



## The Impact of Covid-19 Pandemic on Outdoor Spaces Attached to Residential Units

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### Abstract

The COVID-19 pandemic-induced social distancing restrictions imposed in many cities of the world redefine common spatial behavior and everyday life. In this context, some of the current debate topics focus on the need for hybrid spaces in the urban fabric, while some concentrate on the necessity of the fragmentation of urban space. The motivation of this paper is to emphasize the potential of outdoor spaces as effective components of this duality. This study aims to reconceptualize the change of outdoor spaces by investigating their role and meaning during the pandemic. Depending on the conceptual framework developed by the criteria defining the relationship among outdoor spaces and social interaction, this paper clarifies how these spaces are perceived, evaluated and used by people. The new spatial behavior that has changed within the pandemic is investigated via selected study areas located in mixed-use and traditional residential settlements in Ankara, the capital of Turkey. The research data are obtained with the participation of 150 residents in total: a survey is conducted to 120 participants, and on-site observations and in-depth interviews are conducted to 30 participants. The results are digitized and represented with figures and schematic diagrams. The findings developed by qualitative and quantitative analyses contributed to the literature by revealing potential value regarding the intervention of outdoor spaces in the context of a holistic planning approach. This study can help determine what variables should be considered for future social interaction through outdoor spaces in the urban design framework.

**Keywords:** Ankara; COVID-19 pandemic; outdoor spaces; social distancing; spatial organization

### 1. INTRODUCTION

Coronavirus (COVID-19), identified in the literature with the first case detected in Wuhan, China on December 21, 2019, is an infectious disease that is considered in the pandemic class by the World Health Organization due to its rapid spread rate (World Health Organization, 2020). While various research for the treatment for COVID-19 is underway, some basic measures such as individual hygiene control, physical isolation and safe distance have been proposed to reduce its spread. These measures, changing daily life practices and urban space patterns on the other hand, have led researchers to re-think cities, urban areas, public spaces, building and environment design issues. Correspondingly, various academic studies on subjects in architecture and urban planning disciplines such as socio-spatial and psychological effects (Lima et al., 2020; Salama, 2020), changes of urban life practices and built environment (Ahsan, 2020; Dietz et al., 2020; Honey-Roses et al., 2020; Megahed & Ghoneim, 2020; Pinheiro & Luís, 2020), urban policies and pandemic management (Acuto, 2020; Lai et al., 2020), resilience cities and planning (Bereitschaft & Scheller, 2020; Takewaki, 2020) etc. have been produced. Additionally, a number of studies on COVID-19 have presented innovative urban research in the context of the open space and housing relationship. The prominent topics in these studies are neighborhood relations and outdoor spaces (Mehta, 2020), the role of built and



social environmental factors in transmission (Hu et al., 2021), recommendations for a healthy, safe, and sustainable housing design parameters (D'Alessandro et al., 2020), physical activities of users (Pombo et al., 2020), built environment and health relations (Amerio et al., 2020).

The underlined studies have been instrumental in questioning the changes of daily life practices with the focus of new concepts such as 'social distance' and 'new normal'. These concepts, which are closely related to the effects of the pandemic, especially in public life, have caused the transformation of urban open spaces. Such that closure of public parks and green spaces have restricted opportunities for healthy outdoor activity and stress relief. Nevertheless, there is not adequate number of research focusing on outdoor spaces and the changing environmental characteristics of different residential settlement types with regards to the usage-based transformations during the pandemic process. Indeed, the new understanding of daily life, which is based on the idea of isolation from large-scale and crowded areas in parallel with the COVID-19 restrictions, proposes the existence of a distant contact in social relations. However, people's desire for urban spaces that meet their socialization needs remains.

Due to this basic need, it has been determined that outdoor spaces attached to residential units where social interaction takes place in a relatively more sheltered and controllable manner has started to be intensively used. In this context, as a reflection of the adaptation to the pandemic, outdoor spaces in the immediate vicinity of residential areas have been redefined in line with the place-making activities carried out by most of the residents.

Therefore, the boundaries of this article have been drawn to make clear the effects of outdoor spaces on the physical, functional and social structures of the settlements by focusing on the usage-based transformations before and during the pandemic.

In the study, today's housing settlements and the daily life they create are examined through the spatial behavior and social relations of individuals in open spaces during the pandemic period. The spatial and behavioral observations made for this review are carried out by the authors based on existing literature and a comparative field study in Ankara. In the different types of settlements selected in the field study, the relations and organization of outdoor spaces with residences in their immediate vicinity are taken into account. Within the scope of the study, quality factors affecting outdoor use in residential settlements are questioned through on-site observations of residents' spatial behavior and semi-structured interviews designed within the framework of COVID-19.

## **2. LITERATURE REVIEW**

Open spaces one of the important layers of urban fabric, plays a central role not only in the formation of the physical environment but also in the community relations by encouraging a variety of activities. They gained great importance in the aftermath of the Second World War, when architectural production accelerated, and housing blocks were built without considering the context. During the rationalist planning process, cities were seen as immense collections of buildings placed tactically side by side under the approach of the sprawled settlement pattern. Accordingly, the missing links between objects and open spaces have been regarded as a reflection of the 'fragmented contemporary society' (Secchi, 1993). These neglected areas, which were defined as 'useless bits of ground left between streets and rigidly rectilinear buildings' (Curl & Wilson, 2015), emerged as the main problem within the framework of the housing needs after World War II (Alexander et al., 1977; Ginsburg, 1973; Jones & Canniffe, 2012; Trancik, 1986).

The present century we live in faces similar problems due to various planning approaches. As part of mass housing projects, high-rise buildings, which have gained momentum since the 1990s with the rapid urbanization, became one of the representative elements of



developed cities. The open spaces of these large-scale residential projects were areas that were rarely designed and tended to be leftover spaces (Can & Heath, 2016). Hanson (2000) defines their transformation into leftover spaces as 'ruptured interfaces' where the physical disconnection of buildings had changed the urban environment from 'all neighbors' to 'no neighbors' and draws attention to the impact of these spaces on social interaction. Significantly, the transformation of traditional urban fabric into modern residential developments consistently cause to neglect the relationship between buildings and outdoor space (Anderson, 1991; Schittich, 2004) as well as to weaken the relationship of buildings from the street according the reducing of the connectivity of streets (Can & Heath, 2016). Similarly, the negative trend in the livability of residential environments due to the increasing urban sprawl with globalization and environmental and socioeconomic threats has become one of the most important problems of today's rapidly developing cities.

Today, in addition to traditional housing projects, high-rise clustered housing types have gained momentum and formed mixed-use gated communities in cities. As a matter of fact, one of the essential factors in physical design and spatial organization of both residential environments, which enable the residents to get to know each other and to have social interaction, is outdoor spaces. As public open spaces, outdoor spaces of housing estates are interactive and social areas which are an extension of living spaces and a part of the house (Dillman & Dillman, 1987). Basically, the outdoor spaces of gated communities are limited to use by the residents. Therefore, it can be said that such spaces are private and shared only for residents. On the contrary, in settlements consisting of traditional housing blocks, outdoor spaces can be used by all users residing in the neighborhood and its immediate surroundings. From this viewpoint, they can be defined as semi-public spaces providing great opportunity for social encounters, interaction and recognition.

Accordingly, outdoor spaces of residential areas that facilitate social activities play a key role in establishing residents' sense of neighborliness with regard to the spontaneous encounters and potential interactions they provide (Abu-Ghazze, 1999; Al-Homoud & Tassinary, 2004; Farida, 2013; Fleming et al., 1985; Huang, 2006; Ramyar et al., 2019; Sanoff, 1971). As shown in Table 2.1, many researchers describe the criteria which affect social interaction in residential areas in terms of three general features such as physical design, functional factors, social similarity (Abu-Ghazze, 1999); physical elements, spatial arrangement, social variables (Farida, 2013). There are also researchers who dealt with physical and spatial arrangements under a single topic such as environmental variables (Sanoff, 1971); space enclosure (Al-Homoud & Tassinary, 2004) and physical factors (Ramyar et al., 2019).

**Table 2.1.** List of criteria defining the relationship between outdoor spaces and social interaction in residential environments

Theorist		Criteria					
<b>Sanoff, 1971</b>		<b>Environmental variables</b>	<table border="0"> <tr> <td><b>Demographic variables</b></td> <td><b>Attitudinal variables</b></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>▪ Socio-economic status</li> <li>▪ Length of residence</li> <li>▪ Household composition</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>▪ Casual neighboring</li> <li>▪ Social participation</li> <li>▪ Family solidarity</li> <li>▪ Leisure</li> <li>▪ Privacy</li> </ul> </td> </tr> </table>	<b>Demographic variables</b>	<b>Attitudinal variables</b>	<ul style="list-style-type: none"> <li>▪ Socio-economic status</li> <li>▪ Length of residence</li> <li>▪ Household composition</li> </ul>	<ul style="list-style-type: none"> <li>▪ Casual neighboring</li> <li>▪ Social participation</li> <li>▪ Family solidarity</li> <li>▪ Leisure</li> <li>▪ Privacy</li> </ul>
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<b>Abu-Ghazze, 1999</b>		<b>Physical design</b>	<b>Social similarity</b>				
Abu Nuseir, Jordan	<ul style="list-style-type: none"> <li>▪ Physical distance</li> <li>▪ The orientation of dwellings to one another through front, side, and back doors</li> </ul>	<ul style="list-style-type: none"> <li>▪ Community spaces,</li> <li>▪ activity sites</li> <li>▪ shared required paths</li> </ul>	<ul style="list-style-type: none"> <li>▪ Neighboring and social interaction</li> <li>▪ Sense of "we-ness"</li> </ul>				



	<ul style="list-style-type: none"> <li>▪ Location of service units such as garbage cans</li> <li>▪ The paths that residents follow for daily activities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ functional distances</li> </ul>	
<b>Al-Homoud &amp; Tassinary, 2004</b>	<b>Space enclosure</b>		<b>Social interaction</b>
College Station, Texas	<ul style="list-style-type: none"> <li>▪ Transitional spaces (entrances, front porches, front steps, front yards, paths, and driveways)</li> <li>▪ Territorial markers (modification, landscaping, decorating, fencing, and signs)</li> <li>▪ Architectural surfaces (walls, curtains, shutters, openings and overheads, and additional external walls and fences)</li> </ul>		<ul style="list-style-type: none"> <li>▪ Social support (Personal, Instrumental, Informational)</li> </ul>
			<b>Other variables</b>
			<ul style="list-style-type: none"> <li>▪ Demographic and socio-economic characteristics</li> <li>▪ Neighborhood and residential unit characteristics</li> <li>▪ The front outside space</li> </ul>
<b>Huang, 2006</b>	<b>Physical features</b>	<b>Space layout</b>	X
Taipei, Taiwan	<ul style="list-style-type: none"> <li>▪ Design elements</li> <li>▪ Provision of common access</li> <li>▪ Street furniture</li> <li>▪ Seats, objects, sculptures etc.</li> <li>▪ Provision of greenery</li> </ul>	<ul style="list-style-type: none"> <li>▪ Space types (seating, scenic, circulation, activity, vague spaces)</li> <li>▪ Common areas</li> <li>▪ Activity nodes</li> </ul>	X
<b>Farida, 2013</b>	<b>Physical elements</b>	<b>Spatial arrangement</b>	<b>Social variables</b>
Biskra, Algeria	<ul style="list-style-type: none"> <li>▪ Physical features (efficient design elements: interesting objects such as water scenery and seats, playgrounds with recreational facilities, provision of greenery)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Layout pattern</li> <li>▪ Site plan</li> <li>▪ Scale and proportion</li> <li>▪ Mixed land use</li> </ul>	<ul style="list-style-type: none"> <li>▪ Respondents' stage in the life cycle (including age, marital status, and presence of children at home)</li> <li>▪ Owner-renter status</li> <li>▪ Length of residence</li> <li>▪ Educational attainment</li> <li>▪ Annual income</li> </ul>
<b>Ramyar et al., 2019</b>	<b>Physical factors</b>		<b>Human Interaction Factors</b>
Tehran, Iran	<ul style="list-style-type: none"> <li>▪ Appearance and aesthetics</li> <li>▪ Nature and contact</li> <li>▪ Recreation and Leisure facilities</li> <li>▪ Environment design and layout</li> </ul>		<ul style="list-style-type: none"> <li>▪ Social interaction</li> <li>▪ Personal and individual factors</li> </ul>

As can be followed from the table, a large number of studies on residential areas suggest that there are significant relationships between the physical design of outdoor spaces and social interaction (Abass et al., 2019; Abu-Ghazze, 1999; Al-Homoud & Tassinary, 2004; Farida, 2013; Festinger, 1951; Huang, 2006; Patricios, 2002; Sanoff, 1971; Yancey, 1971). These include the elements such as 'spatial organization, functional distance, focal points, visual perception, casual contact centers, mobility' (Sanoff, 1971); 'physical distance, the orientation of dwellings to one another through front, side, and back doors, location of service units, the paths for everyday activities' (Abu-Ghazze, 1999); 'transitional spaces (entrances, front porches, front steps, front yards, paths, and driveways), territorial markers (modification, landscaping, decorating, fencing, and signs), architectural surfaces (walls, curtains, shutters, openings and overheads, and additional external walls and fences)' (Al-Homoud & Tassinary, 2004); 'design elements, provision of common access, street furniture, seats, objects, sculptures etc., provision of greenery' (Huang, 2006); 'design elements, objects such as water scenery and seats, playgrounds, provision of greenery' (Farida, 2013); 'appearance and aesthetics, nature and contact, recreation and leisure facilities, environment design and layout' (Ramyar et al., 2019). According to Gehl (2011), physical design that is desired to reach a qualified point with all these factors significantly affects the extent and character of outdoor activities. It should also be mentioned that the concepts of physical and functional distances which affect how individuals use outdoor spaces, are influential in the process of forming the social relations



in residential environment (Festinger, 1951; Gans, 1961; Sanoff, 1971; Abu-Ghazze, 1999; Can & Heath, 2016). In this sense, the less distance between residents, the greater number of paths residents are likely to share in spaces between buildings and public spaces, and the greater the probability of passive contacts (Abu-Ghazze, 1999). Similarly, social contacts are enhanced in a residential area when residents have opportunities for contact, live in close proximity to each other and have adequate spaces for interaction (Can & Heath, 2016). Increasing proximity through design increases repeated passive contacts between residents. Gans stated that (1961) as the social contacts continue repeatedly, residents begin to perceive each other's attitudes, values and interests, so that similarities and differences become apparent.

The functional features of outdoor spaces that affect the patterns of social contact among residents include various spatial form and organization models such as: 'community spaces, activity sites, shared required paths, functional distances' (Abu-Ghazze, 1999); 'neighborhood and residential unit characteristics, the front outside space' (Al-Homoud & Tassinary, 2004); 'space types (seating, scenic, circulation, activity, vague spaces), common areas, activity nodes' (Huang, 2006); 'layout pattern, site plan, scale and proportion, mixed land uses' (Farida, 2013).

The spatial arrangement of outdoor spaces for high-rise developments is important not only for legal and environmental considerations but also from the perspective of social concern (Huang, 2006). The layout plan of housing estates can contribute to the interaction among residents and eventually to the formation of social relationships (Farida, 2013). Well-planned outdoor spaces of these complexes can become effective activity nodes (Bechtel, 1977) that give opportunity residents' daily informal contacts.

In high-density residential neighborhoods where public spaces are inadequate, individuals tend to use the semi-private zones, i.e. 'soft edges', in which long duration activities occur, to be of great importance as a physical element to support life on the street. According to Gehl (1986), who considers the spatial quality of the front gardens, semi-private courtyards and porticos that are related to the street on the ground floors as the richness of urban life; doorsteps, niches on the facades, and interfaces of buildings are the soft edges of the city, which offer good opportunities for people of all ages to spend time together. In fact, these spaces that can be an extension of a building's interior space directly attached to the street such as courtyards, balconies, front outside spaces through forming the interface between the private and the public (Can & Heath, 2016).

The socio-demographic features of a residential environment, on the other hand, affect how neighbors interact with each other, and how they use shared outdoor spaces (Farida, 2013). These features, which depend particularly on demographic and socio-economic characteristics relevant with social interaction, include 'socio-economic status, length of residence, household composition, casual neighboring, social participation, family solidarity, leisure privacy' (Sanoff, 1971); 'neighboring, sense of we-ness' (Abu-Ghazze, 1999); social support (personal, instrumental, informational) (Al-Homoud & Tassinary, 2004); 'respondents' stage in the life cycle (including age, marital status, and presence of children at home), and owner-renter status, length of residence, educational attainment, annual income' (Farida, 2013).

Hence, in addition to being directly or indirectly related to the physical, spatial and social features, the factors related to the concepts of 'distance', 'proximity', 'contact', 'path', 'transitional spaces', and 'architectural surfaces' come to the fore in the relationship of the outdoor spaces with social interaction. During the pandemic process, though, this review has led us to read the relationship between outdoor spaces of the residential environments and the concepts of distance, contact and transition, which are similar definitions that become prominent in the new urban arrangements.



The prominent role and meaning of outdoor spaces in residential neighborhoods within the pandemic process and the list of criteria compiled on the relationship between social interaction and outdoor spaces form the theoretical framework of the study. In the article, the factors affecting social interaction in residential environments are examined in the study by dividing them into three basic types defined as 'physical features', 'functional features' and 'social features'.

### **3. METHODOLOGY**

The importance of outdoor spaces attached to residential units as places where private life can open to nature and prosperity, such as fresh air, natural light and community interaction, was not emphasized until COVID-19 reached its acute stage. However, in the unprecedented conditions of the pandemic, outdoor spaces in the immediate vicinity of the buildings that are directly related to the residential area, assumed a great responsibility to become a heartening living space: they revived as a living space to meet, share, communicate, play, listen and/or rest. Therefore, recent measures of social distancing, based on public health guidelines and imposed by governments' authorities, have turned them to a potential that is often used.

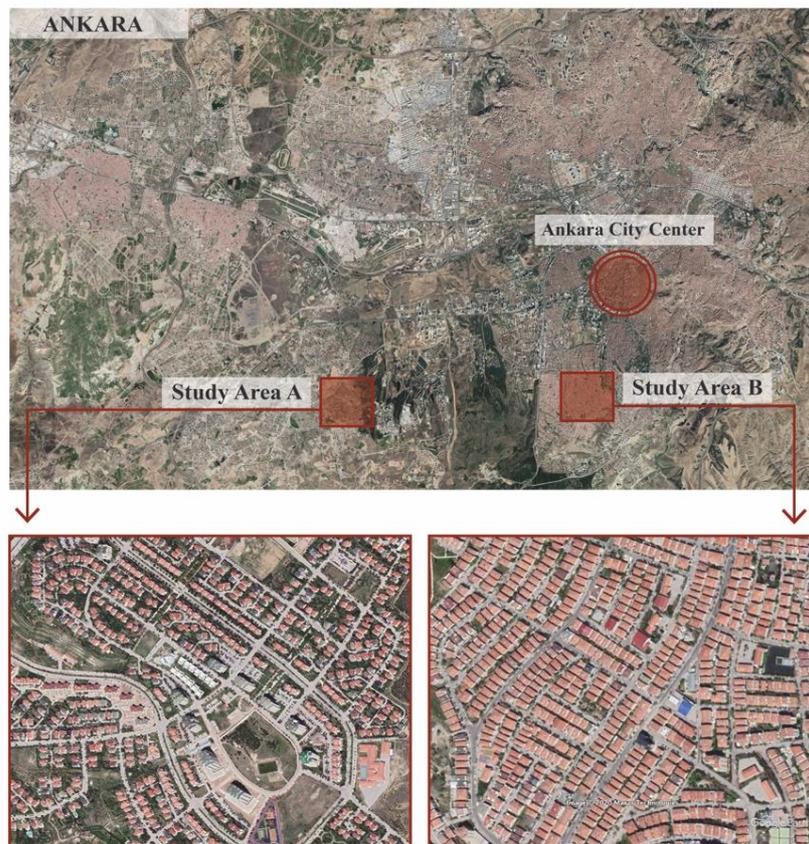
Starting from this, the research carried out within the scope of this article aims to embody the changing usage patterns of the outdoor spaces resulting from COVID-19. The study was conducted in the interval of June 1, 2020 (827 cases and 23 deaths) and September 30, 2020 (1391 cases and 65 deaths), when the impact of the pandemic was intensely experienced in Turkey (Republic of Turkey Ministry of Health, 2020). Although the effects of the pandemic can still be observed, its tectonic impacts on social life and urban fabric still remain uncertain. For this reason, a combination of qualitative and quantitative research methods was used for the framework of the article.

Within the scope of this methodology, a comprehensive literature research has firstly been conducted on outdoor spaces that are discussed under the titles of urban quality and social interaction in residential environments. The examinations made by the researchers who have made studies on the subject are presented in chronological order with the help of a holistic table (Table 2.1). With the help of this table, which is an important output of the literature study and enables the determination of various criteria, the properties of residential settlements and outdoor spaces were questioned in the context of their physical, functional and social potentials.

In order to illustrate this framework, two different settlement patterns from Turkey's capital Ankara were selected as case study areas (Figure 1). The first study area located in the southwest of Ankara is named Study Area A. Study Area A, where mostly upper and upper-middle income groups reside, is a gated-community hosting approximately 2000 households. Approximately half of the land allocated to this site, which has 35 m<sup>2</sup> green area per person, consists of residences, and the other half consists of semi-public areas including schools, sports areas, parks and greeneries. The second study area examined within the scope of the study was named Study Area B. Study Area B, located in the south of the city and showing an unplanned organic development, is located in an area attracting the attention of students and retirees. The area has a texture where mostly four or five-story apartment blocks are aligned side by side along the streets that define the parcels. Most of the apartments in the area have small open spaces including commercial units, sport facilities, and health uses on their front ground floors.

In the context of this dual case study, in which the layout pattern and ownership status were excluded from the scope, the potential value of outdoor spaces depending on COVID-19 was questioned through a detailed web-based questionnaire and in-depth interviews. The web-based questionnaire, which has three main sections on socio-demographic features, physical qualities and functional attributes, includes 28 questions in total. The

questionnaire was designed to gather information on the residents' perceptions on the adequacy and function of outdoor spaces for social interaction and filled out by a total of 120 volunteer residents: 60 from Study Area A and 60 from Study Area B. All of these data were collected from volunteer residents in the apartment blocks that were surrounded by open spaces. Further, face-to-face in-depth interviews were conducted with 30 residents who coincided with the place-making activity during the observations made in the study areas. The questions asked in this section are open-ended, based on understanding the purpose of use of outdoor spaces in the pandemic process and their contribution to social integration, as well as to identify problems and suggestions regarding these recent potential areas.



**Figure 1.** Study Area A and Study Area B from Ankara, Turkey (Source: Google Earth)

All the data obtained from this comparative research with the participation of a group of 150 residents in total were interpreted and digitized through tables and graphs with the help of the Likert Scale. The new usage patterns, changing roles and meanings of outdoor spaces attached to residential areas were further documented by photographs and schematic diagrams based on on-site examinations. In order not to disturb the residents during the indicated observation phase, Whyte's (1988) "obstructive direct observation technique" was used. In this way, it is aimed to identify the similarities and differences in the formation and use of outdoor spaces by comparing gated communities-based upon Study Area A and traditional residential areas-based upon Study Area B, during the COVID-19 pandemic.

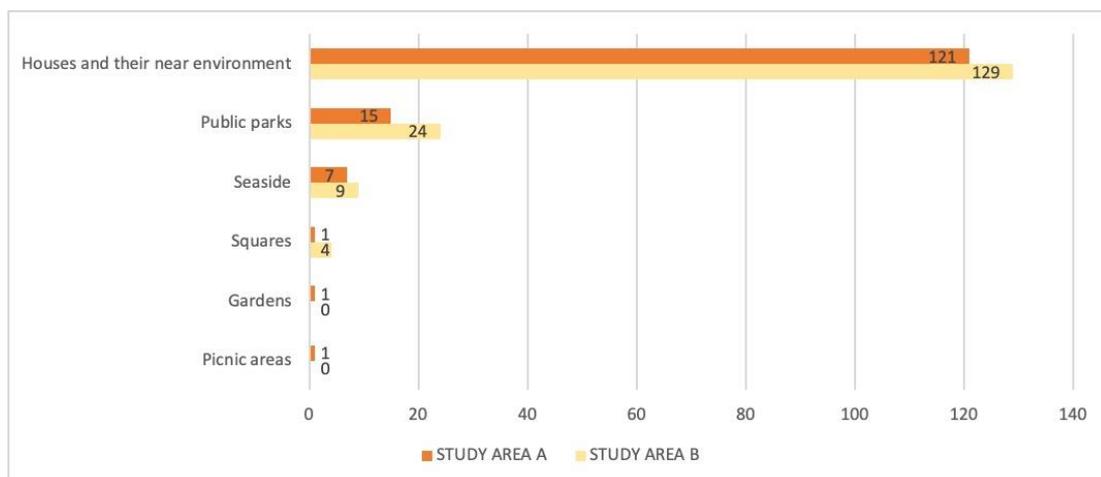
## 4. RESULTS

### 4.1 Survey Results

The web-based survey of the study, which was conducted with 38 (63%) female and 22 (37%) male in Study Area A and 37 (62%) female and 23 (38%) male in Study Area B, were first examined in terms of social features. In this context of the residents in Study Area A, 20 (34%) are 18-25 years old, 27 (45%) are 26-35 years old, 5 (8%) are 36-49 years old, 5 (8%) are 50-64 years old, 3 (5%) are over 65; while in Study Area B, 29 (48%) are 18-25 years old, 25 (42%) are 26-35 years old, 5 (8%) are 36-49 years old, 1 (2%) is over 65 years old. In Study Area A, of the residents, 14 (23%) have pre-university education, 3 (5%) are university students and 43 (72%) are university graduates. In Study Area B, of the residents, 15 (25%) have pre-university education, 8 (13%) are university students and 37 (62%) are university graduates.

In Study Area A, of the residents, 17 (28%) are unemployed, 3 (5%) are self-employed, 7 (12%) are civil servants, and 33 (55%) are private sector employees; while in Study Area B, of the residents, 24 (40%) are unemployed, 3 (5%) are self-employed, 15 (25%) are civil servants, and 18 (30%) are private sector employees. In addition to this, in Study Area A, among working residents, 25 (42%) are working from home (distance) and 18 (30%) are working at a workplace (face-to-face); while in Study Area B, of the residents, 20 (33%) are working from home (distance) and 16 (27%) are working at a workplace (face-to-face).

According to the home ownership status of these two settlements, in Study Area A, of the residents, 40 (67%) are owners, 20 (33%) are tenants; while in Study Area B, of the residents, 43 (72%) are owners, 17 (28%) are tenants. Of the residents of Study Area A, 12 (20%) have just moved in, 22 (37%) have been living there for 1-5 years, 8 (13%) have been living there for 6-9 years, and 13 (22%) for 10-19 years, 5 (8%) have been living there over 20 years; while of the residents of Study Area B, 1 (2%) have just moved in, 26 (43%) have been living there for 1-5 years, 8 (13%) have been living there for 6-9 years, and 15 (25%) for 10-19 years, 10 (17%) have been living there over 20 years. When residents' rate of getting to know their neighbors is questioned, of the residents of Study Area A, 5 (8%) know nobody, 35 (58%) know several, 7 (12%) know half of them, 7 (12%) most of them, 6 (10%) know all of them; while of the residents of Study Area B, 2 (3%) know nobody, 12 (20%) know several, 8 (14%) know half of them, 8 (14%) most of them, 30 (50%) know all of them.



**Figure 2.** Places where residents meet during the pandemic experienced in Study Area A and Study Area B (Source: Authors)

By confirming the rationale of the study, during the pandemic process, of the residents, 129 from Study Area A and 121 from Study Area B state that they have spent most of their time in the immediate vicinity of their houses: outdoor spaces attached to residential units instead of heavily used public parks, seaside, squares, gardens or picnic areas as before (Figure 2). In this context, outdoor spaces in both study areas are identified as streets, sidewalks, parking lots, green areas, back/front gardens and terraces adjacent to residences (Figure 3).

During the pandemic, the most common activity that takes place in these outdoor spaces is sports/exercise/walking by 36 residents in Study Area A, and chat/conversation by 35 residents in Study Area B. The rarest activity detected is work declared by 4 and 7 residents for both study areas, respectively. It is also found that, of the residents in Study Area A, 14 (23.3%) use these spaces every day, 29 (48.3%) use them weekdays, 7 (11.7%) use them weekends; while of the residents in Study Area B, 15 (25%) use these spaces every day, 26 (43.3%) use them weekdays, 18 (30%) use them weekends. Also, while 10 (16.7%) of the residents in Study Area A do not use these spaces, 1 (1.7%) of the residents in Study Area B does not. The time interval when these outdoor spaces are used extensively has been determined as 18.00-20.00 on weekdays and 14.00-18.00 on weekends for both study areas.



**Figure 3.** Use of outdoor spaces adjacent to parking lot, children's playground, sports area and green area; respectively (Source: Authors).

Following such results, it was aimed to compare the usage frequency of the residents living in both areas before and during the pandemic. Within this scope, for Study Area A, before the pandemic, terraces are determined as the least used contact spaces for 43 of the residents and doorsteps are determined as the most frequent contact space for 10 of the residents. Similarly, for Study Area B, terraces are determined as the least used contact spaces for 38 (63.3%) of the residents, and the front gardens of the building blocks are determined as the most frequent contact space for 14 (23.3%) of the residents. Whereas

during the pandemic, terraces are determined as the least used contact spaces for 47 (78.3%) of the residents of Study Area A, while in the front gardens of the building blocks are determined as the most frequently used contact spaces for 13 (21.7%) residents. According to the results of Study Area B, in a similar way, terraces are determined as the least used contact spaces for 44 (73.3%) and doorsteps are determined as the most frequent contact space for 10 (16.7%) residents. When the averages of the usage frequency of these outdoor spaces are compared for the uses before and during the pandemic, some of the apparent results are as follows. During the pandemic, it is observed that the usage of outdoor spaces increased by 12.9% and 24% in Study Area A and Study Area B, respectively. Especially, 7.2% increase was determined in the usage frequency of back/front gardens in both study areas (Figure 4).



**Figure 4.** Examples of the use of the back/front gardens in Study Area A and Study Area B, respectively (Source: Authors).

When the answers are evaluated with the five-point Likert Scale, which are given to the factors related to physical features of these outdoor spaces (Table 4.1), it is found that 24 (40%) of the residents in Study Area A find the location, quality and adequacy of service units in their residential environment excellent, while 3 (5%) find it fair. Of the residents, 26 (43.3%) find the design and management of pedestrian paths located in the immediate surroundings of their home excellent, 26 (43.3%) find the provision of their nearby greenery very good, 23 (38.3%) find the quality of urban furniture in their residential settlement very good. 22 (36.7%) of the residents in Study Area B find the location, quality and adequacy of service units of their residential environment very good, while 2 (3.3%) find it fair. Of the residents, 21 (35%) find the design and management of pedestrian paths located in the immediate surroundings of their home good, 22 (36.7%) find their nearby greenery very good, 20 (33.3%) find the quality of urban furniture in their residential settlement very good.

Looking at the average values of four selections in Study Area A results, as one of the physical features within the scope of space enclosure, it was observed that the average degree of transitional spaces is 4.03. The factor with the highest rating (4.15) is territorial markers and design elements in the residential settlement. On the contrary, it is seen that the least effective component, with an average rating of 3.58, is the quality of urban furniture for residents. When the average values from Study Area B are evaluated, it is determined that the average degree of transitional spaces is 3.4. The factor with the highest rating (3.86) is territorial markers and design elements in the residential settlement. In contrast, it is seen that the least effective component, with an average rating of 2.73, is the quality of urban furniture.



**Table 4.1.** Factors and rating related to 'physical features' of Study Area A and B

Subject	Poor		Fair		Good		Very Good		Excellent		Avg.	
	A	B	A	B	A	B	A	B	A	B	A	B
Location, quality and adequacy of service units (garbage cans, etc.) in or around residential environment	0% (0)	3.3% (2)	5% (3)	13.3% (8)	15% (9)	20% (12)	40% (24)	36.7% (22)	40% (24)	26.7% (16)	<b>4.15</b>	<b>3.86</b>
Pedestrian paths that residents follow for daily activities in the immediate surroundings of their home	1.7% (1)	5% (3)	10% (6)	16.7% (10)	15% (9)	35% (21)	30% (18)	20% (12)	43.3% (26)	23.3% (14)	<b>4.03</b>	<b>3.4</b>
Provision of greenery in the residential environment	0% (0)	15% (9)	5% (3)	16.7% (10)	16.7% (10)	21.7% (13)	43.3% (26)	36.7% (22)	35% (21)	10% (6)	<b>4.08</b>	<b>3.1</b>
Adequacy and quality of urban furniture (seats, sculptures etc.) in the residential settlement	8.3% (5)	21.7% (13)	6.7% (4)	20% (12)	25% (15)	23.3% (14)	38.3% (23)	33.3% (20)	22.7% (13)	1.7% (1)	<b>3.58</b>	<b>2.73</b>

In the web-based questionnaire, questions were also asked about the functional characteristics of the outdoor spaces in order to determine the contact priorities of the residents. In line with the answers to these questions, the reasons for the residents to prefer the outdoor spaces in which they come into contact with each other are determined as follows: spaces integrated with nature (a), controlled spaces where they can feel safe on a human scale (b), accessible spaces (c), visually scenic spaces (d), spaces suitable for use by all, isolated spaces accessible to a limited people (e), spaces with sufficient lighting (f), spaces where the quality and quantity of the living units are sufficient (h), clean and well-maintained spaces (i), spaces where surface coverings are suitable for different activities (k), spaces suitable for climatic conditions and have adequate amount of shading (l), quiet spaces (m), spaces close to activity areas (n) and spaces that allow mobility (o) (Table 4.2).

Looking at the average values among these options, in Study Area A, it is observed that the feature of the outdoor spaces being quiet and providing opportunities for mobility have the least ratings with 2.6 and 2.5; while in Study Area B, it is observed that outdoor spaces being close to activity areas and providing opportunities for mobility have the least ratings with 2.63 and 2.43. Whereas in both study areas, the feature of outdoor spaces to be integrated with nature, as well as being clean and well-maintained have the highest ratings, respectively, with 3.58 and 3.81 in Study Area A, with 3.83 and 3.95 in Study Area B (Figure 5). Therefore, the least rated features of the outdoor spaces in Study Areas A and B are spaces suitable for use by all and spaces that allow mobility, respectively; while the most rated features are spaces integrated with nature and clean and well-maintained spaces.

**Table 4.2.** The reasons of the residents' choice of the outdoor spaces they contact each other in the process of pandemic

	Study area	a	b	c	d	e	f	g	h	i	k	l	m	n	o
Strongly disagree	A	16, 7% (10)	16, 7% (10)	16, 7% (10)	15 % (9)	13, 3% (8)	18, 3% (11)	25 % (15)	16, 7% (10)	11, 7% (7)	20 % (12)	15 % (9)	11, 7% (7)	21, 7% (13)	23, 3% (14)
	B	15 % (9)	13, 3% (8)	15 % (9)	10 % (6)	16, 7% (10)	18, 3% (11)	25 % (15)	21, 7% (13)	10 % (6)	18, 3% (11)	18, 3% (11)	15 % (9)	20 % (12)	26, 7% (16)
Disagree	A	8,3 % (5)	6,7 % (4)	6,7 % (4)	11, 7% (7)	23, 3% (14)	8,3 % (5)	13, 3% (8)	13, 3% (8)	5% (3)	21, 7% (13)	10 % (6)	8,3 % (5)	15 % (9)	13, 3% (8)
	B	6,7 % (4)	6,7 % (4)	3,3 % (2)	23, 3% (14)	13, 3% (8)	13, 3% (8)	10 % (6)	11, 7% (7)	5% (3)	8,3 % (5)	3,3 % (2)	6,7 % (4)	13, 3% (8)	8,3 % (5)
Neither agree nor disagree	A	13, 3% (8)	11, 7% (7)	18, 3% (11)	28, 3% (17)	25 % (15)	25 % (15)	20 % (12)	21, 7% (13)	18, 3% (11)	35 % (21)	23, 3% (14)	30 % (18)	31, 7% (19)	21, 7% (13)
	B	10 % (6)	13, 3% (8)	6,7 % (4)	20 % (12)	15 % (9)	33, 3% (20)	21, 7% (13)	25, 3% (15)	13, 3% (8)	30 % (18)	16, 7% (10)	20 % (12)	25 % (15)	28, 3% (17)
Agree	A	23, 3% (14)	33, 3% (20)	38, 3% (23)	23, 3% (14)	18, 3% (11)	25 % (15)	20 % (12)	28, 3% (17)	20 % (12)	15 % (9)	30 % (18)	25 % (15)	23, 3% (14)	23, 3% (14)
	B	16, 7% (10)	40 % (24)	40 % (24)	23, 3% (14)	23, 3% (14)	26, 7% (16)	31, 7% (19)	26, 7% (16)	23, 3% (14)	30 % (18)	45 % (27)	33, 3% (20)	25 % (15)	18, 3% (11)
Strongly agree	A	38, 3% (23)	31, 7% (19)	20 % (12)	21, 7% (13)	20 % (12)	23, 3% (14)	21, 7% (13)	20 % (12)	45 % (27)	8,3 % (5)	21, 7% (13)	25 % (15)	8,3 % (5)	18, 3% (11)
	B	51, 7% (31)	26, 7% (16)	35 % (21)	23, 3% (14)	31, 7% (19)	8,3 % (5)	11, 7% (7)	15 % (9)	48, 3% (29)	13, 3% (8)	16, 7% (10)	25 % (15)	16, 7% (10)	18, 3% (11)
Avg	A	<b>3.58</b>	<b>3.56</b>	<b>3.38</b>	<b>3.25</b>	<b>3.08</b>	<b>3.26</b>	<b>3</b>	<b>3.21</b>	<b>3.81</b>	<b>2.7</b>	<b>3.3</b>	<b>2.6</b>	<b>2.81</b>	<b>2.5</b>
	B	<b>3.83</b>	<b>3.6</b>	<b>3.76</b>	<b>3.26</b>	<b>3.4</b>	<b>2.93</b>	<b>2.95</b>	<b>3.01</b>	<b>3.95</b>	<b>3.11</b>	<b>3.83</b>	<b>3.46</b>	<b>2.63</b>	<b>2.43</b>

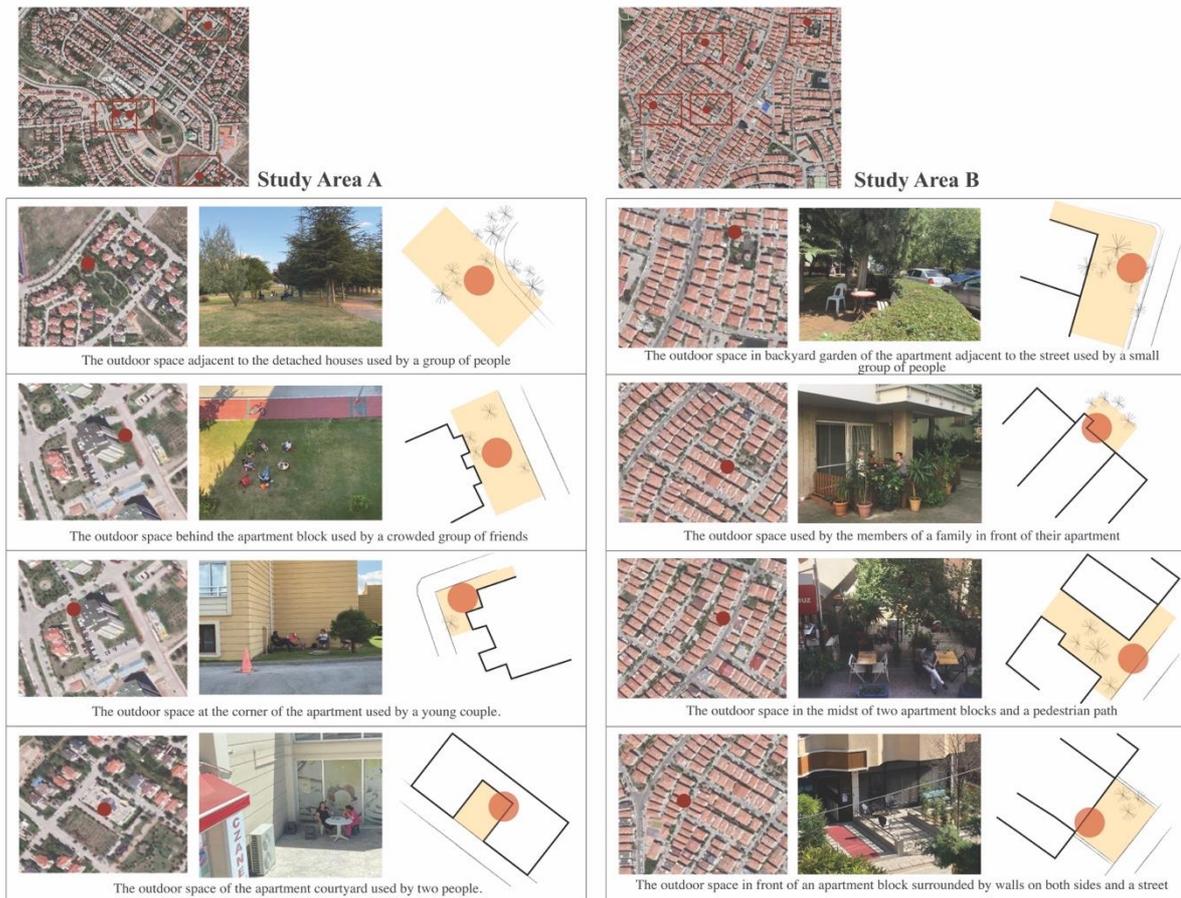


**Figure 5.** Examples of clean and well-maintained open spaces that integrate with nature in Study Area A and Study Area B (Source: Authors).

#### 4.2 In-depth Interviews

When the findings of the study are evaluated, it has been observed that the outdoor spaces chosen by the residents during the pandemic period have basic common spatial characteristics in both study areas (Figure 6). Within the scope of the on-site observations, it was seen that the residents are a part of 'place-making' with their personal furniture rather than any existing urban furniture in the study areas. In fact, of the residents in

Study Area A, 12 (75%) state the presence of urban furniture in the immediate surroundings of their residences, but 8 (52%) indicate that they have not used them during the pandemic, rather they have made their own place with personal belongings, especially due to hygiene risks. In Study Area B, of the residents, 7 (58%) state that there is urban furniture in their immediate surroundings, while 9 (60%) emphasize that they have used their personal belongings since the existing urban furniture is not sufficient and suitable for the social distance rules.



**Figure 6.** Examples of place-making activities in outdoor spaces observed in both study areas (Source: Authors)

In Study Area A, in response to the question of 'whether they want to live in a house other than the one they live in considering the pandemic conditions', 6 residents express their desire for a different residence and lifestyle, while 9 of them express their satisfaction with their own residences and their surroundings. Similarly, 8 residents express their need for more isolated areas. 2 residents who moved to Study Area A during the pandemic stated that the main reason behind their displacement was their desire to live in a more comfortable and safer place. In Study Area B, 9 residents express their desire for a different residence and lifestyle. One of these residents stated that he wanted to live in a higher quality apartment in the future and said, "We have a common garden, but I think it is not big enough. Especially the lack of activity areas during the pandemic condemned us to houses." 8 of the residents in Study Area B express their desire to live in a detached house with a garden; similarly, 4 residents mention that their settlement needs more green space and parking lots. A resident states that he would prefer to live in a detached house with a garden to be more isolated from other people around by saying "During the pandemic, the meaning of the balcony, garden, parking lot, so the outdoor and indoor spaces, changed completely." In addition to these, the majority of the residents underlined the insufficiency



of different functional spaces, clean and safe areas and lighting in and around their residences.

In order to identify the spatial deficiencies and needs felt during the pandemic process, a final question was asked to the residents about how they would like the immediate surroundings of their residences to be. 8 residents from Study Area A answer this question in line with the need to increase green areas and parks in residential areas. One of the residents expresses this need as follows: "The green areas in the community where I live are very good compared to the average, but still not enough. Considering the pandemic conditions in these areas, the number of people per square meter is very high." Other factors associated with pandemic conditions expressed by 9 residents of Study Area A are the need for alternative spaces and isolated activity paths. Further, 6 residents underline that they spend more time in and around their residences than before the pandemic and state that they need more recreation spaces around their residential settlements. Again in this context, 3 residents emphasize the need for the quantity and quality of the service units in their surroundings such as benches, lighting elements and garbage bins.

Answers to the same question given by residents of Study Area B concentrate more on the need for large open areas. Feeling safe in outdoor spaces come to the fore for 8 residents from Study Area B and 5 of them emphasized the lack of different activity areas such as sports and walking. In this direction, most residents state that they have difficulty in maintaining social distance due to the spatial arrangement of residences while performing their daily activities. 2 different residents made the following statements on this subject: "Our apartment blocks are very close to each other; living in an apartment with a functioning air circulation would be better." and "I think there is not enough green space around our apartment. The increase in green areas will positively affect human psychology. In times of crisis like COVID-19, isolated and quiet greeneries help to overcome the process much more easily".

## 5. CONCLUSION

While doing this study, it was witnessed that spatial behavior and daily life transformed in different ways due to COVID-19. With the pandemic where social distance has just become normal, there has been an increase in the trend towards small open spaces that can offer an alternative to large-scale public spaces where safe distance rules can be developed. This sharp change is an opportunity to put outdoor spaces attached to residential units among the contemporary discussions of urban planning.

In this article, the changing patterns of outdoor spaces have been questioned through mixed-use and traditional residential settlements. The results of the research show that the existing outdoor spaces especially in-between spaces such as entrance areas, front/back gardens close to residential units are used for a set of social, physical and functional needs of the residents in both study areas. The study further showed that outdoor spaces are not only social platforms for dialogue and negotiation with residents, but also urban components that provide isolation. It is clear that such findings will define outdoor spaces attached to residential areas as potential urban elements to be considered in the future.

When examined in detail, in terms of *social features*, despite the higher sense of *we-ness* in traditional residential settlements compared to mixed-use settlements in terms of getting to know neighbors, there is no big difference between the frequency of use of the outdoor spaces in both residential settlements. Similarly, looking at the average age of those who use outdoor spaces, it is seen that open spaces are used more frequently by the elderly group in both study areas. Additionally, it has been determined that contact with other residents is minimized in outdoor spaces of both mixed-use and traditional residential settlements. Correspondingly, the "flexibility", "adaptability" and "well-being"



features of outdoor spaces in social context offer residents a variety of uses. As can be followed from the results of the study, residents prefer to focus on a contactless new experience environment. Therefore, it can be concluded that outdoor spaces should be accessible and large enough to comfortably accommodate people and provide adequate privacy, security, and well-being to meet the daily activities and basic needs of residents. In terms of the *physical features* of both types of residential settlements, transitional spaces (especially entrances and front yards), territorial markers (landscaping and decorating) as well as the number and quality of urban furniture are prominent features during the pandemic. Although the majority of the residents stated that the distant contact areas were building blocks and doorways, the limited socialization time and inflexible spatial conditions led them to prefer back/front gardens where they could meet their social needs. Hence, the need for each building block to have its own green area comes to the fore in both settlements.

Regardless of the spatial differences in terms of functional characteristics of both settlements, it has been determined that social activities are preferred in well-maintained outdoor spaces integrated with nature instead of places that contain pedestrian mobility and close to activity areas during the pandemic. In the light of the results obtained, it is also noteworthy that despite the high level of security and control, people living in mixed-use residential areas spend much more time in outdoor spaces attached to their residences especially in their back/front gardens, compared to traditional settlements. A slight difference that can be stated in addition to these common qualities is that outdoor spaces, unlike planned recreational spaces, are threshold spaces for isolation needs of the residents of mixed-use settlements. On the other hand, for residents of traditional settlements, these areas have contributed positively to creating a social space and a relatively sheltered / controllable environment. From this point of view, it is possible to discuss outdoor spaces within the framework of the relationship between the integrated urban scale and the zoning approaches of modern housing environments. Instead of large-scale housing projects and public spaces that are fragmented in the urban texture, prioritizing the homogeneous arrangement of outdoor spaces needed in residential settlements can be considered as a liberating approach for the future of urban planning. Another crucial topic of discussion within the scope of the research is the low capacity of over-designed cities in the 21<sup>st</sup> century to adapt to crisis times. Before the pandemic, in the grip of privatization and globalization, appropriation types and place-making activities in outdoor spaces were a remarkable issue as an informal spatial behavior. However, now, the increasing number of examples of this behavior as a vital need demand a change of policy regarding permanent and complete design approaches in urban space.

Consequently, due to the limitations of the pandemic, it must be accepted that most studies are not completely finished and/or conclusive. While the outdoor space is an integral layer of urban fabric, the COVID-19 pandemic reminded us of its irreplaceable importance and timeless value. Hence, viewing the COVID-19 pandemic as an opportunity to think about and reevaluate the scale of residential environments, the organization of outdoor spaces and the patterns of activity that take place in them could prove critical for ensuring resilient cities. In this context, the new normal outcomes have a potential to lead to permanent changes and originate a new paradigm for the betterment of cities. In the next century, it is expected that a wide experience pool will be created for the disciplines of architecture and urbanism by carrying out important studies on dealing with intervention and infection risks. As a matter of fact experiences like these expected in the context of COVID-19 may lead to a richer perspective of the architectural planning culture, spatial requirements and place standards, participation, and public health by also creating opportunities to build a systematic questioning for urban policy. Although the pandemic will not last forever, it is clear that responses to the variables on outdoor spaces encountered today will shape our future built environment.



## REFERENCES

- Abass, Z. I., Andrews, F., & Tucker, R. (2019). Socializing in the suburbs: relationships between neighbourhood design and social interaction in low-density housing contexts. *Journal of Urban Design*, 25(1), 108–133. <https://doi.org/10.1080/13574809.2019.1592663>
- Abu-Ghazze, T. M. (1999). Housing Layout, Social Interaction, and The Place of Contact in Abu-Nuseir, Jordan. *Journal of Environmental Psychology*, 19(1), 41–73.
- Acuto, M. (2020). COVID-19: lessons for an urban (izing) world. *One Earth*, 2(4), 317–319. <https://doi.org/10.1016/j.oneear.2020.04.004>
- Ahsan, M. M. (2020). Strategic decisions on urban built environment to pandemics in Turkey: Lessons from COVID-19. *Journal of Urban Management*, 9(3), 281–285. <https://doi.org/https://doi.org/10.1016/j.jum.2020.07.001>
- Al-Homoud, M., & Tassinari, L. G. (2004). Social interactions at the neighborhood-level as a function of external space enclosure. *Journal of Architectural and Planning Research*, 21(1), 10–23.
- Alexander, C., Silverstein, M., & Ishikawa, S. (1977). *A pattern language: Towns, buildings, construction*. Oxford university press.
- Amerio, A., Brambilla, A., Morganti, A., Aguglia, A., Bianchi, D., Santi, F., Costantini, L., Odone, A., Costanza, A., Signorelli, C., Serafini, G., Amore, M., & Stefano, C. (2020). Covid-19 lockdown: Housing built environment's effects on mental health. *International Journal of Environmental Research and Public Health*, 17(16). <https://doi.org/10.3390/ijerph17165973>
- Anderson, S. (1991). *On streets: Based on a project of the Institute for architecture and urban studies* (4th ed.). MIT Press.
- Bechtel, R. B. (1977). *Enclosing Behavior*. Hutchinson & Ross.
- Bereitschaft, B., & Scheller, D. (2020). How Might the COVID-19 Pandemic Affect 21st Century Urban Design, Planning, and Development? *Urban Science*, 4(4), 56. <https://doi.org/https://doi.org/10.3390/urbansci4040056>
- Can, I., & Heath, T. (2016). In-between spaces and social interaction: a morphological analysis of Izmir using space syntax. *Journal of Housing and the Built Environment*, 31(1), 31–49.
- Curl, J. S., & Wilson, S. (2015). *The Oxford Dictionary of Architecture*. Oxford University Press.
- D'Alessandro, D., Gola, M., Appolloni, L., Dettori, M., Fara, G. M., Rebecchi, A., Settimo, G., & Capolongo, S. (2020). COVID-19 and Living space challenge. Well-being and Public Health recommendations for a healthy, safe, and sustainable housing. *Acta Bio Med*, 91(9), 61–75. <https://doi.org/https://doi.org/10.23750/abm.v91i9-S.10115>
- Dietz, L., Horve, P. F., Coil, D. A., Fretz, M., Eisen, J. A., & Wymelenberg, K. Van Den. (2020). 2019 Novel Coronavirus (COVID-19) Pandemic: Built Environment Considerations To Reduce Transmission. *American Society for Microbiology*, 5(2). <https://doi.org/10.1128/mSystems.00375-20>
- Dillman, J., & Dillman, D. (1987). Private outside space as a factor in housing acceptability. *Housing and Society*, 14(1), 20–29. <https://doi.org/10.1080/08882746.1987.11429989>
- Farida, N. (2013). Social interaction in communal outdoor spaces of residential housing estates in Biskra-Algeria. *International Journal of Environment, Ecology, Family and Urban Studies*, 3(1), 45–58.
- Festinger, L. (1951). Architecture and Group Membership. *Journal of Social Issues*, 7(1–2), 152–163.
- Fleming, R., Baum, A., & Singer, J. E. (1985). Social support and the physical environment. In S. Cohen & S. L. Syme (Eds.), *Social Support and Health* (pp. 327–345). Academic Press.
- Gans, H. J. (1961). Planning and Social Life: Friendship and Neighbor Relations in Suburban Communities. *Journal of the American Institute of Planners*, 27(2),



- 134–140. <https://doi.org/10.1080/01944366108978443>
- Gehl, J. (2011). *Life between buildings: using public space*. Island Press.
- Ginsburg, L. (1973). Summing Up. *Architectural Review*, 154(920), 263–265.
- Hanson, J. (2000). Urban transformations: a history of design ideas. *Urban Design International*, 5(2), 97–122.
- Honey-Roses, J., Anguelovski, I., Bohigas, J., Chireh, V., Daher, C., Konijnendijk, C., Litt, J., Mawani, V., Mike McCall, Orellana, A., Oscilowicz, E., Sánchez, U., Senbel, M., Tan, X., Villagomez, E., Zapata, O., & Nieuwenhuijsen, M. (2020). The Impact of COVID-19 on Public Space: A Review of the Emerging Questions. *OSF Preprints*. <https://doi.org/https://doi.org/10.31219/osf.io/rf7xa>
- Hu, M., Roberts, J. D., Azevedo, G. P., & Milner, D. (2021). The role of built and social environmental factors in Covid-19 transmission: A look at America's capital city. *Sustainable Cities and Society*, 65. <https://doi.org/https://doi.org/10.1016/j.scs.2020.102580>
- Huang, S.-C. L. (2006). A study of outdoor interactional spaces in high-rise housing. *Landscape and Urban Planning*, 78, 193–204. <https://doi.org/10.1016/j.landurbplan.2005.07.008>
- Jones, P. B., & Canniffe, E. (2012). *Modern Architecture Through Case Studies 1945 to 1990*. Routledge.
- Lai, K. Y., Webster, C., Kumari, S., & Sarkar, C. (2020). The nature of cities and the Covid-19 pandemic. *Current Opinion in Environmental Sustainability*, 46, 27–31. <https://doi.org/https://doi.org/10.1016/j.cosust.2020.08.008>
- Lima, C. K. T., Carvalho, P. M. de M., Lima, I. de A. A. S., Nunes, J. V. A. de O., Saraiva, J. S., Souza, R. I. de, Silva, C. G. L. da, & Neto, M. L. R. (2020). The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). *Psychiatry Research*, 287. <https://doi.org/https://doi.org/10.1016/j.psychres.2020.112915>
- Megahed, N. A., & Ghoneim, E. M. (2020). Antivirus-built environment: Lessons learned from Covid-19 pandemic. *Sustainable Cities and Society*, 61. <https://doi.org/https://doi.org/10.1016/j.scs.2020.102350>
- Mehta, V. (2020). The new proxemics: COVID-19, social distancing, and sociable space. *Journal of Urban Design*, 25(6), 669–674. <https://doi.org/10.1080/13574809.2020.1785283>
- Patricios, N. N. (2002). The neighborhood concept: A retrospective of physical design and social interaction. *Journal of Architectural and Planning Research*, 19(1), 70–90.
- Pinheiro, M. D., & Luís, N. C. (2020). COVID-19 Could Leverage a Sustainable Built Environment. *Sustainability*, 14. <https://doi.org/https://doi.org/10.3390/su12145863>
- Pombo, A., Luz, C., Rodrigues, L. P., Ferreira, C., & Cordovil, R. (2020). Correlates of children's physical activity during the COVID-19 confinement in Portugal. *Public Health*, 189, 14–19.
- Ramyar, R., Hayati, Z., Saeedi, S., & Taj, M. M. (2019). Evidence of Poor Environments in Shared Outdoor Spaces of Residential Complexes in Iran. *Pol. J. Environ. Stud.*, 28(3), 1335–1345.
- Salama, A. M. (2020). Coronavirus questions that will not go away: Interrogating urban and socio-spatial implications of COVID-19 measures. *Emerald Open Research*, 2(14), 1–12. <https://doi.org/10.35241/emeraldopenres.13561.1>
- Sanoff, H. (1971). The Social Implications of Residential Environments. *International Journal of Environmental Studies*, 2(1–4), 13–19. <https://doi.org/10.1080/00207237108709439>
- Schittich, C. (2004). *High-density housing: Concepts, planning, construction*. Birkhäuser: München.
- Secchi, B. (1993). Un'urbanistica di spazi aperti. *Casabella*, 597–598, 5–9.
- Takewaki, I. (2020). New Architectural Viewpoint for Enhancing Society's Resilience for Multiple Risks Including Emerging COVID-19. *Front. Built Environ.*, 6(143). <https://doi.org/https://doi.org/10.3389/fbuil.2020.00143>



- Trancik, R. (1986). *Finding Lost Space: Theories of urban design*. John Wiley & Sons.
- Whyte, W. H. (1988). *City: Rediscovering the City*. New York: Doubleday.
- World Health Organization. (2020). *WHO: Rolling Updates on Coronavirus Disease (COVID-19)*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>.
- Yancey, W. L. (1971). Architecture, interaction, and social control: The case of a large-scale public housing project. *Environment and Behavior*, 3(1), 3–21.