0.002	N/O 48.5	17.545	0.001	N/E 47.1	18.000	0.000
	Natural/Built	N 78.2	32.168	0.000	N 79.4	11.765	0.001	N 84.8	16.030	0.000	N 85.3	16.941	0.000
	Enclosed/Open	E 72.3	20.050	0.000	O 64.7	2.941	0.086	O 51.5	0.030	<b>0.862</b>	E/O 50	0.000	<b>1.000</b>
9. SPACE	General	N/E 55.4	57.297	0.000	N/E 50	14.176	0.001	N/E 45.5	10.515	0.015	N/E 50	15.176	0.002
	Natural/Built	N 81.2	39.297	0.000	N 97.1	30.118	0.000	N 75.8	8.758	0.003	N 79.4	11.765	0.001
	Enclosed/Open	E 63.4	7.218	0.007	E-O 50	0.000	<b>1.000</b>	E 54.5	0.273	<b>0.602</b>	E 64.7	2.941	0.086
10. SPACE	General	N/E 41.6	25.455	0.000	N/O 44.1	12.824	0.005	B/O 48.5	11.970	0.007	N/E 64.7	31.412	0.000
	Natural/Built	N 74.3	23.772	0.000	N 79.4	11.765	0.001	B 63.6	2.455	<b>0.117</b>	N 88.2	19.882	0.000
	Enclosed/Open	E 53.5	0.485	<b>0.486</b>	O 58.8	1.059	<b>0.303</b>	O 75.8	8.758	0.003	E 70.6	5.765	0.016
11. SPACE	General	N/E 40.6	33.614	0.000	N/O 67.7	33.059	0.000	N/O 51.5	6.545	0.038	N/E 58.8	10.647	0.005
	Natural/Built	N 77.2	29.950	0.000	N 91.2	23.059	0.000	N 84.8	16.030	0.000	N 85.3	16.941	0.000
	Enclosed/Open	O 54.5	0.802	<b>0.371</b>	O 67.6	4.235	0.040	O 66.7	3.667	<b>0.056</b>	E 58.8	1.059	<b>0.303</b>

### 3. Discussion and Conclusion:

The interaction of architectural space and personal space is shaped by societal forms. The architectural space a person inhabits assists in drawing the boundaries of the personal space belonging to the individual. Limiting elements psychologically relax people. Ruddel and Hammitt (1987) revealed that people chose bounded regions. Most users of hospital gardens like the feeling of enclosure (Kaplan & Kaplan, 1978; 1990). Appleton revealed that the most commonly chosen views provide a chance of refuge and are close to bounding elements. Users chose spaces where they can easily see without being seen and that are distant from disturbing sounds (Campbell, 1994).

Generally, selections with openness and enclosure provided by natural elements were chosen by users, while selections with openness and enclosure provided by built elements were not chosen. Patients chose enclosure for activities without movement, while openness or enclosure was not important for activities involving movement. Medical faculty students provided responses similar to patients, while landscape architects generally chose open spaces.

According to the study results, among the four different selections offered to users for each space, apart from the 4th space called the back porch, they chose the natural-enclosed selection for all activity areas. As the 4th space is only used by patients and the activities proposed for this space can be completed together indoors, patients did not feel a need for enclosure in this space. When the choices of the non-patient groups are examined, choices differed on a space basis and it was revealed that landscape architects, especially, chose the natural-open selection more frequently. While areas with high visual prospect provide a feeling of control to users, fenced and secluded areas provide users with a feeling of safety (Appleton, 1990). Aygün and Erçin (2021) emphasized that patients need to be able to control social interaction in hospitals and the need to protect the privacy of patients. Whitehouse (1999) revealed that patients were anxious, vulnerable and depressed by unprotected spaces where they did not feel safe. For this reason, patients chose the natural-enclosed selection for nearly every space. Landscape architects generally chose selections with high visual prospect. This situation emphasizes the reality that landscape architects need to design hospital gardens by noting the desires and needs of patients, not in line with their own wishes. There is much variety among users of hospital gardens. However, the most important aim when organizing these areas should be to positively contribute to treatment of patients, which requires that areas be created in accordance with the personal space boundaries of patients, rather than other users. Patients do not wish to spend time in spaces which are not suitable for their personal space boundaries (Barnhart et al., 1998) and it cannot be expected that this type of space will provide any benefit in terms of therapy when they do not feel safe within the space. Personal space plays an important role in creating a safety zone in social relationships.

Bounding elements psychologically relax people. Ruddel and Hammitt (1987) revealed that people chose restricted regions. Schizophrenia patients have larger interpersonal distance, in other words personal space, compared to other people (King & Dixon 1996; Nechamkin et al. 2003). Physical environment is an important concept assisting in protecting patients in both affective and physical terms from the larger environment. Clinical observations show that schizophrenia patients have a more damaged capacity to form relationships with their environment and people (Wallace, 1984). Experimental studies show that chronic schizophrenic patients establish a larger interpersonal distance from surroundings than normal individuals. Patients have personal space boundaries which are over the desired social distance (Penn et al., 2000; Semple et al., 1999) and display lower social skill performance compared to other people (Hoffmann et al., 1998; Jackson et al., 1989). The physical environment is an important concept which assists in protecting them in affective and physical terms from their environment and the results of these studies are in parallel to the results of our study. As



patients have expanded personal space, enclosure is an important criterion which assists in distancing them from fears felt in relation to their environment.

When the study results are assessed in two different categories of natural-built and enclosed-open, for the natural-built category, the natural selections were chosen by both patients and healthy groups for nearly all spaces. When assessed according to the enclosed-open category, patients generally chose the enclosed selection for all spaces, apart from the 4th space called the back porch.

In order to reveal whether the personal space choices of patient differed compared to other user groups, each user group was investigated on the basis of enclosed values desired on a space basis and the patient choices were researched for whether differences were present or not (Table 4).

Table 4. Enclosed values desired by users for each activity area for the proposed open area therapy unit.

Frontyard Spaces	Patient	Visitor	Lands. Arch.	Med. faculty stud.
1. SPACE (seating nearby pool)	Enclosed	Indifferent	Open	Enclosed
6. SPACE (entrance and main road)	Open	Open	Open	Open
8. SPACE (winter garden)	Enclosed	Indifferent	Open	Enclosed
9. SPACE (seating wall)	Enclosed	Indifferent	Open	Enclosed
10. SPACE (front porch)	Open	Open	Open	Enclosed
<b>Backyard Spaces</b>				
3. SPACE (open lawn area-seating steps)	Enclosed	Enclosed	Open	Open
4. SPACE (back porch)	Open	Open	Open	Open
5. SPACE (private seating corner)	Enclosed	Enclosed	Enclosed	Enclosed
7. SPACE (working garden)	Open	Open	Open	Open
<b>Front-back Spaces</b>				
2. SPACE (calmness corner)	Enclosed	Open	Open	Open
11. SPACE (walking path)	Open	Open	Open	Open

Enclosed
  Open
  Indifferent

According to the results, patients did not choose openness for any activity area. For all activities completed in groups (seating by pool, winter garden, seating wall, open lawn area and calmness corner), enclosed spaces were chosen. They did not pay attention to openness and enclosed criteria for the front and back porches where indoor activities are completed in an outdoor space. Patients did not pay attention to the enclosed criterion for activities involving movement at the entrance, working garden and walking path, and chose suitable environments for the activities completed in these spaces. For the 5th space, called the private seating corner, all users chose the enclosed selections as this space was proposed to be an area where patients could be alone and think. For other activity areas, user groups apart from patients generally did not pay attention to the openness or enclosed criteria and choices were generally not different. Apart from the private seating area (5th space), visitors chose enclosed spaces for the open lawn area (3rd space), while medical faculty students chose enclosed spaces for the seating by the pool (1st space) and front porch (10th space), with enclosure not desired for any of the other spaces. Landscape architects did not want enclosure for any space and chose open selections for the front and back porches (10th and 4th spaces) and the calmness corner (2nd space). Visitors reported they wanted open spaces for the proposed activities in the working garden (7th space) and the walking path (11th space). A study of a psychiatric hospital by Sommer (1969) observed that when another person sat next to a patient on a bench, the patient rose and moved to another bench. Again, Deus and Becig (2006) determined that schizophrenia patients had larger personal space boundaries than normal people and were uncomfortable and left the space when someone else entered their personal space in shared activity areas. Appleton (1990) revealed that most users chose

enclosed spaces instead of open spaces in the hospital environment using the 'visual prospect-visual refuge' theory. Mealey and Theis (1995) investigated association between people's landscape choices and moods using the 'visual prospect-visual refuge' theory and found that people with cheerful, optimistic and energetic mood were identified to choose with places with high visual prospect, while those who felt stressed and worn out were identified to surround themselves with places with high visual refuge. Patient choices focusing on more enclosed spaces and the changes linked to activity groups are similar to the results of this study.

Barnhart et al. (1998) revealed that both personnel and patients chose natural and open spaces for passive activities like watching the view and other users, while they chose natural enclosed spaces for active activities like walking alone or with others and chatting. Thus, there was a correlation between behaviour choices and space choices and the study emphasized that there were significant similarities between patient choices and personnel choices. Our study results show that the patient chose enclosure according to whether the patients are moving or still within that activity space and that there were differences according to the activities to be completed in the space. However, in our study, if patients were in a still position within the space, in other words not moving, they wanted the personal space boundaries to be enclosed in order to feel safe, while if patients are not still at a fixed point, in other words moving, then they did not attach much importance to the enclosed criterion.

A study by Ulrich (1999) revealed that enclosed and natural areas were chosen for chatting and privacy, while open and natural areas were chosen for meditation and perspective. Again, studies by Reizenstein and Gran (1981) revealed that users chose enclosure for seating areas in hospital gardens. According to the results of our study, enclosed and natural areas were chosen for chatting and seating areas.

In hospitals, patient and waiting rooms should be places with high visual prospect, and there should be easy perception of spaces in the garden and garden entrances from these areas; thus, it is proposed that multiple stimulations are provided and users will gain information about the garden (Appleton, 1996; Aygün & Erçin, 2021). In our study, for the front and back porches, considered to reflect the waiting rooms in the indoor space into the outdoors, patients did not attach importance to enclosed criterion due to visual prospect. Whitehouse (1999) proposed that healing gardens should have strongly protected, surrounded areas creating very little feeling of hazard, and also areas permitting broad views. In our study, patient choices displayed a similar tendency.

In conclusion, when user choices are investigated according to the natural category among the four different selections created for each space determined within the open space therapy unit for Ataköy Psychiatric Hospital, all user groups participating in the survey (patients and non-patients) liked the natural selections for all spaces when generally assessed. However, differences were revealed on the basis of space and activity in terms of enclosure. Purcell et al. (1994) investigated the relationship between space choices in hospital gardens and diverse behaviour and determined that behaviour affected space choices and participants chose natural choices in selections between natural and built scales. Larsen (1992) found that schizophrenia patients liked more complicated and enclosed environments compared to people without schizophrenia, while both groups preferred natural choices according to the natural criterion. Whitehouse (1999) reported that it was very important that hospital gardens provide users with enclosed, secluded and shaded areas and thus users can remain alone for a short time, and distance themselves from things they don't want to see. As a result of interviews with patients, Whitehouse (1999) determined that users chose natural elements to create enclosed spaces and thus could relax and be calm in these areas. For this reason, Whitehouse (1999) recommended the use of plants to create enclosure in these areas. Research about seating areas in hospital gardens determined that both shrub and tree selections were chosen more often compared

to selections using only one of these and the reason for this was that users felt safer within enclosed spaces (Carpman & Grant, 2016; Paine et al., 1998). It is important that elements creating enclosure have qualities supporting multiple sensory stimulation. Another study revealed that plants used to create enclosure being dense and diverse plant types positively contributed to area choices. This study revealed that users chose areas with dense plants instead of places with a few trees and did not want to be observed by the environment. They reported that in addition to plants creating enclosure, they provided beauty, colour and shade and additionally were a source of visual interest (Carpman & Grant, 2016; Reizenstein & Grant, 1981). These judgements support the results of this study.

**Funding:** The research leading to these results received funding from [Karadeniz Technical University Scientific Research Projects] under Grant Agreement No [2006.113.003.1].

**Conflicts of interest/competing interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Ethics approval:** Approval was obtained from the ethics committee of the Karadeniz Technical University Medical Ethics Committee [2006-22] and necessary permissions were obtained from Trabzon Health Directore.

**Acknowledgments:** This study was produced from the PhD thesis called 'Open Space Therapy Unit In Psychiatric Hospitals: A Case Study Of Ataköy Psychiatric Hospital' by CS under the supervision of MV.

#### REFERENCES:

- Akçayır M., & Akçayır, G. (2017). Advantages and challenges associated with augmented reality for education: A systematic review of the literature. *Educational Research Review*, 20, 1-11. <https://doi.org/10.1016/j.edurev.2016.11.002>
- Alp, A. V. (1993). An experimental study of aesthetic response to geometric configurations of architectural space. *Leonardo*, 26(2), 149-157. <https://doi.org/10.2307/1575901>
- Appleton J. (1990). *The symbolism of habitat: An interpretation of landscape in the arts*. London: University of Washington Press, p.114.
- Appleton, J. (1996). *The experience of landscape*. Revised edition, New York: John Wiley & Sons, p. 296.
- Aygün, A. H., & Erçin, Ç. (2021). Evaluation of hospital's emergency departments according to user requirements. *European Journal of Sustainable Development*, 10(1), 103-103. <https://doi.org/10.14207/ejsd.2021.v10n1p103>
- Barnhart, S. K., Perkins, N. H. & Fitzsimonds, J. (1998). Behaviour and outdoor setting preferences at a psychiatric hospital. *Landscape and Urban Planning*, 42(2-4), 147-156. [https://doi.org/10.1016/S0169-2046\(98\)00083-8](https://doi.org/10.1016/S0169-2046(98)00083-8)
- Bitter, G., & Corral, A. (2014). The pedagogical potential of augmented reality apps. *International Journal of Engineering Science Invention*, 3(10), 13-17.
- Bower, M., Howe, C., McCredie, N., Robinson, A., & Grover, D. (2014). Augmented reality in education—cases, places and potentials. *Educational Media International*, 51(1), 1-15. <https://doi.org/10.1080/09523987.2014.889400>



- Campbell, M. H. (1994). *An informational approach to preference of urban waterspaces*. Los Angeles, CA.
- Carpman, J. R. & Grant, M. A. (2016). *Design that cares: Planning health facilities for patients and visitors*. Third Edition, San Francisco: Jossey-Bass, Chapter 8, pp. 173-311.
- Clay, G. R., & Daniel, T. C. (2000). Scenic landscape assessment: The effects of land management jurisdiction on public perception of scenic beauty. *Landscape and Urban Planning*, 49(1–2), 1–13. [https://doi.org/10.1016/S0169-2046\(00\)00055-4](https://doi.org/10.1016/S0169-2046(00)00055-4)
- Deus, V., & Begic, N. J. (2006). Personal space in schizophrenic patients. *Psychiatria Danubina*, 18(3-4), 150-158, from [https://www.researchgate.net/profile/Natasa-Jokic-Begic/publication/6697189\\_Personal\\_space\\_in\\_schizophrenia\\_patients/links/54d5afd70cf25013d02b9db7/Personal-space-in-schizophrenia-patients.pdf](https://www.researchgate.net/profile/Natasa-Jokic-Begic/publication/6697189_Personal_space_in_schizophrenia_patients/links/54d5afd70cf25013d02b9db7/Personal-space-in-schizophrenia-patients.pdf)
- Gür, Ş. Ö. (1996). *Mekan örgütlenmesi*. Trabzon: Gür Yayıncılık, p. 280.
- Hoffmann, H., Kupper, Z., & Kunz, B. (1998). Predicting schizophrenic outpatients' behavior by symptomatology and social skills. *Journal of Nervous and Mental Diseases*, 186(4), 214-222. [https://journals.lww.com/jonmd/Fulltext/1998/04000/Predicting\\_Schizophrenic\\_Outpatients\\_\\_Behavior\\_by.3.aspx](https://journals.lww.com/jonmd/Fulltext/1998/04000/Predicting_Schizophrenic_Outpatients__Behavior_by.3.aspx)
- Hull, R. B., & Stewart, W. P. (1992). Validity of photo-based scenic beauty judgements. *Journal of Environmental Psychology*, 12(2), 101–114. [https://doi.org/10.1016/S0272-4944\(05\)80063-5](https://doi.org/10.1016/S0272-4944(05)80063-5)
- Jackson, H. J., Minas, I. H., Burgess, P. M., Joshua, S. D., Charisiou, J., & Campbell, I. M. (1989). Negative symptoms and social skills performance in schizophrenia, *Schizophrenia Research*, 2(6), 457-463. [https://doi.org/10.1016/0920-9964\(89\)90014-5](https://doi.org/10.1016/0920-9964(89)90014-5)
- Kaplan, S., & Kaplan, R. (1978). *Humanspace: environments for people*. Belmont: Duxbury Press, p. 480.
- Kaplan, R., & Kaplan, S. (1990). Restorative experience: the healing power of nearby nature. In M. Francis & R.T. Hester (Eds.), *The meanings of gardens: Idea, place, and action* (pp. 238-243). Cambridge: MIT Press.
- Kerr, J., & Lawson, G. (2020). Augmented reality in design education: landscape architecture studies as AR experience. *International Journal of Art & Design Education*, 39(1), 6-21. <https://doi.org/10.1111/jade.12227>
- King, S., & Dixon, M. J. (1996). The influence of expressed emotion, family dynamics, and symptom type on the social adjustment of schizophrenic young adults. *Archives of General Psychiatry*, 53(12), 1098- 1104. doi:10.1001/archpsyc.1996.01830120028007
- Larsen, L. (1992). *Nature as therapy: An assessment of schizophrenic patients' visual preferences for outdoor environments*. Master Thesis, University of Guelph, Canada.
- Liu, S., & Huang, G. (2020). The ventilation improvement assessment of sky gardens-a case study of hysan place. In IOP Conference Series: *Earth and Environmental Science*, 440(5), p. 052033. IOP Publishing. doi:10.1088/1755-1315/440/5/052033.

- Lotfi, Y. A., Refaat, M., El Attar, M., & Salam, A. A. (2020). Vertical gardens as a restorative tool in urban spaces of New Cairo. *Ain Shams Engineering Journal*, 11(3), 839-848. <https://doi.org/10.1016/j.asej.2019.12.004>
- Mealey, L., & Theis, P. (1995). The relationship between mood and preferences among natural landscapes: An evolutionary perspective. *Ethology and Sociobiology*, 16(3), 247-256. [https://doi.org/10.1016/0162-3095\(95\)00035-J](https://doi.org/10.1016/0162-3095(95)00035-J)
- Nasar, J., & Lin, Y. H. (2003). Evaluative responses to five kinds of water features, short communication. *Landscape Research*, 28(4), 441-450. <https://doi.org/10.1080/0142639032000150167>
- Nechamkin, Y., Salganik, I., Modai, I., & Ponizovsky, A.M. (2003). Interpersonal distance in schizophrenic patients: relationship to negative syndrome. *International Journal of Social Psychiatry*, 49(3), 166-174. <https://doi.org/10.1177/00207640030493002>
- Paine, R., Francis, C., Marcus, C.C., & Barnes, M. (1990). Hospital outdoor spaces. In C.C. Marcus, & C. Francis, (Eds.), *People places: Design guidelines for urban open spaces* (pp. 311-345), Second Edition, John Wiley & Sons: Canada.
- Palmer, J. F., & Hoffman, R. E. (2001). Rating reliability and representation validity in scenic landscape assessments. *Landscape and Urban Planning*, 54(1-4), 149-161. [https://doi.org/10.1016/S0169-2046\(01\)00133-5](https://doi.org/10.1016/S0169-2046(01)00133-5)
- Pasini, M., Berto, R., Brondino, M., Hall, R. & Ortner, C. (2014). How to measure the restorative quality of environments: The PRS-11. *Procedia-Social and Behavioral Sciences*, 159, 293-297. <https://doi.org/10.1016/j.sbspro.2014.12.375>
- Penn, D. L., Kohlmaier, J. R., & Corrigan, P. W. (2000). Interpersonal factors contributing to the stigma of schizophrenia: social skill, perceived attractiveness and symptoms. *Schizophrenia Research*, 45(1-2), 37-45. [https://doi.org/10.1016/S0920-9964\(99\)00213-3](https://doi.org/10.1016/S0920-9964(99)00213-3)
- Piga, B. E. (2017). Experiential simulation for urban design: from design thinking to final presentation. In B. E. A. Piga & R. Salerno (Eds.), *Urban Design and Representation* (pp. 23-36). Springer: Cham,
- Purcell, A., & Lamb, R. (1984). Landscape perception: an examination and empirical investigation of two central issues in the area. *Journal of Environmental Management*, 19(1), 31-63.
- Purcell, A. T., Lamb, R. J., Peron, E. M., & Falchero, S. (1994). Preference or preferences for landscape?. *Journal of Environmental Psychology*, 14(3), 195-209. [https://doi.org/10.1016/S0272-4944\(94\)80056-1](https://doi.org/10.1016/S0272-4944(94)80056-1)
- Reizenstein, J. E., & Grant, M. A. (1981). Patient and visitor preferences for outdoor courtyard design. Unpublished Research Report, Patient and Visitor Participation Project, Office of Hospital Planning, Research and Development, University of Michigan, Ann Arbor.
- Ruddell, E. J., & Hammitt, W. E. (1987). Prospect refuge theory: A psychological orientation for edge effect in recreation environments. *Journal of Leisure Research*, 19(4), 249-260. <https://doi.org/10.1080/00222216.1987.11969696>
- Sakıcı, Ç. (2009). *Open space therapy unit in psychiatric hospitals: A case study of Ataköy Psychiatric hospital*. PhD Thesis, Karadeniz Technical University, Trabzon, Turkey.

- Sakıcı, Ç., & Var, M. (2014). A visual perception effect assessment of some large and broad-leaved trees under different lighting arrangements. *Architectural Science Review*, 57(2), 139-146. <https://doi.org/10.1080/00038628.2013.840258>
- Semple, S. J., Petterson, T. L., Shaw, W. S., Grant, I., Moscona, S., & Jeste, D. V. (1999). Self-perceived interpersonal competence in older schizophrenia patients: The role of patient characteristics and psychosocial factors. *Acta Psychiatrica Scandinavica*, 100(2), 126-135. <https://doi.org/10.1111/j.1600-0447.1999.tb10833.x>
- Sommer, R. (1969). *Personal Space. The Behavioral Basis of Design*. New Jersey, p. 176.
- Suresh, K., Thomas, S. V., & Suresh, G. (2011). Design, data analysis and sampling techniques for clinical research. *Annals of Indian Academy of Neurology*, 14(4), 287-290. doi: 10.4103/0972-2327.91951
- Ulrich, R. S. (1999). Effects of gardens on health outcomes: Theory and research. In C. C. Marcus, & M. Barnes, (Eds.), *Healing gardens: Therapeutic benefits and design recommendation* (pp. 27-86). John Wiley & Sons: Canada.
- Torbati, H. E. (2018). The role of environmental graphic in the identification of urban public spaces. *Civil Engineering Journal*, 4(8), 1949-1954. doi: 10.28991/cej-03091129
- Uzunboylu, H., & Yıldız, E. P. (2016). Augmented reality research and applications in education. *New Trends and Issues Proceedings on Humanities and Social Sciences*, 11, 238-243. Available from: [www.prosoc.eu](http://www.prosoc.eu)
- Wallace, C. J. (1984). Community and interpersonal functioning in the course of schizophrenic disorders. *Schizophrenia Bulletin*, 10(2), 233-257. <https://doi.org/10.1093/schbul/10.2.233>
- Whitehouse, S. L. (1999). *Healing gardens and coping with stres at a children's hospital: A multimethod evaluation*. PhD Thesis, The University of Utah, Utah.
- Zhao, X. (2021). Application of 3D CAD in landscape architecture design and optimization of hierarchical details. *Computer-Aided Design & Applications*, 18(S1), 120-132.