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ORIGINAL RESEARCH

How Can People with Disabilities Use the Outdoors? An Assessment Within the Framework of Disability Standards

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Abstract

The urban parks, where people interact with nature, be socialize and relieve stress, are located in urban open green spaces, and their importance has increased even more with pandemi in todays. Parks should be designed within the framework of design approaches that allow everyone to benefit equally and should serve all users in the city. Especially special arrangements are necessary for people with disabilities who are known as the disadvantaged group among urban people use these parks. Designs should be improved in accordance with the standars determined for the people with disabilities. It's required to evaluate the factors that will be constraints for them and to ensure effective use. In this study, four city parks (Reşat Oyal Kültürpark, Merinos Park, Soğanlı Botanic Park and Hüdavendigar City Park) located in Bursa and serving all the people of the city were evaluated. The observation and evaluation techniques were used for determine the parks, entrances, parking lots, road circulation, etc. Afterward, the data were analyzed by evaluating within the scope of the standards available for people with disabilities and their suitability. As a result, it was observed that the parks partially comply with the standards and there are some important situations that will cause problems for people with disabilities. Although there are no items such as tactile surfaces and reinforcement buttons in the parks, it has been determined that there are deficiencies such as level differences on the road floors, the absence of stairs and ramp solutions, and also the inconsistency of the dimensions of the reinforcement elements. In this case, In this case, the obstacles in front of the people with disabilities may be removed and a comfortable circulation may be provided by solving the existing problems and completing the deficiencies.

Keywords Disabled people · Disability standards · Outdoors · Urban parks · Accessibility

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1 Introduction

Urban open green spaces are functional areas that create physically and socially suitable environments for urban spaces, depending on their functional characteristics (Lotfi & Koohsari, 2009; Ayoğlu, 2010; Madsen et al., 2021). The city parks are the areas which are located in urban open green areas and play an important role in increasing the quality of life, and also help establish the nature-human relationship. These urban parks play a key role in determining the quality of life of city residents with their economic, aesthetic, social and health functions (Aykal et al., 2017; Błaszczyk et al., 2020; Wolch et al., 2014). In a city, every people has not the same characteristic abilities for using the parks. There are also some people with disabilities, that placed in an important counted, among these groups (Basu & Nageda, 2021; Sağlık et al., 2021).

The term disability is expressed as an inclusive term that expresses the deficiency faced by individuals, the limitation of movement and participation conditions. According to the dictionary of the Turkish Language Institution, a person with disabilities is defined as. "a person with a disability, missing or defect in his body; disabled" (Emini & Ayaz, 2019). In different sources, it is explained as "the loss of physical, mental, spiritual, sensory and social abilities that occurs in the individual from birth or later" (Çetin, 2020; Kavaklı & Özkara, 2012). Disability is not only caused by biological or social structure, but also emerges as a result of interactions between health conditions and environmental and personal factors, and is considered as the restriction or non-fulfillment of the duties expected from individuals (Basouli, 2020; Çetin, 2020; Koca, 2010; Parodi & Sciulli, 2019). Although disability is divided into two groups as congenital and later according to its occurrence, it is also classified in different ways (Tufan & Arun, 2006). In the 2002, according to the Survey of People With Disabilities in Turkey conducted by the Prime Ministry Administration for People With Disabilities (ÖZİ) and the Turkish Statistical Institute (TUIK), disability was grouped into six groups, and these groups were defined as physical, visual, language and speech, hearing, mental disabilities and chronic diseases (Aykal et al., 2017; Kavaklı & Özkara, 2012; Tufan & Arun, 2006).

Approximately 15% of the world's population and 12.29% of the population in our country consist of people with disabilities. According to the 2016 report of the United Nations Department of Economic and Social Affairs, more than half of the world's disability population lives in cities. It is predicted that 6.25 billion people worldwide will live in cities and 15% of this will consist of people with disabilities by 2050 (Bayram & Çoban, 2022; Çetin, 2020; Erten & Aktel, 2020). This situation reveals once more how important it is for the people with disabilities to have equal conditions and rights for other individuals in the society, regardless of the type of disability (Basouli, 2020; De Souza & Post, 2016; Dursun, 2021). Thereby, it is necessary to increase the quality of life of individuals with disabilities, to benefit from the available opportunities in every field without any problems and to be assured (Al-Taesh & Wasowich, 2021; Emini & Ayaz, 2019; Hanson, 2004; Shahraki, 2021).

There are many factors that prevent access for people with disabilities in the cities and the environment where we live (Pretto, 2020). Especially, people with disabilities are not deprived of physical limitations, bu of support systems which can remove these limits (Emini & Ayaz, 2019). For this reason, the important thing is to make a good evaluation, and it is necessary to realize designs that are safe, comfortable, comfortable, Accessible and also can be felt with all their senses (Çelik et al., 2015; Das & Honiball, 2016).

Urban parks, which are shaped according to the city's topography, settlement, climate and geographical structure, should be commonly designed within the framework of an inclusive design approach as one of the open green spaces frequently preferred by the urban people (Błaszczyk et. al., 2020; Sarı, 2019). Within this approach, some special arrangements are required for the types of disabilities for individuals with disabilities. For this purpose, there are important guides include standards for the use of outdoor spaces by the people with disabilities, and these guides include the issues that must be followed in planning and designs in terms of quality and quantity (Aykal et al., 2017; Hanik, 2019; ÖZİ, 2011; TSE, 1999; Türcan İmren, 2019; Ulaşkın et al., 2021; WHO, 2011). Nevertheless, designs that do not comply with the disability standards restrict the peaceful and safe time of the people with disabilities, and bring with them negativities. For example, differences in road circulation in parks, the absence of tactile surfaces are a situation that creates restrictions for the people with visually impairements and disabilities that required wheelchair. Also, the signs and plates which are not used at certain heights and large fonts can also create restrictions for the people with visually impairements. Besides that, other situations that may restrict the movement of people with disabilities and cause difficulties in access can be listed as follows: The danger of ramps and stairs not being in proper dimensions and surrounding them with handrails, railings and vegetation along the road circulation in the parks; Seating units that do not have suitable depths and distances, especially for people disabilities that required wheelchair; Existing car parks in accordance with the dimensions, together with the absence of disabled parking lots; Lack of simple markings and guiding-informative equipment for people with intellectual disabilities (Ak, 2022; Alkan Meshur & Yılmaz Cakmak, 2018; Arat & Bulanık, 2020; Aykal et al., 2017; Bayram & Çoban, 2022; Çakar, 2021; Çelik et al., 2015; Perry et al., 2018; Türcan İmran & Kiper, 2020; Ulaşkın et. al., 2021).

Considering that green spaces, which have gained even more importance with the pandemi today, are still not able to be used properly as they contain some restrictions for people with disabilities, optimum use should be provided. Therefore, at the point of expanding studies on a regional and national scale, our goal is to reveal how parks comply with accessibility standards and how they can be further supported. In line with this hypothesis, considering that Bursa, the fourth largest city of Turkey, has a population of approximately 3 million with rapid urbanization and the population with at least one disability varies between 4.33 and 6.36%, the necessity of evaluating urban parks with a dense user population in terms of disabled people emerges. For this purpose, four city parks in Bursa (Reşat Oyal Kültürpark, Merinos Park, Soğanlı Botanic Park and Hüdavendigar City Park) were examined within the framework of disability standards, the necessary measurements were made, their current situation was revealed, the problems were determined and appropriate solutions were suggested.

2 Research Design

2.1 Research Material

The research material consists of 4 city parks located in the central districts of Bursa. These parks are Reşat Oyal Cultural Park (1955), Soğanlı Botanical Park (1998), Merinos Park (2008) and Hüdavendig, ar City Park (2014), respectively, according to their years of establishment (Fig. 1).

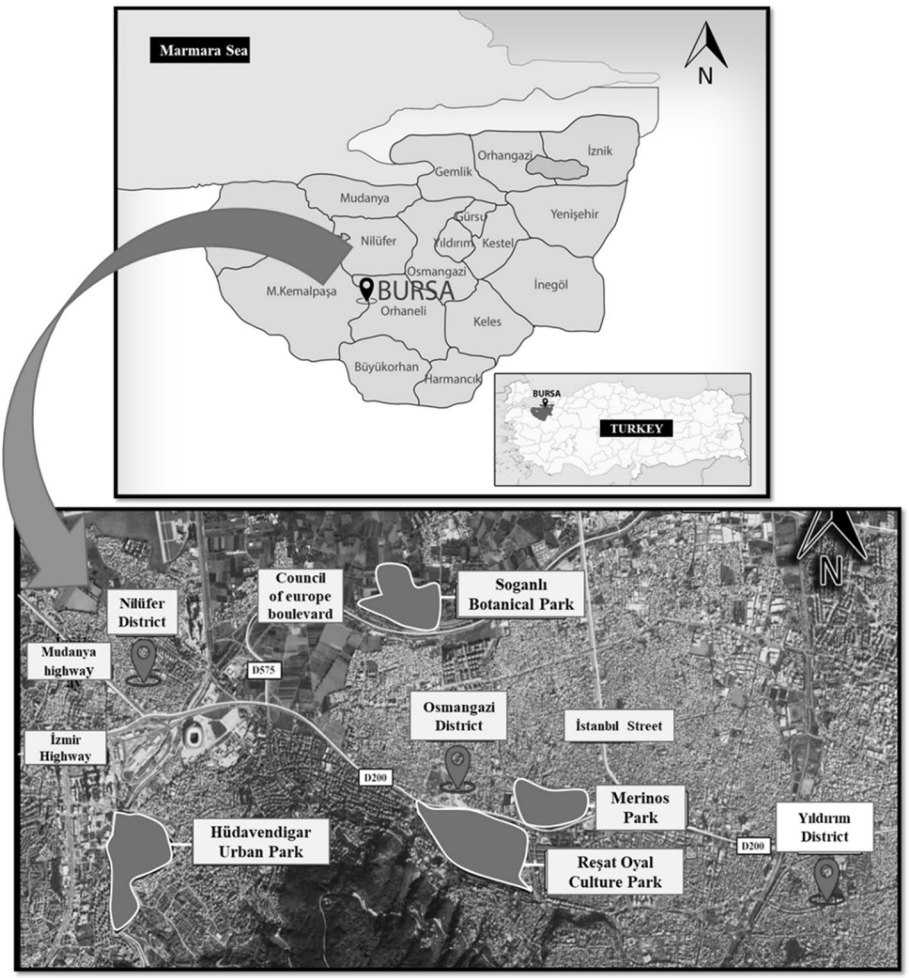


Fig. 1 Location of the work area (made by B. Akgun Piskin)

Reşat Oyal Kültürpark: It was established on an area of 393,000 m^2 and is the first and oldest city park of Bursa. Known as the Cultural Park, the park has been named after the deceased Reşatthe OYAL and known as "Reşat Oyal Cultural Park" since 1999. The park is in a position extending horizontally from Altıparmak to Çekirge and vertically from Merinos to Muradiye (Karlıer, 2017).

Soğanlı Botanical Park: The park, which has an area of 400,000 m^2, is located on the Izmir-Istanbul highway and was established next to the Bursa Zoo. The park, which was opened in 1998, has been included in the 1st-degree natural protected area since 13.01.1998 and has been taken under protection. (Akdeniz & Zencirkıran, 2019).

Merinos City Park: It is a park with a green area of 252,500 m^2. It was established by Bursa Metropolitan Municipality on the land of Sümerbank Bursa Merino Factory between 2006 and 2008 within the framework of the urban transformation project. The park, which has a central location, hosts national and international congresses (Karlıer, 2017).

Hüdavendigar City Park: It is the city park established most recently in Bursa with an area of 510,000 m^2. The Park is a park planned to integrate with Mihraplı Park on the edge of Nilüfer Stream and among residential areas. In the park, there are activity areas and water elements, etc., towards the center (Karlıer, 2017).

2.2 Methodology

In the research, the forms were prepared from the different sources with the standards guideliness published by National Administration for People With Disabilities (ÖZİ), Turkish Standards Institute (TSE, 1999) and the United Nations (Table 1), and then the field study was conducted (Aykal et al., 2017; Hanik, 2019; Koca, 2010; ÖZİ, 2011; TSE, 1999; Türcan İmren, 2019; WHO, 2011). The observation and evaluation techniques were used in the research. The observation technique is frequently used as one of the qualitative research methods and provides the opportunity to reach the data first hand. For this purpose, within the scope of field studies, measurements were made in order to determine the suitability of the criteria specified in the standards guide by visiting the city parks and taking photographs to record the observed environment. The city parks were divided into four groups as park entrances, car parks, in-park road circulation (stairs, pedestrian and walking paths, sidewalks, ramps, etc.) and reinforcement elements (bench, bench with table, fountain, bin border element, lighting element). Measurements were made with a tape measure to represent the elements in each group and noted in centimeters (cm). A triple Likert scale was used to compare the compliance of the measurements with the standards and it was evaluated as appropriate, partially appropriate and not appropriate (Koca, 2010; Tahta, 2013; Bahadır, 2014; Bengston, 2016; Baltacı, 2019; Hanik, 2019, Türcan İmren, 2019; Ulaşkın et al., 2021; Çakar, 2021).

2.3 Statistical Analyses

The evaluations were statistically analyzed in the SPSS 23 program. The suitability of the urban parks was evaluated according to one-way analysis of variance, and the differences between the groups were determined according to the Duncan test and were lettered at the level of $p \leq 0.05$.

3 Findings

3.1 Park Entrances

An evaluation of compliance of the park entrances with the standards reveals it was found to be statistically significant at the $p \leq 0.05$ level. Accordingly, while Merinos Park with70%, and Reşat Oyal Cultural Park with 63.64% comply with the standards, Hüdavendigar City Park is partially suitable with 50% (Fig. 2).

The road widths at the entrances to the parks were measured between 200 and 800 cm and were found to comply with the standards. No guideline was determined in the parks other than the Reşat Oyal Cultural Park, and the guideline in the Reşat Oyal Cultural Park does not show continuity. While the ground material used in the entrances was suitable in Merinos Park, it was determined to be partially suitable in other parks. That is, paving stones and concrete materials are generally used, and although they are non-slippery

Table 1 Standards for people with disabilities

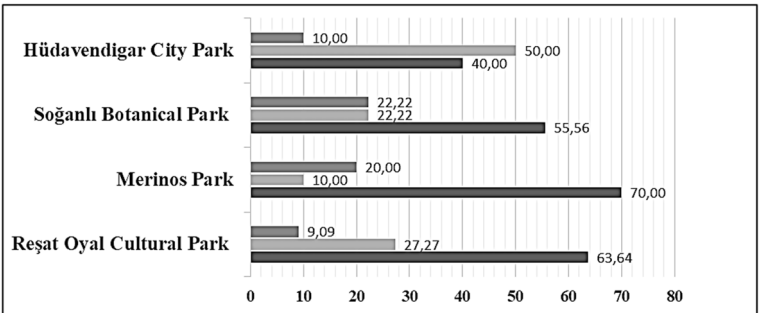
Standards	International Standards	TSE 12576	(ÖZİ)
Path width	90cm	150cm	120-200cm
Guide track		60cm width	
Material nature of the path		Non-slip material	It should be directional and reliable
Minimum barrier-free space	90cm	150cm	-
The maximum height of signboards showing directions and signs	250cm	250cm	-
Minimum bottom clearance of pendent sign and advertising sign	200cm	220cm	-
Character pen thickness-height ratio	1/5.1/10		-
Pavement width		Min. 150cm	Min.150cm
Pavement height	7-15cm	3-15cm	3-15cm
Pavement surface		Easy to watch for the visually impaired with a walking stick, no dangerous chamfers	must have anti-slip, non-glare and walkable texture
Pavement slope		Up to 2% transversely and up to 5% longitudinal	-
Number of disabled parking lots		1 handicapped parking lot for every 50 vehicles	The parking lot of 5% of all parking space
Maximum distance of the passenger drop-off and pick-up areas to the entrance section	3000cm	2500cm	-
Parking lot width		Minimum 360cm	Minimum 360cm
Minimum width of passenger drop-off and pick-up areas	360 cm	400cm	--
Minimum length of passenger drop-off and pick-up areas	1600cm	700cm	--
Parking lot guidance		There must be a directional disabled sign.	There must be a directional disabled sign and a disabled parking sign on the ground
Distance between two parking spaces for wheelchairs	-	250 cm	-
Disabled sign in the parking lot		At least 1 disabled sign on the side of the carriageway	Disabled parking signs must be visible, readable, and illuminated

Table 1 (continued)

Standards	International Standards	TSE 12576	(ÖZİ)
Curb ramp	9%	The middle ramp is a maximum of 8%, the side ramp is 10%	There must be a the curb ramp; the curb-stone should be 3 cm
Ramp width	Maximum 2%	90cm	180cm
Landing depth on ramps	120cm	250cm	250cm
Handrail height used at the ramp edge	90-140cm	80-90cm	
Depth of warning marking at the beginning and end of the ramp		150cm	
Ramp slope	9%	8%	Maximum 8%
Ramp surface	Hard, stable, non-slip, slightly rough material		Hard, stable, non-slip, slightly rough material
Stairstep height	15cm	15cm	15cm
Landing height on stairs	250cm	180cm	
Landing depth on stairs	120cm	200cm	200cm
Stairstep width	30cm	33cm	Riser height is a maximum of 15 cm and the width of steps is 63cm
Handrail usage width in the middle of the stairs	300cm	180cm	
Handrail usage height in the middle of the stairs	250cm	180cm	
Stair walking surface	Rough anti-slip coating	Rough anti-slip coating	Rough anti-slip coating
The tactile surface on the pre-step landings and at the end		60 cm width	Minimum 60 cm
Landing surface	Rough anti-slip coating	Rough anti-slip coating	Rough anti-slip coating
Height of the bench seats from the ground	45cm	45cm	45cm
Height of the backrest of the benches	70cm	70cm	70cm
Depth of seating elements	45-50cm	45-50cm	45-50cm
Required width next to seating elements for the disabilities that require wheelchairs	90*90 cm	90*90 cm	120 cm
Distance in front of seating elements	150*150cm	150*150cm	
Distance between seating elements	100cm	100 cm	100 – 200 cm
Height of table benches		75-90 cm	The

Table 1 (continued)

Standards	International Standards	TSE 12576	(ÖZİ)
The surface of the seating element		The color-texture difference for sensible surface	Texture differentiation must be created.
Minimum depth required for benches with tables for the disabilities that require wheelchairs		60cm	60cm
Tap height in fountains	90-120 cm	85-95 cm	85 cm
The approach area of the fountains		Height: min. 70cm Width: min.50cm	
Height of the mouth of the garbage cans from the ground		90-120cm	90-120cm
Distance of the litter box from the road		Minimum 40cm	Minimum 40cm
Maximum height of the signboards on the road showing directions and signs	250cm		
Minimum bottom clearance of pendent sign and advertising sign	200cm	220cm	
Character pen thickness-height ratio	1/5.1/10		
Lighting element minimum bottom clearance			220 cm
Height of reinforcing buttons on the lighting element			140-160 cm
Minimum passage width in front of the lighting element			150 cm



	Reşat Oyal Cultural Park	Merinos Park	Soğanlı Botanical Park	Hüdavendigar City Park
Not suitable	9,09b	20a*	22,22a*	10b
Partially suitable	27,27b	10c	22,22b	50a*
Suitable	63,64ab	70a*	55,56b	40c

Fig. 2 Statistical evaluation of park entrances (*The letters indicate different groups at the $p \leq 0.05$ level)

materials, it was observed that there are level differences and damages on the ground in the parks that are considered partially suitable. This state may create limitations for disability groups such as the disabilities that require wheelchairs and visually impaired people. On the other hand, the widths and slopes (2–3%) of the entrances were found to be suitable in all parks. Non-slip and non-shiny wash concrete material was used as the pavement surface material in Merinos Park and complies with the standards. In other parks, clay cobblestone, cube stone, etc. were used, and there was is age on the ground andwaand w to be partially suitable. The lower clearances of the signs and billboards were measured aat200 cm in the Reşat Oyal Cultural Park and were partially suitable, while they were measured in the range of 100–150 cm in other parks and they were determined not to be suitable (Table 2). Examples from the parks are given in Fig. 3.

3.2 Car Parks

As a result of the evaluations made in the parking lots, it was found to be statistically significant at the $p \leq 0.05$ level. That is, the evaluations made in the car parks revealed that the criteria measured were not suitable with 66.67% in Hüdavendigar City Park and 62.5% in Reşat Oyal Cultural Park, while it was found to be partially suitable with 50% in Soğanlı Botanical Park (Fig. 4).

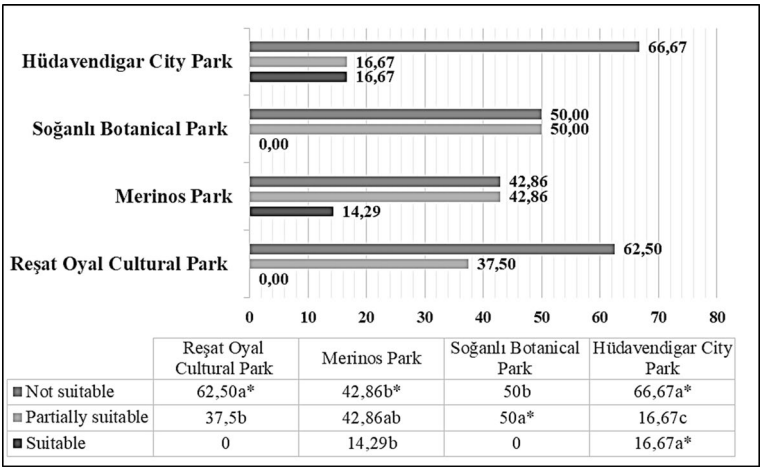
There are 4 disabled car parks in Reşat Oyal Cultural Park, 2 in Merinos Park, and 2 in Soğanlı Botanic Park, which are partially suitable. As there is no disabled car park in Hüdavendigar City Park, a normal car park size was considered. The measurements determined that the distance between two parking spaces for wheelchairs was 250–300 cm and not suitable. While the direction was observed in the parking lot of Reşat Oyal Cultural Park, no direction was observed in other parks. The disabled sign, which is important for people with disabilities, is located in other parks except for Hüdavendigar City Park. Disabled signs are in the form of disabled signboards or landmarks, and since they cannot be illuminated, etc. it is partially suitable. Also, there are curb ramps in other parks except for Merinos Park, the slope of which is 8–10% and it is partially suitable (Table 3). Examples of parks are given in Fig. 5.

Table 2 Suitable of the park entrance to the standards

Standards	Reşat Oyal Cultural Park			Merinos Park			Soğanlı Botanical Park			Hüdavendigar Park		
	S	PS	US	S	PS	US	S	PS	US	S	PS	US
Width of the road	*			*			*			*		
Guideline			*									
Material nature of the entrance		*		*				*			*	
Minimum barrier-free passage	*			*			*			*		
Maximum height of direction and signboards	*				*				*		*	
Minimum bottom clearance of pendent sign and advertising boards		*				*			*			*
Character pen thickness/height ratio	*			*			*				*	
Pavement width	*			*			*			*		
Pavement height	*					*	*			*		
Pavement surface		*		*				*			*	
Pavement slope	*			*			*			*		

Given as suitable *S*: suitable, *PS*: partially suitable, and the *US*: not suitable.

Fig. 3 Measurements related to parking entrances (made by B. Akgun Piskin)



	Reşat Oyal Cultural Park	Merinos Park	Soğanlı Botanical Park	Hüdavendigar City Park
Not suitable	62,50a*	42,86b*	50b	66,67a*
Partially suitable	37,5b	42,86ab	50a*	16,67c
Suitable	0	14,29b	0	16,67a*

Fig. 4 Statistical evaluation of car parks (*The letters indicate different groups at the $p \leq 0.05$ level)

3.3 In-park Road Circulation

The values measured in the road circulation in the park were found to be statistically significant at the $p \leq 0.05$ level. Accordingly, it is seen that it partially complies with the standards in Soğanlı Botanical Park with 69.23% and Hüdavendigar Park with 22.26%, while it complies with the standards in Reşat Oyal Cultural Park with 56.25%. (Fig. 6).

Road widths were measured between 150–250 among the side roads of all parks and 300–800 cm on main roads and they were determined to comply with the standards. No guidelines were observed along with the road circulations in the park and this creates a problem, especially for the visually impaired. Materials such as granite paving stone, interlocking paving stone, concrete, cube stone, etc. were used on the roads. Although these materials are non-slip materials, they are partially suitable due to level differences and damage on the ground. While there is no pavement in the road circulation in Merinos Park and Hüdavendigar City Park, it was observed that there are sidewalks in other parks and they comply with the standards in terms of width. Also, there are ramps and stairs in the road circulation. Ramp widths are in different sizes (80–120-150 cm) in Reşat Oyal Cultural Park and Soğanlı Botanical Park and are partially suitable. In other parks, they were measured as 120–150 cm and conform to the standards. Although there are no warning signs at the beginning and end of the ramps and it was observed to possibly create a danger for people with disabilities, and also it has been determined that the handrail that should be on the side of the ramp is only in Merinos Park. The step heights of the stairs were

Table 3 Suitable of the car parks to the standards

Standards	Reşat Oyal Cultural Park			Merinos Park			Soğanlı Botanical Park			Hüdavendigar Park		
	S	PS	US	S	PS	US	S	PS	US	S	PS	US
Number of disabled car parks		*			*				*			
Maximum distance of the passenger drop-off and pick-up areas to the entrance			*	*				*		*		
Parking space width			*		*			*				*
Minimum width of passenger drop-off and pick-up areas			*			*			*			*
Minimum length of passenger drop-off and pick-up areas			*			*			*			*
Car park guidance			*									
Distance between two parking spaces for wheelchairs			*			*			*			*
Disabled sign in the car park		*			*			*				
Curb ramp		*						*			*	

Given as suitable S: suitable, PS: partially suitable, and the US: not suitable.

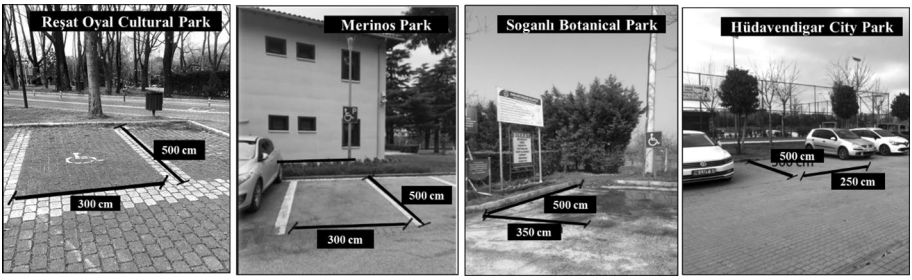
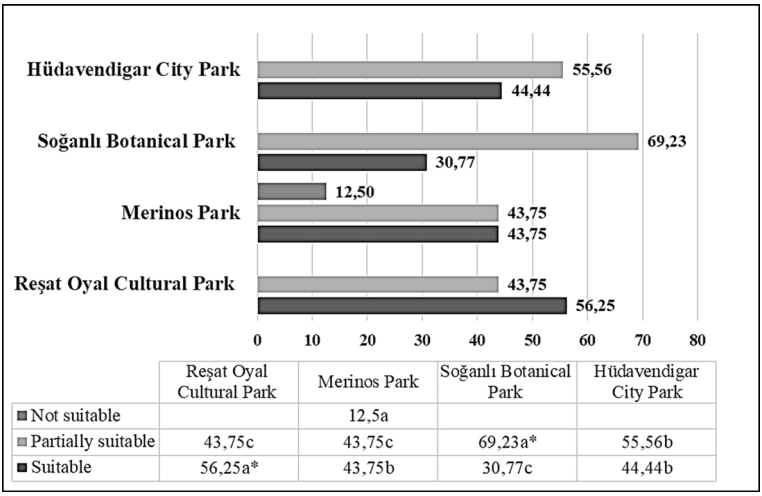


Fig. 5 Measurements related to car parks (made by B. Akgun Piskin)



	Reşat Oyal Cultural Park	Merinos Park	Soğanlı Botanical Park	Hüdavendigar City Park
Not suitable		12,5a		
Partially suitable	43,75c	43,75c	69,23a*	55,56b
Suitable	56,25a*	43,75b	30,77c	44,44b

Fig. 6 Statistical evaluation of road circulation (*The letters indicate different groups at the $p \leq 0.05$ level)

measured as 15–20 cm only in Reşat Oyal Cultural Park and are appropriate. They are high at 16–20 cm in Merinos Park and are not suitable. The stairs in Reşat Oyal Cultural Park, on the other hand, are made of cobblestone and rubber materials and are suitable. Stairs in other parks consist of different materials such as marble, wood, cobblestone, and concrete. It was observed that especially marble stairs can be slippery according to the season, which creates a problem for the people with disabilities. Besides, there is no perceivable surface on the landings before the stairs and at the end of the stairs in all of the parks (Table 4). Examples of road circulation are given in Fig. 7.

3.4 Reinforcing Elements

It has been found that the reinforcement elements in the city parks are statistically significant at the $p \leq 0.05$ level in terms of compliance with the standards. That is, the measured criteria suitable with the standards in Reşat Oyal Culture Park with 63.16%, Hüdavendigar and Merinos parks with 50%, and Soğanlı Botanical Park with 44.44%. (Fig. 8).

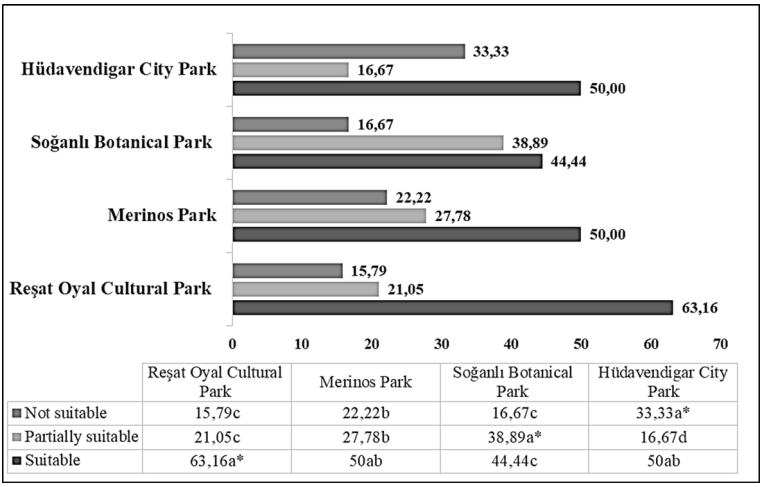
The height of the seating parts of the benches in the city parks from the ground is appropriate. While the backrest heights are under the standards (80–85 cm) in Reşat Oyal

Table 4 Suitable of the road circulation to the standards

Standards	Reşat Oyal Cultural Park			Merinos Park			Soğanlı Botanical Park			Hüdavendigar Park		
	S	PS	US	S	PS	US	S	PS	US	S	PS	US
Width of the road	*			*			*			*		
Bidirectional pass width	*			*			*			*		
Guideline												
Material nature of the road		*			*			*			*	
Pavement width	*						*					
Pavement height	*							*				
Pavement surface		*						*				
Pavement slope							*					
Ramp width		*		*				*		*		
Landing depth on ramps		*		*								
Handrail height used on the side of the ramp				*								
Warning marking depth in the beginning and at the end of the ramp												
Ramp slope		*			*			*			*	
Stairstep width		*				*		*		*		
Stairstep height	*					*		*			*	
Landing height on the stairs	*			*								
Landing depth on the stairs	*			*								
Handrail usage width in the middle of the stairs					*							
Handrail usage height in the middle of the stairs					*							
Stair walking surface	*				*			*			*	
The tactile surface on the landings before the steps and at the end of them												
Landing surface	*				*							
Ramp surface		*			*			*			*	

Given as suitable S: suitable, PS: partially suitable, and the US: not suitable.

Fig. 7 Measurements related to road circulation (made by B. Akgun Piskin)



	Reşat Oyal Cultural Park	Merinos Park	Soğanlı Botanical Park	Hüdavendigar City Park
Not suitable	15,79c	22,22b	16,67c	33,33a*
Partially suitable	21,05c	27,78b	38,89a*	16,67d
Suitable	63,16a*	50ab	44,44c	50ab

Fig. 8 Statistical evaluation of reinforcing elements (*The letters indicate different groups at the $p \leq 0.05$ level)

Cultural Park, it was observed that some of them are partially suitable because they do not have backrests in other parks. The width left next to the seating elements for wheelchair users was measured as 100–120 cm in all parks and complies with the standards. However, while the distance in front of the seating elements is under the standards in Reşat Oyal Kültürpark, in other parks, since the seating units are located directly on the road in some places, it was considered partially appropriate. Again, the approach distance to the benches with tables for the wheelchair users was measured at 60 cm in the Reşat Oyal Cultural Park

and it complies with the standards. In other parks, it is not suitable because it is less than that distance. On the other hand, the tap heights of the fountains in Reşat Oyal Cultural Park and Hüdavendigar City Park vary from place to place, but are between 70–110 cm and are not under the standards. In other parks, it was measured as 80–120 cm and is suitable. The height of the trash cans from the ground was measured between 65–90 cm, making them partially suitable while some of the garbage cans were located directly on the road. Maximum heights of the signboards showing directions and signs on the road were measured between 200–350 cm in all parks and do not comply with the standards. Similarly, the minimum bottom clearances of the lighting elements were measured between 400–500 cm and they were determined not to be suitable. All lighting elements do not have the necessary equipment buttons for the people with disabilities (Table 5). Examples of reinforcing elements in the parks are given in Fig. 9.

Also, on the side of the road in the parks, boundary elements have been used that aim to separate the pavement from the road, preventing vehicles from parking and preventing vehicles from entering pedestrian roads, etc. and it was determined that they were generally in the form of concrete cork or iron pontoons. There is no warning light or warning sign in front of the boundary elements. This situation may create negative effects on the visually impaired. There is one handicapped WC in all parks and easy access is provided. Except for Soğanlı Botanical Park and Hüdavendigar City Park, there is no direction to WCs in other parks.

4 Discussion

This study is about Bursa City Parks and the study concluded that in general, the parks are partially in compliance with the standards. Although depends on the park, it was observed that there are problems in terms of people with disabilities. The most important problem seen in all parks is that there is no guideline at the park entrances and on the roads inside the park. Also, tactile surfaces on stairs in parks, reinforcing buttons on lighting elements, warning signs, etc. onramps are not available. This state is observed to have the possibility to prevent the people with disabilities from wandering freely in the parks. Materials such as cube stone, granite, and cobblestone are used at the entrances of the park, and there are differences in the ground level, especially at the entrances of Reşat Oyal Cultural Park, Soğanlı Botanical Park, and Hüdavendigar City Park and this poses a problem for the people with disabilities. While the minimum unobstructed passage opening, pavement width, and slopes at the entrances are under the standards, the lower clearances of the pendent advertising signs and plates are generally not under the standards. The study coincides with the studies of different researchers. That is to say, in their studies in different parks, Kuter and Çapraz (2020) and Ankaya and Aslan (2020) emphasized that there should be tactile surfaces and guidelines for visually impaired individuals, and they mentioned that there are elevation differences in cobblestone pavements and this situation poses a danger.

Considering that people with disabilities can come with their vehicles, except for public transportation, it is necessary to have a car park reserved for them. According to the current standards, there should be 1 disabled parking space in a 50-car parking lot and it should be visible and under appropriate standards (Turkish Standards Institute, 1999, ÖZİ 2011, Word Health Organization, 2011). This study concluded that the car parks in the city parks are insufficient in number and even there is no disabled car park in Hüdavendigar

Table 5 Suitable of the reinforcing elements to the standards

Standards	Reşat Oyal Cultural Park			Merinos Park			Soğanlı Botanical Park			Hüdavendigar Park		
	S	PS	US	S	PS	US	S	PS	US	S	PS	US
Height of seating parts of the benches	*			*				*		*		
Height of the backrests of the benches	*				*			*			*	
Depth of seating elements	*			*			*			*		
Required width for the disabilities that require wheelchairs next to seating elements	*			*			*			*		
Distance in front of seating elements	*				*			*			*	
Distance between seating elements	*			*			*			*		
The surface of seating elements	*			*			*			*		
Height of table benches	*			*			*			*		
Minimum depth required for wheelchair accessible benches with tables	*					*			*			*
Tap height in fountains			*		*			*				*
The approach area of the fountains		*				*		*				*
Height of the mouth of the garbage cans		*			*			*				*
Distance of the garbage can from the road		*			*			*			*	
Maximum height of signboards on the road showing directions and signs			*			*			*			*
Minimum bottom space of pendent signs and advertising signs			*			*			*			*
Character pen thickness to height ratio		*		*			*			*		
Lighting element minimum bottom clearance	*			*			*			*		
Height of reinforcing buttons on the lighting element												
Minimum passage width in front of the lighting element	*			*			*			*		

Given as suitable *S*: suitable, *PS*: partially suitable, and the *US*: not suitable.

Fig. 9 Measurements related to reinforcing elements (made by B. Akgun Piskin)

City Park. The parks with disabled car parks, on the other hand, are generally not under the standards. There are no directive signs in the disabled car parks in all parks. The minimum width and length of the passenger drop-off and pick-up areas and the distance between the two parking spaces for wheelchairs are also not suitable. Although there are disabled signs on the ground or in the form of a sign in the car parks, they appear to be lacking in terms of elements such as warning, lighting, denouncement, etc. Similarly, Türcan İmren (2019), Sarı et al. (2020), and Aykal et al. (2017) stated in their studies in different parks that there is no parking lot reserved for the people with disabilities, that there are no direction signs and lines in the park at the entrance and exit to the parking lots, and they emphasized that there is not enough space, especially for wheelchair users.

While it is important to integrate the solutions needed to encourage people with disabilities to use the parks into master plans (Rowe, 2019), from an interactive perspective, recreation facilities in parks should be designed to provide appropriate experiences for the people with disabilities (Rigolon et al., 2019). Thus, in this study, although it is seen that the main and side road widths of the city parks comply with the standards, there are some limitations. Namely, although the floor material used in the road circulation is not slippery, it may create difficulties for people with disabilities, especially since there are damaged areas in places where cobblestone and cube stone are used. There is no pavement along with the road circulation in Merinos City Park and Hüdavendigar City Park, which is a positive feature for the people with disabilities. It was observed that there are sidewalks in other parks, the sidewalks are partially suitable in terms of surface and height and will pose a problem. Although there are ramps in the parks for the use of the people with disabilities along the way, there are only handrails on the sides of the ramps in Merinos Cultural Park. Also, there are stairs at the entrances of the venues such as restaurants, cafes, etc. in the parks, the heights of the stairs are higher than the standards and are not suitable. The circumstances that there are no tactile surfaces and warning signs etc. on the stairs and

at the beginning and end of the ramps and the stair surfaces are slippery due to weather conditions are not suitable for the these people. While different researchers stated in their different studies that the height and width of the stairs in the parks are different, they also mentioned that materials such as cube stone, concrete slab, and lean concrete are used on the walkways and that some of them are damaged, which is not suitable for the people with disabilities to go around easily (Kuter & Çakmak, 2017; Olgun & Yılmaz, 2014). Again, Şenkaya et al. (2019) emphasized that there are no handrails and tactile areas on the stairs in a park in the example of Istanbul and that they pose danger. Arı and Güngör (2019) stated that manual wheelchair users in the park experience access problems due to insufficient flooring.

Moreover, urban furniture and equipment and markings should be placed in a way that does not restrict the mobility of the disabled, and dangerous negativities should be avoided (Çelik et al., 2015). This study, on the other hand, concluded that the equipment elements in the parks are generally partially suitable for the use of people with disabilities. The height and depth of the seating units, the distance between the seating elements, the surface of the seating elements, and the width required for the disabilities that require wheelchairs are under the standards in all parks. However, the heights of seating units vary in Soğanlı Botanical Park. Seating elements are generally positioned on the road and the distance in front of them varies. Fountains, on the other hand, vary according to the parks, but are generally below or above the standards and are partially suitable. On the other hand, it was observed that the garbage cans in the parks are often located directly on the road, which will pose a problem for the people with disabilities. Both the lighting elements in the parks and the minimum lower clearances of them as well as the minimum passage widths in front of them are under the standards in all parks. But the maximum height of the direction and signboards is higher than the standards in other parks except for Reşat Oyal Cultural Park and is not suitable. Moreover, the lack of directions showing disabled WCs in the parks creates a problem. Similarly, studies in different parks concluded that lighting elements, garbage cans, etc. on the in-park pedestrian roads did not have a different texture and color contrasts so that people with disabilities could feel their environment and be warned and emphasized that toilets were not designed according to the standards (Danesharasteh and Balyemez, 2017; Mohandespor & Yücel Caymaz, 2019). Türcan İmren (2019) and Arat and Bulanık (2020), on the other hand, state that the garbage cans, which are among the reinforcing elements, in different park examples do not comply with ergonomic standards, there are trash cans on some pedestrian roads and this prevents wheelchair users, and there was not enough room for maneuver for wheelchair users in seating units.

5 Conclusions

Consequently, the urban parks in Bursa are partially suitable for the use of people with disabilities, and it is important to eliminate existing problems and arrange the parks under standards for these individuals to use the parks equally as other individuals. In all parks, the existence of guidelines, which is important for people with disabilities, redesigning the signs with embossed, voiced, etc. arrangements, and increasing the disabled car parking spaces while arranging them following the standards are necessary. Moreover, to ensure comfortable movement of the people with disabilities in the park, first of all, the roads should be examined and maintained, and the areas that may pose a danger to these people should be limited. The stairs and ramp solutions in the road circulation should be examined

and handrails, tangible surfaces, etc. should be implemented where necessary under the standards so that their effective use should be ensured. It is important to arrange the floorings around the reinforcing elements in different textures and colors so that they can be noticed in the parks, especially by visually impaired individuals. On the other hand, it is necessary to have applications such as leaving appropriate spaces in front of the seating units, having reinforcing buttons on the routing plates, and placing the garbage cans in pockets in a way that they do not pose a danger, etc. so that they are made suitable in terms of standards. Nevertheless, it should be prevented from creating a danger by surrounding areas such as ponds and water surfaces etc. in the parks with border elements. In addition, controlling and maintenance should be carried out regularly in order to be sustainable with the completion of deficiencies. Nevertheless, it should be prevented from creating a danger by surrounding areas such as ponds and water surfaces etc. in the parks with border elements. In addition, controlling and maintenance should be carried out regularly in order to be sustainable with the completion of deficiencies.

In the light of all these recommendations, in Bursa which is the fourth largest city of Turkey, people with disabilities will be able to participate in social life and benefit from the parks on equal terms with other people use parks by improvement of existing deficiencies. In order to make the parks livable, it is important that the plan decisions and design details are made together with the relevant stakeholders, professional experts, public institutions and organizations and non-governmental organizations. However, this study, which is only a city park, will shed light on the work to be done in all open green areas on a regional and national scale, and will contribute to the creation of design awareness for everyone.

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Declarations

Conflict of interest The authors declare no competing interests.

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