

Being a Child on a Car Free Island: Exploring Independent Mobility and Children's Perception in Büyükada-Istanbul

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Abstract

This study aims to discover the mobility of children in a car-free area to understand the effects of freedom of mobility on perception of space. Büyükada Island in Istanbul defines a unique alternative due to its car-free living environment and offers a significant potential in terms of creating a child-friendly environment and freedom of movement. Within this scope, "mind mapping" methodology used for exploring children's spatial perceptions and freedom of mobility through drawings and written expressions of 20 students of 10-years old, living and studying at Büyükada. This paper discusses the findings of a field study regarding active and independent mobility patterns and explores children's perception of space in a car-free settlement which can be promising for developing policies for a child-friendly urban future.

Keywords: child friendly cities, child perception, independent mobility, mind mapping.

Introduction

In today's cities, transportation is developing with the motor vehicle-oriented approach, and traffic problems and their effects are addressed as an important field of study by different disciplines. The problem of the pressure that fossil fuel-using motor vehicle traffic puts on the environment and citizens becomes even more important when it comes to children, preventing their safe and free movement and weakening their relationship with the city. Cities where motor vehicles and highways are dense and dominant are increasing, and the areas where children can walk safely, play, and experience the city freely are decreasing day by day. However, it is noteworthy that within the scope of urban transportation policies and plans, there are few studies on children's access and rights to sustainable transportation, which gives priority to sustainable transportation modes such as pedestrian, bicycle and public transportation (Gilbert et al., 2018). Whereas settlements that children can move safely and freely are important for the healthy development of children who will be adult urban residents of the future.

Studies in the literature show that increased motor vehicle traffic reduces children's physical activities and games (Mindell & Karlsen, 2012), reduces their access to parks and playgrounds (Veitch, Salmon and Ball, 2007), and restricts their free mobility (Collins and Kearns, 2001; Haikkola et al., 2007; Tranter and Doyle, 1996) and weakens the perception of space (Appleyard, 2022; Mitchell, Kearns and Collins, 2007; Rissotto and Tonucci, 2002). As children's opportunities for active movement such as walking and cycling decrease, their free mobility also decreases, and this negatively affects both their physical, mental, and social development (Villanueva et al., 2014). Studies show that parents also restrict their children's independent mobility due to concerns about traffic safety (Björklid and Nordström, 2007; Chandwania and Natu, 2022; Tranter and Doyle, 1996; Villanueva et al., 2014; Wales, Martensson and Jansson, 2021), prefer motor vehicular instead of active transportation for home-school journeys (Appleyard, 2022; Collins and Kearns, 2001; Mitchell, Kearns and Collins, 2007), or cause children to be accompanied by an adult (Collins and Kearns, 2001; Kytä, 2004).

The Child Friendly Cities (UNICEF, 2024a) approach, based on the Convention on the Rights of the Child (UNICEF, 2024b) declared by UNICEF in 1989, is defined as 'cities and communities where children feel safe, have their voices heard and can benefit from social services'. Based on this definition, one of the main goals is to create urban environments where children feel safe, where there is no traffic safety or pressure, and where children can move safely and alone on the streets (Riggio, 2002). At this point, supporting the active and independent mobility of children in their daily lives, making cities car-free, reducing and slowing down traffic in cities, and expanding sustainable and active transportation types are considered to be one of the important steps in creating child-friendly environments (Gilbert et al., 2018; Jansson et al., 2022; Karsten and van Vliet, 2006; Tranter and Doyle, 1996). As Chawla stated, walking and cycling, which are sustainable and active modes of transportation, are also child-friendly modes of transportation (Chawla, 2002). Walking and cycling are also the most basic and independent forms of mobility that children can do on their own. On the other hand, while car-dominated transportation systems contradict the Convention on the Rights of the Child because they restrict the mobility of children, active transportation types such as pedestrian transportation and bicycle transportation support the child rights-based transportation system (Gilbert et al., 2018).

Children's independent mobility, or freedom of mobility, is one of the most important components of child-friendly cities. (Freeman and Tranter, 2011; Global Designing Cities Initiative, 2022; Haider, 2007; Kytä, 2004). This concept is defined as the ability of children to move and play freely and on their own in the environment they live in, without being accompanied or observed by any adult (Hillman, Adams and Whitelegg, 1990; Tranter and Whitelegg, 1994; Wales, Martensson and Jansson, 2021). In their independent mobility, the activities that children perform with their peers or friends are also considered in the independent category (Mikkelsen and Christensen, 2009). Children's independent mobility and therefore their physical-social health are closely related to the environment in which they grow up (Björklid and Nordström, 2007), and are shaped by the existence of environmental opportunities and their ability to access these opportunities independently (Broberg, Kytä and Fagerholm, 2013; Kytä, 2003, 2004). Research shows that the independent mobility of children is decreasing all over the world (Johansson et al., 2020; Wales, Martensson and Jansson, 2021), in this context, it is accepted that vehicle-dense cities are one of the important problems in terms of the independent mobility of children.

There are physical and social benefits of increasing children's active mobility in cities (Carver et al., 2013; Fagerholm and Broberg, 2011; Kytä, 2004; Maiss and Handy, 2011; Villanueva et al., 2014; Wales, Martensson and Jansson, 2021). Active and independent mobility of children can be supported by reducing traffic and increasing walkability (Bourke, 2017; Carroll et al., 2015; Kaplan, Nielsen and Prato, 2016; Prezza, 2007; Villanueva et al., 2014). Independent mobility can contribute to children's development (Mikkelsen and Christensen, 2009), may decrease health problems such as obesity (Mackett et al., 2007), and improve environmental perceptions (Appleyard, 2022; Björklid and Nordström, 2007; Carroll et al., 2015; Mitchell, Kearns and Collins, 2007). There are also studies showing that the sense of social belonging and social bonds may increase (Bourke, 2017; Carver et al., 2013) and social relations may improve (Pacilli et al., 2013). In addition, by reducing vehicle traffic, speed and density, it becomes possible for children to travel with active modes of transportation (Kaplan, Nielsen and Prato, 2016) and thus a child-friendly environment can be created (Gilbert et al., 2018; Tranter and Doyle, 1996), free mobility may increase (Carroll et al., 2015; Whitzman, Worthington and Mizrachi, 2009), and the opportunity to play games in car-free areas may increase (Njeru, 2022). These studies reveal the benefits of car-free settlements in terms of both the physical and mental development and health of children. Considering all these benefits, it is very important to investigate the opportunities that enable/restrict children to freely explore the environments and neighbourhoods in which they live and to act independently (Veitch, Salmon and Ball, 2007) and to produce policies and plans that give priority to children (Carroll et al., 2015).

Considering that urbanized areas are increasing in the world and motor vehicles dominate urban transportation, it is important to explore the opportunities car-free settlements. Studying the mobility and space perception of children living in a non-motorized environment, which the studies in the literature are idealizing, would provide important clues. Within this scope, the purpose of the study is to discover the mobility of children in a car-free area and to understand the effects of freedom of mobility on perception of space. For this purpose, a car-free island from Istanbul, Büyükkada Island, has been chosen for the case study. It is aimed to reveal through which spaces children living in Büyükkada perceive and give meaning to their living spaces by producing mind maps through a workshop to be held with children. Thus, by identifying children's routes in Büyükkada and the areas they use, it will enable questioning the relationships between space

perception and mobility. As part of the case study, spatial components of children's perception about the place they live in and the relation with their mobility types were determined by mind maps with 20 students of 9–10-years old residents of Büyükada Island.

Methodology

As the methodology, “mind mapping” used for exploring children's free mobility experience through drawings and written expressions. Field work was carried out with 20 students of 9–10-years-, living on the Island and studying at Büyükada Primary School. According to Piaget, a child in this period can think logically and process information in his/her mind schematically depending on his/her senses, movements, and intuitions. During this period, children can draw what they perceive about the environment in an abstract way and transfer the routes they know (Appleyard, 2017). Since children's physical and mental development reaches the level where they can perceive the city and act independently at this age, working with children of this age group will ensure that their contributions are at the highest level.

On the other hand, in the curriculum determined by the Ministry of National Education of Türkiye, environmental literacy, perception of change and continuity, map literacy, location analysis and spatial perception, which are among the basic skills that the Social Studies course aims to provide, are included in the 4th grade curriculum. In the 4th grade curriculum, the Learning Area “People, Places and Environments” aims to give students an awareness of human-environment interaction, to establish the cause-and-effect relationships of interaction and to gain an individual or social perspective for the future. It is aimed to provide students with the skills of research, environmental literacy, perception of change and continuity, observation, map literacy and spatial perception with an approach that opens from simple to complex, from near to far and from the location to the environment.

As a beginning of the study, observations were made on the school street while students leave the building after class hours to better understand the mobility behaviours of the children. The individual and group behaviours of the children were noted by observing the streets and routes that the students mostly used after school. Observations supported by shadowing method (Gehl and Svarre, 2013) for identifying the behaviour patterns during their journeys.

For the first phase of the in-class study, individual mind maps were prepared by children to explore the individual perception of space. Children were asked individually to draw and write the island they experienced on a blank sheet of paper. Then in the second phase, collective maps were produced in groups of 2-3 people to determine the general perception about the Büyükada. Children were asked to make markings on a ready-made map, and their verbal transmissions were recorded at the same time. University students studying in the City and Regional Planning Department of Mimar Sinan Fine Arts University accompanied the groups to avoid problems in map reading and prevent this from being an obstacle for the study.

The maps prepared with the children reveal the spaces through children's experience and perception about the Büyükada. The details of the drawings and verbal expressions with the identification of the activity areas related to mobility patterns helped to determine the level of

children's perception about the environment they live in. The prevalence of spaces used by children on the island reveals children's emotional, spatial, or functional related motivations for using and limiting space in a settlement without motorized vehicles pressure.

Büyükada: A car-free district of Istanbul

With its 16 million residents, Istanbul is the most crowded city of Türkiye (TÜİK, 2023). The metropolitan area is shaped by a variety of urban typologies from different historical periods, diverse lifestyles, and heavy traffic load of transportation. Experiencing the Istanbul metropolitan area as a child has difficulties, such as lack of accessibility to amenities, dependency on vehicle urban mobility, large scale physical environment challenging for cognitive mapping. On the contrary, the Büyükada Island in the Sea of Marmara defines a unique alternative due to its low-density urbanization, accessible services, strong urban identity, and car-free transportation. As the largest island district of Istanbul Metropolitan area, the Büyükada, which have managed to preserve the culture of car-free living, and offers a great potential for children and adults, in terms of creating a child-friendly environment and freedom of movement. Since the 19th century, transportation has been provided by horse-drawn carriages and phaetons. Motorized vehicles are only used for public services such as fire brigades, ambulances, and garbage collection. The increase in the number of individual electric vehicles over the last 10 years has brought a different dynamism to on-island mobility. In 2022 the municipality banned horse-drawn carriages, since public transportation was provided by electric shuttles and electric cards. As a result of this heritage residents and even visitors of the islands have this non-motorized and pedestrian dominant awareness as mind setting.

In contrast to the increasing motorized vehicle-oriented development of the Istanbul metropolis since the 1980s, the Princes' Islands are only car-free areas in Türkiye. Büyükada, the largest of the islands, is a settlement where private motor vehicle ownership doesn't exist, transportation is provided by pedestrians, bicycles, electric bicycles, and electric shuttles. The winter population is higher than on the other 3 islands, and offers functional diversity at different levels in terms of education, health, culture, etc. Therefore, Büyükada has significant advantages over Istanbul in terms of creating a child and youth friendly environment and freedom of movement. The Büyükada is a small settlement with a population of 8586 according to 2022 statistics (Adalar Municipality, 2023). According to the 2020 household survey results, 19% of the population living in the Büyükada have battery-powered vehicles or electric bicycles, 17% have bicycles and 52% do not own any vehicle (IBB İPA Statistics Office, 2020). According to the same study, the majority of trips to the islands are made by active transportation modes such as walking and cycling. Children make their school journeys in the Büyükada without a vehicle, and for home-school journeys within the island or to the mainland, pedestrian and ferry options are the highest with 35.7% each, while private vehicles account for 0.9% (IBB İPA Statistics Office, 2020). Therefore, the Büyükada, where there are no private cars, active transportation modes are common, and children go to school on foot, was selected as the study area.

Exploring Children's Island Perceptions, Mobility Behaviours and Activity Spaces

To explore children's perception of the Island and mobility patterns, a field study was conducted with 20 children. The study group consisted of 10 female and 10 male students residing in the Büyükkada. While 12 of the children live in the centre of the Island where commercial facilities and services concentrated among dense urban patterns, 8 of them live on the periphery with lower building density and a more dominant natural environment. The primary school is located in the centre of the settlement and within walking distance of the pier, the market area and most of the residential areas.



Figure 1: Mind Mapping study and drawings of children



Figure 2: Walking routes and activity spaces of children from mind maps and collective maps.

The in-class activity conducted with the students within the research's scope is a two-stage mapping exercise. In the first phase, mind mapping, children were asked to draw and describe the Büyükada on a blank paper. As a hint, they were told to describe their favourite places, streets, home, or school surroundings of the Büyükada to someone who did not know the island. At this stage, it was aimed to determine children's perceptions of location, spatial relations, scale, and spatial details. In the second phase students worked on collective maps, and asked to mark their favourite, least favourite and most frequently visited places on a map showing the current state of the settlement, and to draw the routes of the places they visited. Finding from the mapping exercises with children provided insights about **the general set up and perception of space, mobility patterns and spaces, functions and activities, spaces for play and relationships with the natural environment.**

In terms of **general set up and perception of the space**, the areas where children live, play and use are spread over various parts of the island, and therefore their perception of space covers a wide area. 15 out of 20 children referred to their own home and its close surroundings when defining their living environment on individual mind maps. They defined other spaces by associating them with their location in relation to the house and axes of connection. 3 students chose to draw a single favourite spot (the restaurant in Dilburnu (Dil cape) and its flowery entrance; an old mansion and its garden, which she found peaceful) or a situation (a family picture among their favourite buildings). In each case, the drawings contain spatial references and details.

17 children who preferred to describe their living environment by drawing a map used their own house (89%), the school (65%), the hospital adjacent to the school (53%), and other houses (70%) as main references while describing their physical environment. While the rate of drawing the houses of classmates, neighbours or relatives was 53% in individual mind maps, in all collective island maps, the houses of relatives and friends were marked in addition to their own houses.

In the collective mapping study, students marked the locations by reading on the existing map. Since they were novices in map reading, 90% of the students used the ferry pier as the starting point for finding directions and marked the school by following the road from there. Ferries are the main vehicles to connect the islands to Istanbul mainland. Therefore, pier is also a real starting point when stepping onto the island. The fact that children start from the pier, which is the entry point to the island, by simulating real life while searching for a place on the map and find the house and school by following the path they walk shows the high level of children's spatial cognitive perceptions.

In terms of **mobility**, walking emerges as the primary mode of transportation. Children's school journeys are mostly made by walking as individuals or accompanied by their siblings / friends, rather than by their families. Children living in the periphery mostly use vehicles for commuting. Electric motorcycles are the most common ones, another way is the public shuttles. In mind maps 2 students draw the route of the shuttles, and 4 picture the electric vehicles.

Zeynep Ö.: "When my mom takes care of my brother, she can't pick me up from school, so I go down to the market and take the bus."

Pamir: "my parents bring me to school on an electric motorcycle, but I like walking more because I can observe"

Zeynep B.: "My sister brings me to school by electric car, our house is close to the museum"

Hazal: "we live close to school, so I walk with my brother, and sometimes my mom brings us with the electric motorcycle"

Depending on the weather conditions, students walk to school or are given a ride by their parents via electric bicycles. It has been observed that children walk in groups after school as well as accompanied by an adult. In some cases, adults provide access to neighbourhood children with their electric vehicles, in the sense of a division of labour. Most of the children participating in the study own a bicycle. However, they reported that they used bicycles for recreational purposes around the home and usually walked to school or were chauffeured by their parents with electric bicycles.

Asya: "I like to spend time at the coast because we can sit there with our friends. There are cafes and parks."

When it comes to **the natural environment**, it has been observed that children establish a close relationship with nature and draw in detail the elements that shape the environment they live in. Children know the types of trees, write their names in drawings and visualize them in different ways. All the children said they liked the forest areas at the back of the island. Dil cape, beaches, the big tour route, forests and Aya Yorgi hill are mentioned equally with the uses in the centre. However, this area is more secluded due to the sparseness of the settlement pattern, families do not allow children to go alone for safety reasons. Instead, these areas are visited for family activities such as visiting relatives, nature walks, cycling or swimming in summer. Therefore, the limited use of forested areas by children is not due to accessibility, but to parental concerns about safety and strangers' danger.

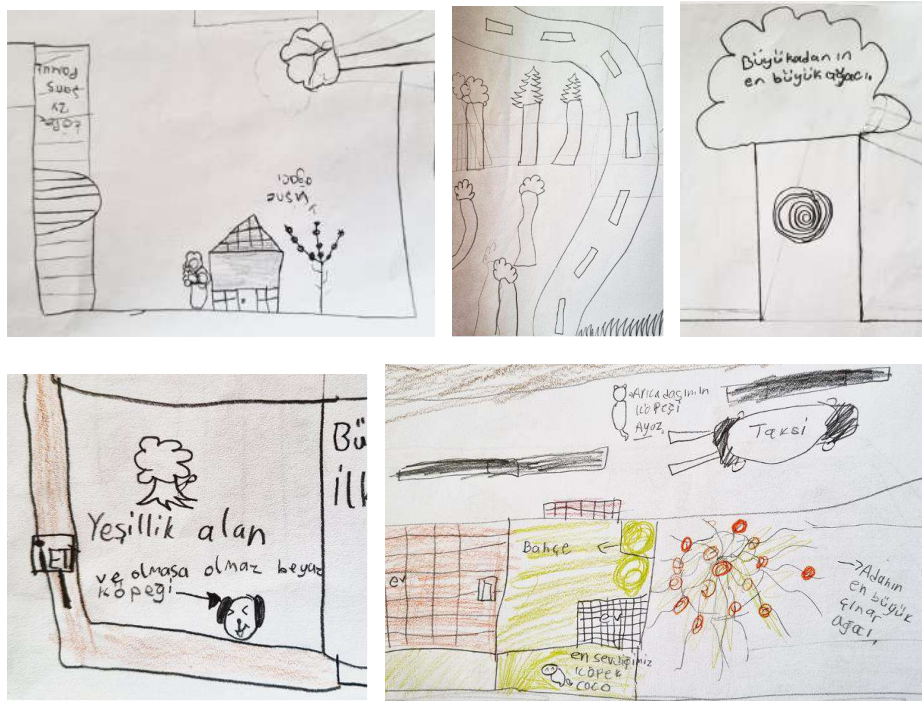


Figure 5: Details of natural element such as trees, gardens, animals in children's mind maps drawings

In terms of play, children drew several places where they played, such as the school garden, the streets where they lived, the island's square and the football field. In their out-of-school activities, most of the children can perform independent activities such as playing on the street / in the park, going to sports, or wandering around the city centre, alone or with groups of friends. The school

garden is one of the most important gatherings and after school play areas since it also offers children out-of-school alternatives with courses and activities. While all boys marked the football field as an important gathering place on the collective map, girls predominantly marked Atatürk Square. Çınar square, located at the intersection of the market and the residential area in the centre, is also expressed by both boys and girls as a play street. Another important finding is that walking backwards on a slope, running and pacing, the movement itself can turn into a game. These findings suggest that active mobility in car-free settings can support play function and turn independent mobility into fun.

Regarding the **interactions between children's independent mobility and their perception** of space, it has been seen that there is a close and strong relationship between active and independent mobility and strong spatial perception. The most important finding of the mapping research is that children who are taken to school by their caregivers cannot identify the routes they use on a map, cannot define spatial references or identical structures. Although they can draw their immediate surroundings around home and micro-scale spatial relations in individual mind maps, their perception of the whole is poor compared to children who commute on foot.

Walking speed makes it possible to notice details and develop a strong perception of space. On the other hand, walking together after school, even if it is for the purpose of going home, provides shared free time on the street. In this way, individual awareness of the environment can be shared, that enables peer education. Naming the animals on the route together, talking about tree and plant species, eating and shopping together in the market reinforces the experience of both life and space. Since children walk with their siblings or friends, they know each other's homes and even their parents' workplaces which enhances the sense of security in the neighbourhood. 75% of children were aware of the names of neighbourhoods, streets or special functions and mentioned them when describing the settlement.

Conclusion

This paper discusses the findings of the field study that shows children living on a car-free island have developed perception of space which allows them to describe the details of space and the ability to find their way independently. In addition, their spatial perceptions vary in terms of their mobility patterns and durations, location of their homes, distances to the centre, and differentiate according to the variety of urban elements they encounter every day.

In the mind maps produced as part of the study, children describe the environment they walk and perceive through four basic components (Zhu and Lee, 2008) as pedestrian facilities, housing density, land use mix and street connectivity. *Residential density* is expressed in terms of rows of houses defining streets or a description of specific houses. Among the activity patterns, children's favourite places to go alone or with their caregivers were the market area, pier, and the coast where the commercial and services take place with the highest level of *land use mix*. Büyükkada offers a variety of functions such as Adalar Museum, libraries, football fields, tennis courts, woodlands,

seashores, and beaches. All these uses are marked in the mind maps and collective maps in addition to the mix use zones. *Pedestrian facilities* are at a high level as the entire island is a pedestrian priority area. This issue is reflected on the mind maps through open public spaces and the promenade on the coastline of the centre. The promenade starts from the small port, continues with cafes, restaurants, municipality building, ferry piers and supermarket, ends at the Atatürk Square. Atatürk Square is an important gathering point of the island's public pedestrian system. In collective maps children defined the square as a most important meeting and playing point by also mentioning the monument on the square as climbing wall or slide statue. Modern style monument on the square became a playing point for Büyükada children with its form that enables them to climb, slide and sit on top of it. In the means of *street connectivity*, the permeable car-free street pattern ensures a high level of connectivity in the centre. In children's mind maps, the streets of Büyükada appear as the main area of activity and the connectors of urban uses and movement areas.

The study showed, in addition to functional diversity, richness and elements that lead to sensory diversity strengthen the relationship between children and space. The variety of natural elements provides significant potential in this regard. Children referred to noisy and crowded areas, silent and peaceful spots, different materials and textures that create surfaces in the urban environment. The elements that attract different senses are recognized in their cognitive mappings.

Findings of the mutual analyses on mind maps and the voice recordings showed that the children's perception of the built environment in Büyükada, is parallel to the natural environment. Büyükada has a very strong natural identity as well as its identical architectural environment. As a result of the study, it was determined that children perceive the built environment together with natural environment references. The sea shore, hills, sloping streets and stairs, which are the result of the rugged topography, play an important role in the perception of space. The viewpoints defined by the hills, combined with the presence of monumental buildings such as the Greek Orphanage and the church of Aya Yorgi, strengthen the emphasis on landmarks. Clock tower, Splendid Palace Hotel, Taşmektep (renovated museum), Anadolu Club, Church and Hamidiye Mosque are landmarks in the centre.

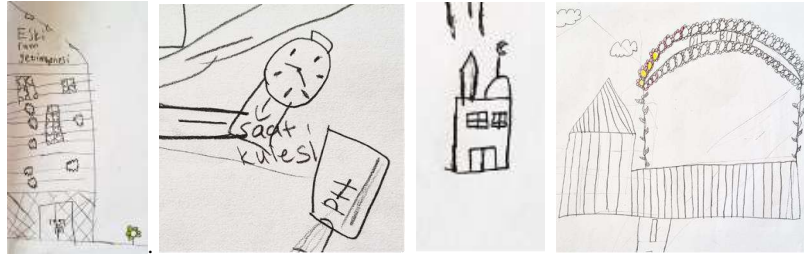


Figure 6: Details of landmarks of Büyükada such as Greek Orphanage, Clock Tower, Hamidiye Mosque and Dilburnu (Dil cape) in children's mind maps.

In most of the studies that use mind mapping method on children's neighbourhood walkability, children marked traffic points, zebra crossings, parking cars as well as the sidewalks and traffic

lanes as a part of their spatial perception. Whereas in Büyükada, children draw streets and roads as connections of spaces and functions, without mentioning any traffic information. It is concluded that when traffic pressure is removed, children can see roads in their most basic urban function. They may not be perceived as traffic or problem areas that limit movement. Roads connect and unite different parts of the city, forming the whole and providing circulation.

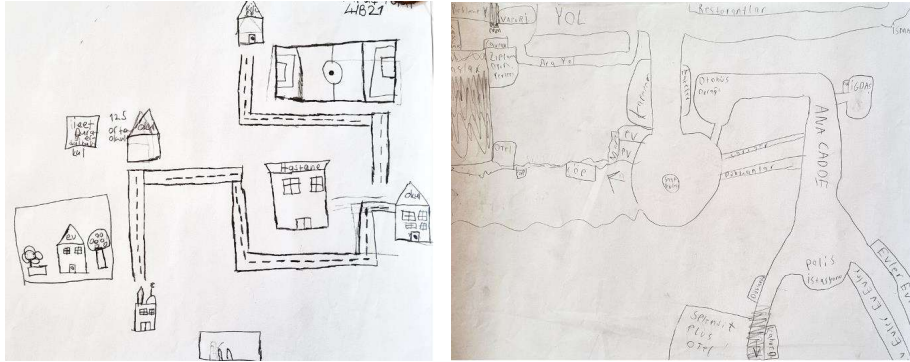


Figure 7: Details of street connectivity and connected activity spaces in children's mind maps.

Another finding of the study was about parental concerns and its' relationship with children's independent movements. It has been determined despite living in an environment without motorized vehicle traffic, the parental concerns persist, and parents continue to chauffeur their children the presence of electric vehicles, the inability to get up early in the morning, or weather conditions. This situation shows that even in car-free environments, parental concerns do not completely disappear and can be limiting on children's independent movements as in other studies in the literature (Collins & Kearns, 2001; Kytä, 2004).

As a result, children's independent mobility allowed them to establish more connections with nature, to perceive landmarks in the urban space they live in, and to spend time and play in diverse urban areas such as the market centre on the island or in natural areas such as the seaside and forests. It is concluded that what is attractive for children in the Büyükada settlement is not attractive playgrounds, well-designed facilities, or smart schoolyards, but a realistic and coherent diversity of the whole environment at a perceptible and walkable scale. This is a real-life experience for children, and in Büyükada, removal of the vehicle pressure makes this experience possible for children. These findings from a car-free settlement can be promising for strengthening the policies for building a child-friendly urban future.

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