

## COMPARING METHODS FOR NEIGHBOURHOOD MAPPING WITH CHILDREN IN THE CONTEXT OF TÜRKİYE (1119)

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**Abstract.** This study focuses on gathering data about children's experiences outside home. The aim is to compare survey methods with writing and drawing activity, and proposed screen-based mapping methods with auxiliary visuals. The study includes 154 children aged nine to twelve from Aliğa and Menemen districts of İzmir metropolitan area in Türkiye. The face-to-face surveys at schools asked children about their neighbourhood attributes, places of likes, dislikes, and where they spend time outside home and school, focusing on their activities, and daily environments. One method requires all children to write or draw. The second method involves GIS-based mapping with researcher guidance. Results compare the two methods. The discussions aim to find ways to encourage young children to talk more about their daily surroundings and how this relates to their spatial orientation and perception of their neighbourhood. The results have the potential to contribute to planning practices for including children in plan-making processes.

**Keywords:** Children, neighbourhoods, mapping, methods for child studies, geographic information systems.

### 1. Introduction

It is important to involve children in urban research to serve the overarching purpose of urban planning to produce inclusive policies and create liveable urban spaces for all. Urban policies inclusive of children are only possible by understanding what the children like and dislike in urban environments. Based on the purpose of child-friendly urban environments, this study focuses on how to gather data about children's experiences, perceptions, and views on their everyday places outside the home. Children's daily activities involve both indoor and outdoor environments, which impact their perception of the city. These experiences help them recognize the physical, natural, and social attributes of urban spaces and develop their sense of safety, fear, and comfort for daily survival.

Previous studies on how to gather data about children are various. When collecting data on the urban experiences of children, conventional tools like surveys with children or their parents are typically employed. However, these tools may sometimes lack the ability to compare spatial data. In order to comprehend children's perceptions and experiences in the city and open spaces, research often employs survey-based traditional tools. Nonetheless, the capacity to compare spatial experience data in such studies may be limited. To strengthen the spatial emphasis on the research, methods to direct children to draw their ideal city and write about being the mayor (Manouchehri and Burns, 2023), draw a child-friendly city (Gökmen and Taşçı, 2016), draw or write about their environmental experiences (Çubukçu et al., 2018) are utilized besides interviews and focus group discussions.

Recently, there has been a growing trend toward with research utilizing geographic information systems (GIS) (such as Chen et al., 2011). In some studies, the observations of children in open spaces are recorded during fieldwork, and maps are generated to comprehend children's behaviours, as demonstrated in studies such as Bozkurt et al. (2019), Zhang et al. (2022), and supported by photo-voice approach (Loebach and Gilliland, 2010). An alternative method of utilizing GIS tools is to create space-time path-based clustering patterns, as demonstrated by Chen et al. (2011). Participatory and qualitative GIS studies encompass the involvement of stakeholders in the mapping process via an interactive method (such as Berg et al., 2022; Kytä et al., 2018; Wridt, 2010). This approach ensures the direct marking of spatial data instead of mere description, thereby allowing participants to express themselves and simplifying the process of automatic data mapping. Such techniques promote dialogues between researchers and residents, offering the potential to intervene and encourage physical activity within communities (Wridt, 2010). Research on children from Helsinki and Tokyo (Kytä et al., 2018) and Finland (Berg et al., 2022) are examples using soft-GIS methods.

While previous studies suggest that children can express themselves better by drawing rather than answering survey questions, this study investigates and discusses the effects of using screen-based tools (here, GIS) and auxiliary visuals to develop child surveys aiming to map children's neighbourhood experiences. The aim of the study is to compare the results of the survey methods with writing and drawing activity, and the proposed visually assisted and GIS-based mapping methods. Furthermore, we argue that these methods may have different results between the neighbourhoods with high and low education levels, used as a proxy for income levels in Türkiye. The research involved the spatial mapping of 154 children aged between nine and twelve, residing in Aliğa and Menemen, two districts situated within the İzmir metropolitan area of Türkiye. This study is part of a broader project that examines children's outdoor utilization (see

Acknowledgements).

## 2. Study Site and Methodology

### 2.1. Study Site

The research was conducted in Izmir, the biggest city on the Aegean coast of Türkiye. Within the scope of the study, a total of 154 children between the ages of nine and twelve living and schooling in Aliğa and Menemen, two districts of İzmir metropolitan area in Türkiye, are included. With the permission from the Ministry of National Education, the study with both methods is conducted face-to-face with children at the classrooms of fourth and fifth grades in local elementary schools. This particular investigation constitutes an integral component of a more extensive endeavour encompassing a total of twelve districts. The two districts, which are the subject of discussion in this current manuscript, are also compared with the comprehensive findings of all twelve districts<sup>1</sup>.

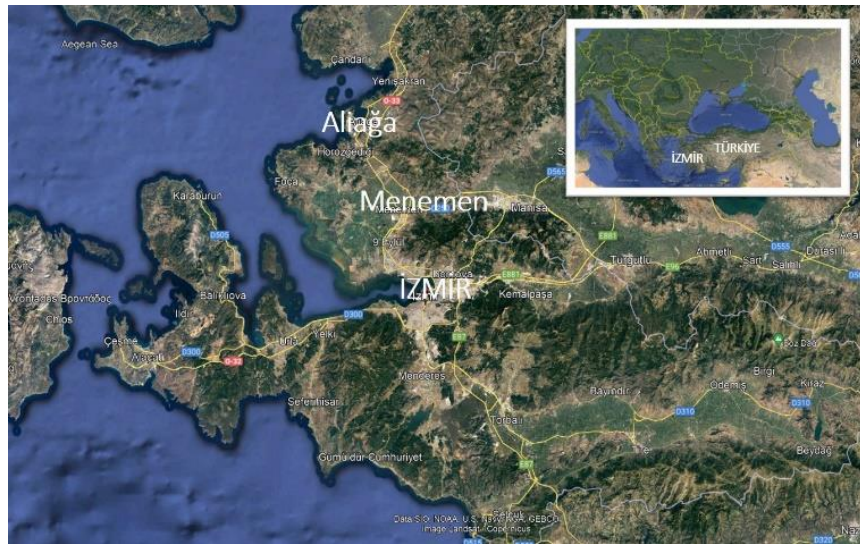


Figure 1. Location of the study sites (Menemen and Aliğa) in Izmir

Aliğa and Menemen are located in the northern part of Izmir (Figure 1). The population in selected neighbourhoods in Aliğa have a higher education and income level than those in Menemen. While the study area in Aliğa is nearby the coast, the

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<sup>1</sup> This study is part of a research project (Improving Living Environments According to Child Development and Care: Accessibility and Usage of Open Spaces by Children in Izmir, Project No: 119K336) supported by TÜBİTAK, The Scientific and Technological Research Council of Türkiye).

neighbourhood in Menemen is inland.

## 2.2. Data and Methods

Focused on children's activities and daily places at their home and school environments, survey questions directed in two methods ask children about their neighbourhood's (physical, natural, and people) attributes and the places they like, dislike, and spend more time outside home and school. The research conducted was a one-on-one and face-to-face study held within schools and comprised two methods.

### *The first method – Write/draw responses*

The first method requires children to write or draw their responses about what they do after school and where in their neighbourhood (Figure 2), where they like and dislike in their neighbourhood. Drawing provides researchers with a useful method of gathering data about the perspectives of children on their everyday lives (Leonard, 2006). In some classes with younger students, their teacher read the questions one by one. Since it was the first semester after the lockdown of the recent pandemic, their teacher's involvement in conducting the survey encouraged students' research participation.



Figure 2. Writing/drawing examples by children in this study (responses with less detail on the left, moderate detail in the middle, and more detail on the right)

### *The second method – Participatory GIS*

In the second method, an example of participatory and qualitative GIS approaches (Berg et al., 2022; Kyttä et al., 2018), survey process evolved to encourage children to map their neighbourhood environments by using the visually supported tools of GIS environment with the guidance of the researchers. As the research subjects were children, a child-friendly visualization was created for them. The first part of the survey ('what's around your house?') used printed and cartographic images that the researchers developed based on the first survey results with drawing and writing. These images are about various neighbourhood features, including the built environment, natural elements, people of various age groups, animals, recreational activities, transportation/vehicles, and reflections/emotions (Figure 3). To facilitate the survey process, visuals were incorporated into the GIS map. While some of these symbols represented tangible items like buses and mosques, others were feature symbols for emoticons related to their enjoyment situations, as depicted in ArcMap.



Figure 3. Visuals to assist the survey questions to be mapped in GIS

At the second part, students were asked about the things and places they like and dislikes in their created map of their home environment including their route to school. The survey requested information regarding their utilization of open spaces, their

reasons for enjoying or not enjoying these spaces, and whether and how they spent their daytime outside of school and home.

None of the children were even slightly familiar with GIS. So when conducting the survey, each student collaborated with a researcher to complete this survey. They needed to give their responses by selecting and then locating a feature among provided visuals (on paper and on-screen) at the appropriate places on their neighbourhood's street map at GIS. The participants were instructed to indicate their responses on a digital GIS map, which displayed their home and school location as well as the surrounding areas. Researchers recorded the responses given by the participants on the map.

The results yielded separate maps for each child, as depicted in Figures 4 and 5. To begin the analysis, a descriptive statistics method was employed in the initial stage to explore potential variations in the children's responses based on their age and gender. Moreover, the students' map data was compared to actual neighbourhood data with land uses and various open spaces.

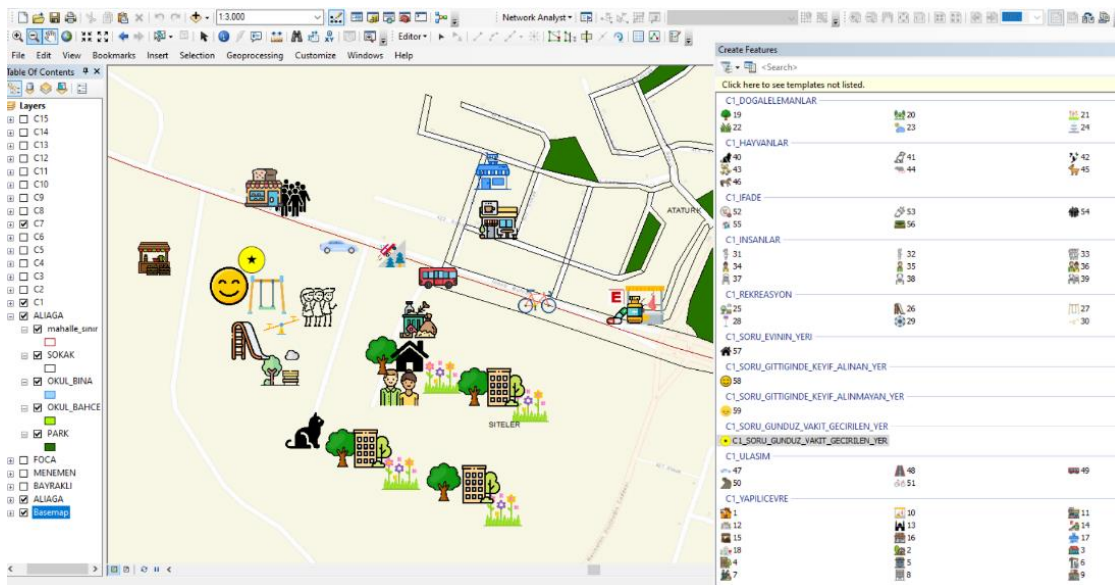


Figure 4. A screen example of spatial mapping at GIS with a sample child (Aliğa)

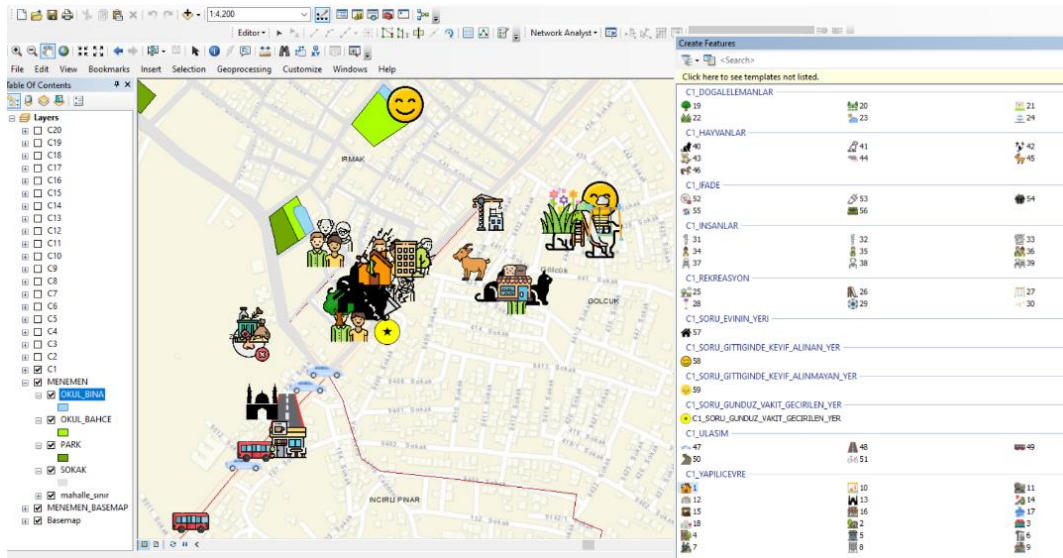


Figure 5. A screen example of spatial mapping at GIS with a sample child (Menemen)

### 3. Results

#### 3.1. Descriptive Results

As mentioned in the methods part, a total of 154 children between the ages of nine and twelve living and schooling in Aliğa and Menemen are participated in this study. The gender distribution of the participant children is presented in Table 1.

Table 1. The gender distribution of the children participated in the study

	Aliğa			Menemen			Total		
	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total
<b>Number</b>	36	40	76	47	31	78	83	71	154
<b>Ratio</b>	47%	53%	100%	60%	40%	100%	54%	46%	100%

Different from the GIS-based method, the first method, write-and-draw, asked about the children's likes to do in their spare time whose results reflected some gendered differences presented in Figures 6 and 7. Accordingly, inquiring about children's revealed that more children (over 40%) in Menemen tend to have activities by 'sitting down' than those (5% for both genders) in Aliğa (Figure 6). In Menemen, more girls than boys indicated sitting as their pastime, but in Aliğa, 25-35 percent of children seem to spend their time in front of a screen. The prevalence of screen time among children shows

slight gender differences only in Menemen.

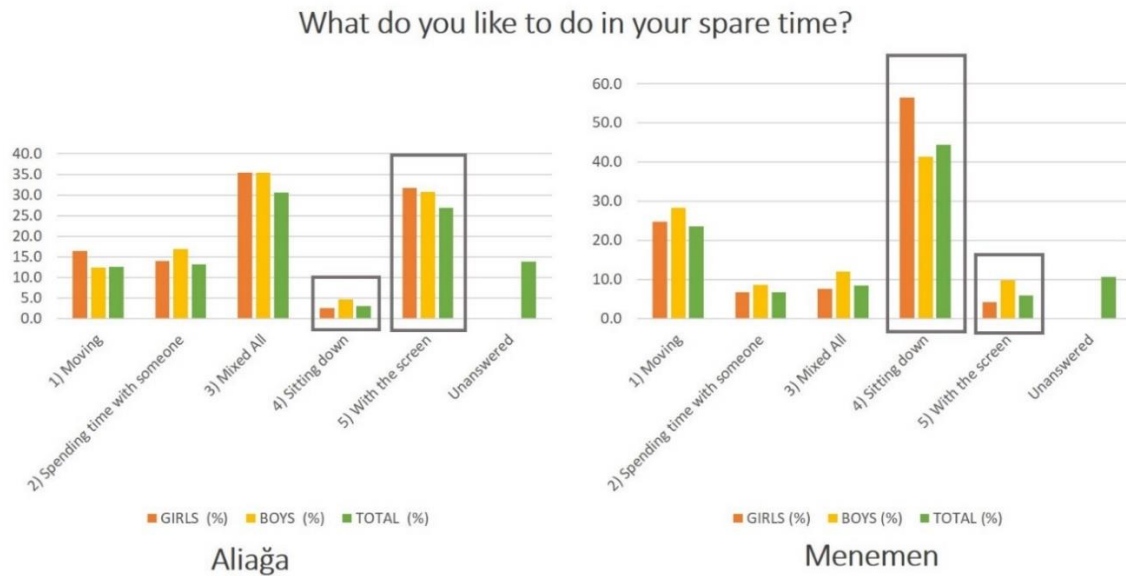


Figure 6. The distribution of responses among gender for the question ‘What do you like to do in your spare time?’

In Menemen, children dislike the environment and roads more than in Aliğa according to write/draw responses (Figure 7). Girls in Menemen have the highest rate of this response. In Aliğa, more children, especially boys, talk about disliking animals in the neighbourhood compared to Menemen where no children gave this response.

Besides these descriptive results, a comparison of two districts (Aliğa and Menemen) by according to the common questions of two separate methods are presented as follows. The main questions are ‘what’s in your neighbourhood?’, ‘places you spend your time during the day (outside school and home)’, ‘places you enjoy’ and ‘places you dislike’. The two districts in this current manuscript are also compared with the comprehensive findings of all twelve districts examined by our on-going research project (see footnote 1).

## What do you dislike in your neighborhood?

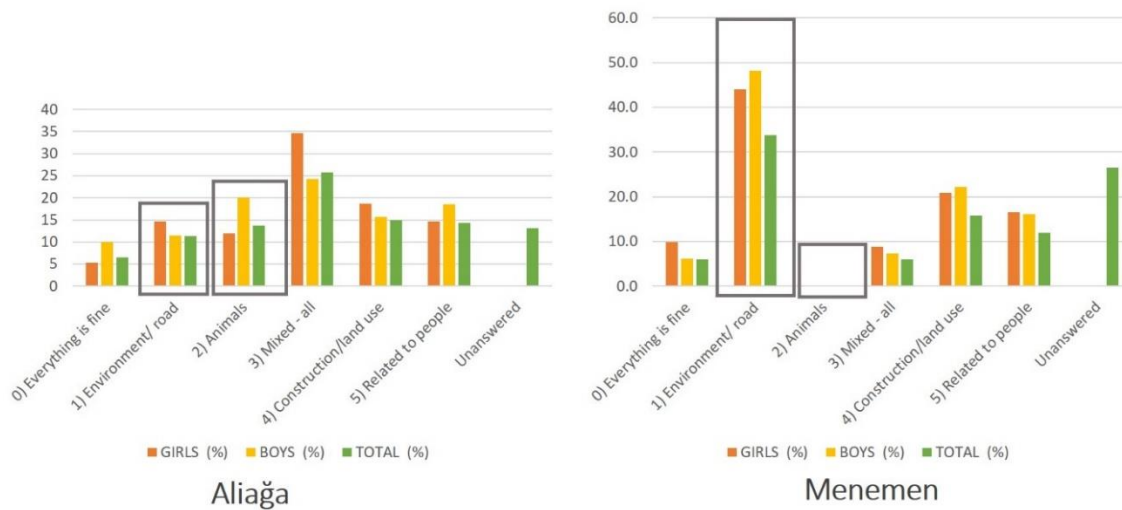


Figure 7. The distribution of responses among gender for the question ‘What do you dislike in your neighbourhood?’

### 3.2. ‘What's in your neighbourhood?’

The study categorized neighbourhood features into six groups: built environment, recreation, natural environment, transportation, people, and animals (Figure 8). Examining the answers revealed differences between the two districts, particularly in the categories of grocery stores/market and non-residential uses. Menemen had more answers related to grocery stores/market (nearly 40 percent whereas Aliaga is zero percent) in the built environment category, whereas Aliaga had more answers related to non-residential uses (nearly 30 percent, whereas Menemen is zero percent). Additionally, Aliaga had responses related to gasoline and museum/theatre that were not present in Menemen. Differences in natural environment responses were also observed, with Aliaga having more sea and pool/water elements answers (more than 30 percent).

The responses of the children in Menemen exhibit a higher rate of mosques, vehicles, ball tools and smells compared to the other districts. Children in Aliaga, on the other hand, have a higher percentage of responses expressing the presence of children, animals such as cats and dogs, and the crowd.

Results from the second method indicate similar answers, but with location data (Figure 9). In Aliaga, the percentage of responses including apartments with gardens is greater than that of Menemen, and such is indicated along specific axes, which may likely be a route frequently taken by the respondent. The natural elements map shows more

clustering in Aliğa and spread farther from the school than in Menemen. Negative answers are closer to the school in Menemen and more widespread in Aliğa.

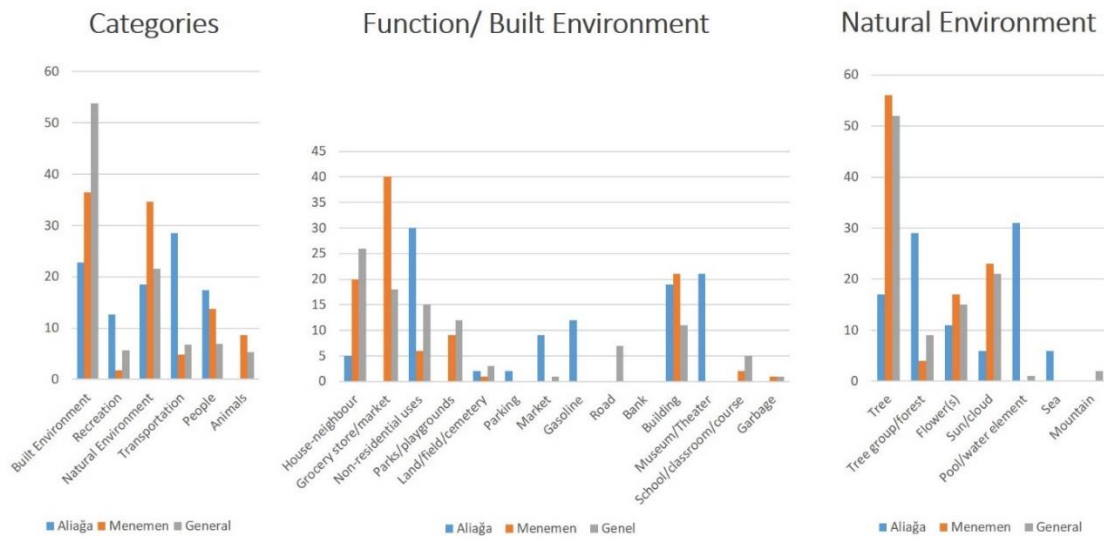


Figure 8. Write/draw responses to 'What's in your neighbourhood?'

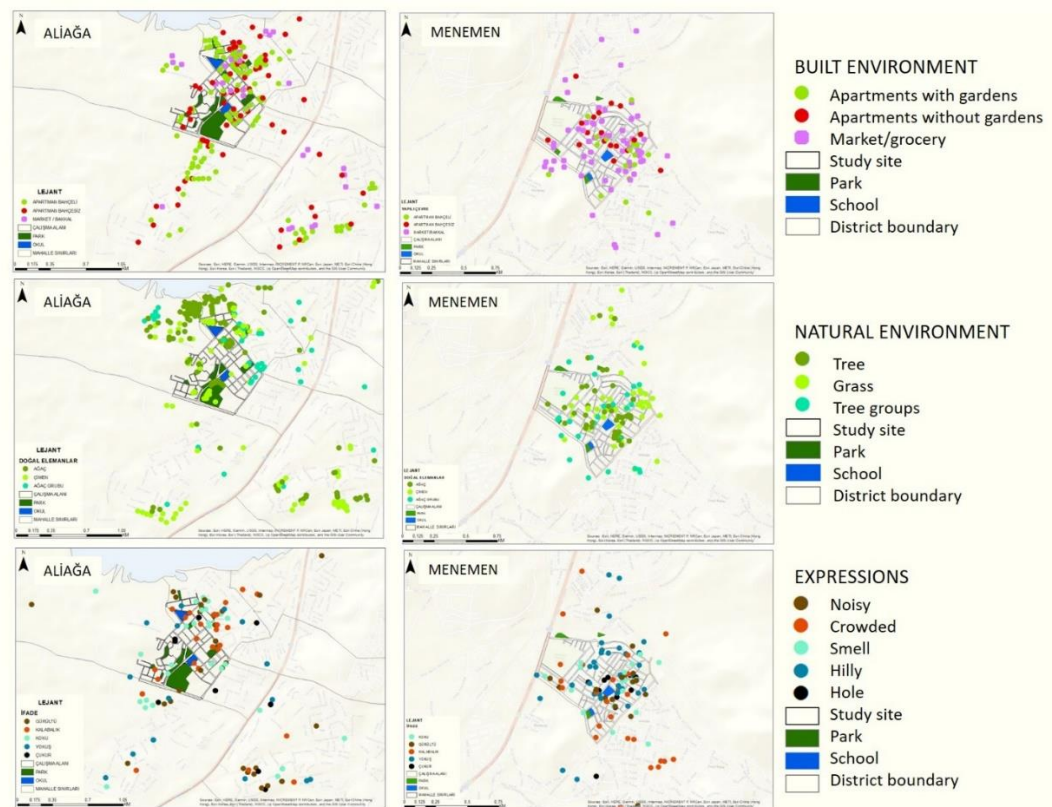


Figure 9. Responses via Participatory GIS method to 'What's in your neighbourhood?'

### 3.3. Places where children spend time during the day (outside school and home)

The places in which children spend their time outside school and home may occasionally be enclosed areas such as the house of the baby-sitter, an educational institution, or a market, or alternatively, open areas such as parks, gardens, and streets (Figures 10 and 11). Thus, the physical attributes of the neighbourhood may play a vital role in this regard. Moreover, it is discernible from the responses, which may hinge upon the socio-economic standing of the parents, that a greater proportion of children in Aliğa attend courses, utilize pools, and are under the care of a baby-sitter. In Menemen, the rate of answering this question as a park/neighbourhood/friend is over 60 percent in the write/draw method.

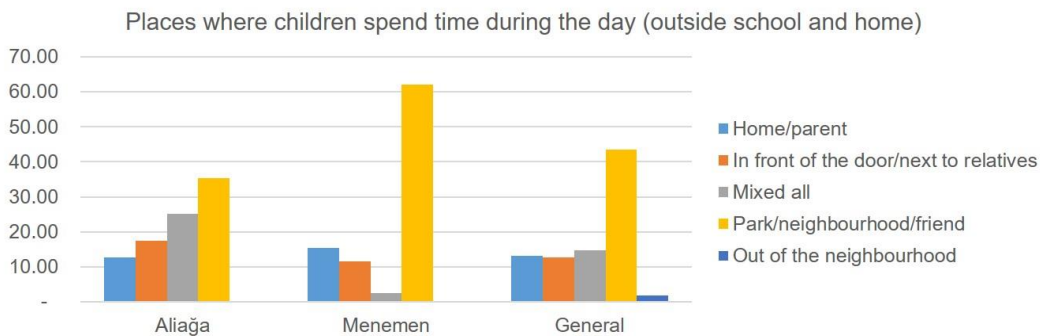


Figure 10. Write/draw responses to places where children spend time during the day (outside school and home)

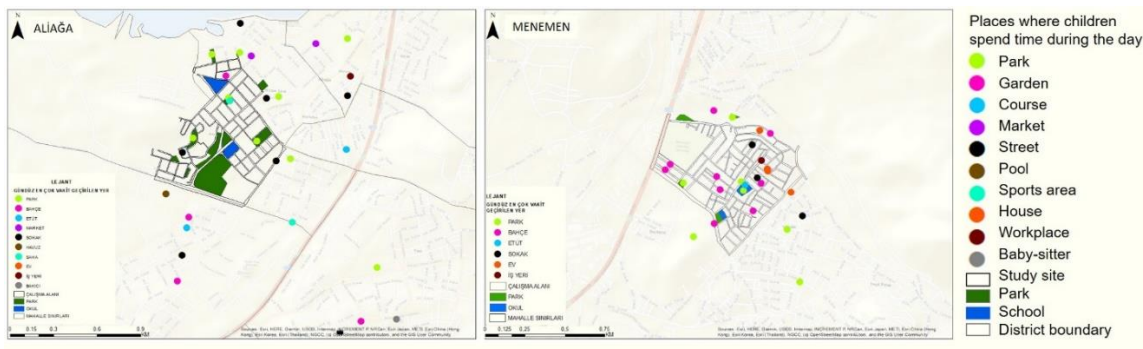


Figure 11. Responses via Participatory GIS method to places where children spend time during the day (outside school and home)

### 3.4. Places where children enjoy

The ratio of the places children enjoy in front of the door is higher in Menemen (more than 50%), while the ratio of home/parent is relatively higher (20%) in Aliğa (Figure 12). GIS-based mapping provided not only the display of a favourite place in the neighbourhood, but also the opportunity to relate causes and other attributes in the database (Figure 13). In both neighbourhoods, ‘play’ come first as the reason why children enjoy the places they like in their neighbourhoods.



Figure 12. Write/draw responses to places where children enjoy

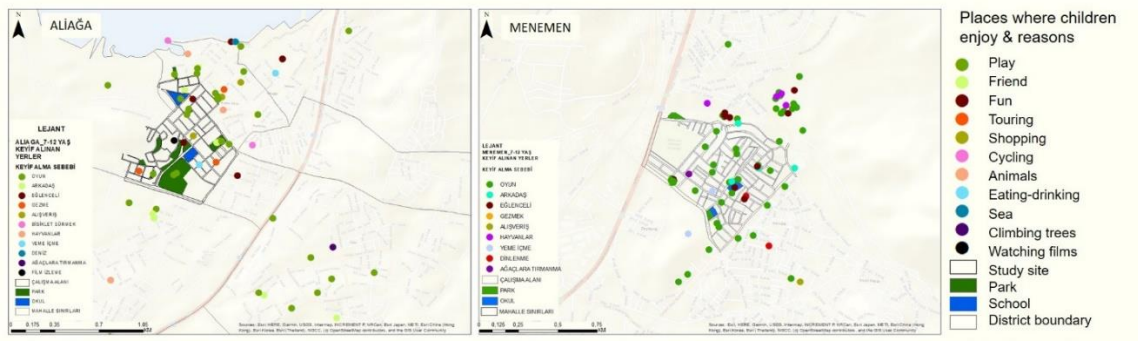


Figure 13. Responses via Participatory GIS method to places where children enjoy

### 3.5. Places where children dislike

Based on the write-draw responses provided by children, it is evident that the locations they tend to avoid in their neighbourhoods are primarily associated with the environment/road, construction/land use, or people (Figure 14). In Aliğa, animals are also identified as a factor contributing to the unfavourable perception of certain areas. Moreover, the proportion of children expressing ‘everything is fine’ in their neighbourhood is approximately 5 percent in both localities. Interestingly, responses

pertaining to the environment and road are relatively more prevalent in Menemen. Remarkably, the GIS maps generated by the participants indicate that the disliked places are not proximal to their school in both districts. In Menemen, however, boring areas are more commonly identified. In Aliğa, unsatisfactory locations associated with danger and pollution are situated in close proximity to the coastal part (Figure 15).

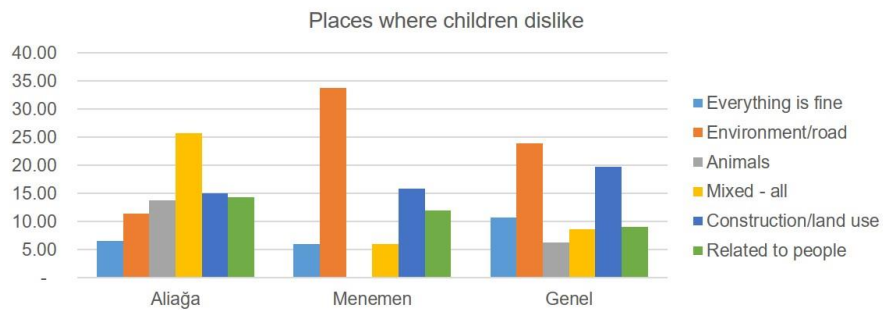


Figure 14. Write/draw responses to places where children dislike

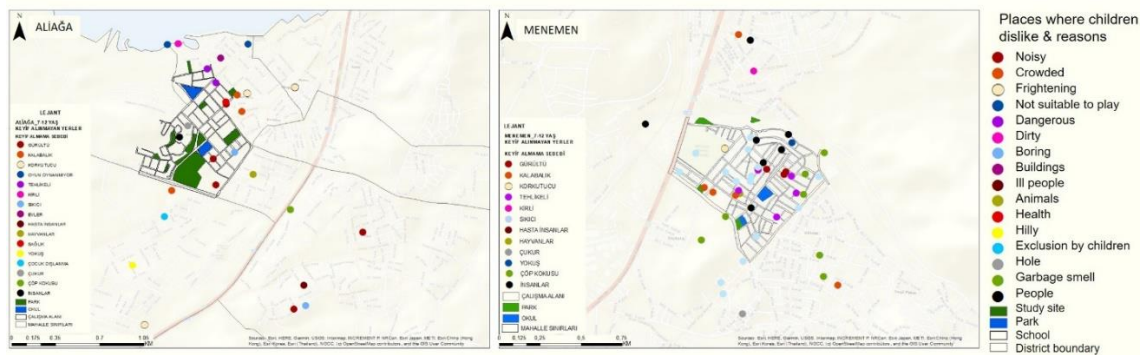


Figure 15. Responses via Participatory GIS method to places where children dislike

### 3.6. Comparison of the Methods

The present investigation confirms the results that has already been anticipated and acknowledged in existing literature (such as Leonard, 2006 and Manouchehri and Burns, 2023), namely, that the utilization of drawing and mapping actions proves to be more efficacious for children's self-expression about spatial aspects and yields richer outputs than relying solely on verbal expressions. Nonetheless, a particular point of interest to be highlighted is the exploration of disparities between a child's autonomous drawing on a blank sheet of paper versus the utilization of interactive, communicative, technology-based process supported with visual elements and guided by a researcher.

The results of the study firstly present a comparison of these two methods in terms of

the number of items used by children in neighbourhood mapping and the variety of materials on their self-expression. The number and variety of items used in the second method (participatory GIS) are more than those in the first method (manual write/draw). Unanswered questions in the first method are more than those in the second method. No answer or only one answer to the five questions in the first method are more in Menemen (7%) than in Aliğa (2%). The children's lack of response could conceivably be attributed to the temporal alignment of the research with the initial phase following pandemic-imposed restrictions, thereby giving rise to probable anxieties. Furthermore, taking into account the proposition that remote learning diverts children away from the act of composing and sketching with a writing instrument amid the pandemic era, the aforementioned outcome can be construed as comprehensible. Besides, as stated by Leonard (2006) that children with less artistic ability than others are at a disadvantage in the (manual) drawing method, in this research children may be shy to express themselves by drawing. The second method utilizing GIS overcome this disadvantage. Also, in the case of two neighbourhoods, the study discusses the results about how children's self-expression and mapping skills may relate to the income levels of their household and neighbourhood.

The PPGIS approach is instrumental in enabling the identification of settings that may have been overlooked through alternative methods, as highlighted by Kyttä et al. (2018). For instance, the inclusion of verbal expressions pertaining to the marked point in the database as attributes enables the identification of clusters of locations where analogous verbal expressions are expressed by children. Moreover, the visualization of areas enjoyed or disliked by children on the map generated by network analysis (an example is presented in Figure 16), as well as the determination of the surroundings of the school or home within walking distance, can offer valuable insights into the location, thus facilitating decision-makers in identifying intervention points. The PPGIS approach also facilitates the simultaneous analysis of experiential, place-based knowledge from children together with objective environmental characteristics, as noted by Kyttä et al. (2018). However, on occasion, the locations indicated by children may not accurately reflect their actual location. This could be attributed to the child's limited cartographic aptitude. Nevertheless, it remains true that such indications can prove more instructive and advantageous than a completely blank paper. In fact, the observation of pre-existing marks may broaden the child's cognitive horizons and serve as a source of inspiration for the identification of novel points of interest.

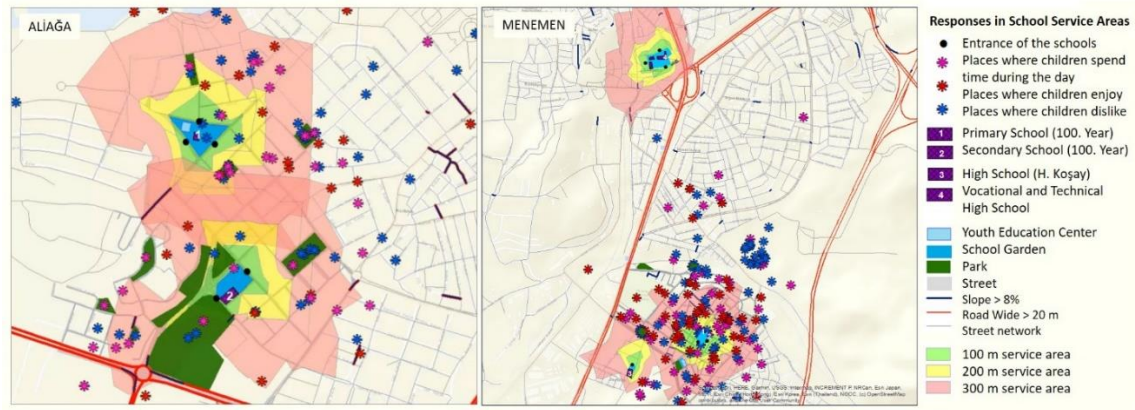


Figure 16. Responses in the school service areas via participatory GIS method

Children did not prefer an environment where they could draw and write on their own, that is, a similar exam environment. Making mapping accompanied by a guide researcher and interacting and chatting with her/him strengthened the children's sense of trust. The diversity of the answers increased in the drawings made with one-on-one attention and supported by visuals in GIS. The second method motivate young children to talk 'more' about physical, natural, and social elements in their daily life and, thus, help the researchers to grasp these children's spatial orientations in and perception of their neighbourhood. In this way, the process of research yields not only knowledge, but also a form of citizen science that actively involves children. The research design's visual elements engage children, enabling them to both enjoy themselves and respond to queries. Consequently, children's participation is fostered and increased.

#### 4. Conclusion

Previous empirical investigations in the literature impart a resounding message to urban decision-makers, urging them to take a more proactive stance in collaborating with young citizens as children who possess the skills necessary for comprehending urban affairs, as part of the urban development process. This study also has the potential to guide researchers who want to answer the question of how urban planning can effectively coordinate the development of interconnected, liveable, diverse and inclusive urban environments for children. The results of the study have potentials to contribute to the planning practices exploring about how to include children in plan making processes and how children express the physical, natural, and social qualities of their daily spaces.

Within a participatory GIS setting, the maps generated with the assistance of children enable the visualization of their perceptions concerning their respective neighbourhoods,

thereby rendering the research process child-friendly. The study's constraint became evident when, occasionally, the children inaccurately marked the locations of existing uses due to their map reading skills' limitations. Nonetheless, the study remains an innovative one in terms of illustrating children's sentiments and opinions via a participatory approach. This study is expected to serve as a foundation for similar research methodologies, which are rare in Türkiye. In the future, decision-making mechanisms would benefit from the inclusion of comparable processes to enhance their inclusivity.

**Acknowledgements.** This study is a part of a research project (Improving Living Environments According to Child Development and Care: Accessibility and Usage of Open Spaces by Children in Izmir, Project No: 119K336) supported by TÜBİTAK, The Scientific and Technological Research Council of Türkiye).

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