Does play-based experience provide for inclusiveness? A case study of multi-dimensional indicators

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Abstract
Playgrounds are not only for play and fun; they are places that offer diverse experiences for all groups of children. Outdoor playgrounds have been studied as an element of public space for their ability to offer an array of amenities and attributes. In addition to design and planning aspects, inclusiveness is a vital attribute of playgrounds. Inclusiveness within playgrounds provides accessibility for all children regardless of age, gender, and ethnicity, as both physical and social access are considered. Given the rapidly changing global agenda affected dramatically by the COVID-19 pandemic and Black Lives Matter movement, playgrounds have gained even more attention and the importance of inclusiveness has become more prevalent. This study examined the inclusiveness of play-based experiences within a playground in San Antonio, Texas, using mixed methods. The study utilized observational methods, behavior mapping, secondary data for spatial mapping, and a survey conducted in order to understand the perception of playground users. This study evaluated the inclusiveness of the playground and analyzed social and physical accessibility relative to the playground by assessing the diversity of users in terms of age, gender, ethnicity, and disability. The findings of this study show that there is a need for additional studies yielding proposed improvements revolving around playground inclusivity. The study results show that urban designers, urban planners, and policymakers need to collaborate in order to create opportunities that work to eliminate social and physical disparities and that ultimately enhance inclusiveness in playgrounds.

Keywords Playground · Inclusiveness · Indicators · Survey · Behaviour

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1 Introduction

Children engage with the environment through various practices, and playgrounds are major venues for these practices. Spending time within playgrounds provides physical and psychological health benefits, including lower rates of obesity, low bone density, well-being, and unsocial manners (Carver et al., 2008; Koplan et al., 2005; Mason & Danby, 2011). Children also have the opportunity to interact with natural and cultural elements of their environment. Playground program elements also establish inclusiveness for children of different ages, gender, and ethnic groups as well providing accessibility options (Edwards et al., 2015).

However, many playgrounds do not consider inclusive aspects regarding children, and this typically results in inequitable, low-quality, and abandoned urban areas. Inclusiveness refers to playgrounds as being accessible to different groups regardless of age, gender, and ethnicity in terms of socio-demographic access and spatial aspects (Wang et al., 2015; Landman, 2020).

Socio-demographic aspects are vital considerations as playground quality and design for diverse uses affects preference and patterns of visitation for both children and parents. Designing playgrounds for various age groups, genders, and ethnicities also plays into the attributes of surrounding neighborhoods, including playground maintenance, crime, loitering, etc. (Ries et al., 2008; Jenkins et al., 2015; Vaughan et al., 2013). As several studies highlighted, these socio-demographic characteristics may result in inequalities in equal distribution, particularly among disadvantaged individuals who are part of low-income and/or high-percentage communities (Jemmali, 2019). Playground usage for many children is also dependent upon parental access as they provide transportation and general guidance (Sallis et al., 1997). Playgrounds serve key roles in the interaction of various demographic groups.

While some studies concentrated on the spatial aspects of playgrounds, playground inclusivity has been under-explored from both social and physical standpoints, particularly in the U.S. Considering the recent global agenda of the COVID-19 pandemic and Black Lives Matter movement, playgrounds have gained more attention in order to address potential concerns for children.

The primary goal of this study was to assess the inclusiveness of playgrounds from socio-demographic and physical access points of views. The study specifically examined user behavior during their time at the playground and identified whether current playground attributes were inclusive within a diverse, urban context.

2 Previous studies

2.1 Play as child rights

Play has been recognized as a right of children in the Declaration of the Rights of the Child since 1954 (U.N. Commission on Human Rights, 1959). It declares essential parts of play that develop physical, social, mental, and educational aspects in children. In addition, some other global organizations, including UNICEF, recommend having play and participation by children present within cities to improve aspects
of livability and equity (UNICEF, 2000). Later on, the United Nations Convention on the Rights of the Children (UNCRC) also acknowledged that play is an essential human right of each child (UNCRC, 1989). The UNCRC also addressed the extra considerations of children who are minorities, have disabilities, and are female (UNCRC, 2013). The key intention of these actions was to provide an ideal mechanism for kids to play freely without pressure or stress of any kind being placed on them (Ginsburg et al., 2007).

2.2 Socio-demographic features (age, gender, ethnicity, disability)

Playgrounds are designed for various groups of children, and meeting the needs of all age groups is imperative. Program elements including design ergonomics, color, texture, and type should be adjusted accordingly. Refshauge et al., (2015) conducted a post-occupancy evaluation within a playground in Copenhagen, Denmark, and found that since many children attend childcare, their park use and play times are different from other age groups. Toddlers play with more functional program elements instead of teamwork or object-based elements (Frost et al., 2004; Hughes, 2009; Refshauge et al., 2015). Pre-schoolers engage with vigorous, constructive elements for body balance and moving activities with same-age friends (Johnson et al., 1999; Perry, 2003). School-aged children utilize more versatile activities with physical and mental collaboration with program elements (Johnson et al., 1999; Hughes, 2009).

Another critical aspect of inclusivity is considering the gender for playground design and equipment. For gender differences, program elements are preferred based on physical and sensory aspects of play, particularly after the pre-school age. Refshauge et al., (2015) also found no significant difference between program element usage; however, girls used playgrounds less often than boys. In another study, Barbu et al., (2011) found the nexus between age and gender changes around the age of three, as pre-school boys tend to play alone as compared to pre-school girls on playgrounds. However, this trend has shifted, as many other studies also documented, as boys utilize playgrounds more frequently than girls by engaging with more vigorous games (Evenson et al., 2016; Joseph & Maddock, 2016).

Ethnicity is one of the primary socio-demographic characteristics but is a complex aspect for addressing playground vitality. Changing demographic patterns of communities also alters built environment features, and they need to be addressed by providing a more inclusive design for everyone. Blatchford et al., (2003) observed that girls tend to remain within the same ethnic groups during play. The same study found that 37% of children remained within the same ethnic group, while 25% of them were within mixed ethnic groups for activities. However, mixing within ethnic groups reduced with the increase of age. On the other hand, Huberty et al., (2011) found no significant difference among race and ethnicity categories for these activities. Similarly, Kaczynski et al., (2013) conducted a study with over 2,000 participants and found no significant difference among white and non-white children, but noted that white children were more active than non-whites in open space and trail program elements.

In addition to ethnicity, disabilities call for the consideration of ergonomic design in playgrounds in addition to the mental and social inclusiveness of the environment.
Ripat & Becker (2012) conducted a qualitative study by interviewing 20 participants among children with disabilities. The findings showed that playgrounds should offer balanced and various challenges, that designers should overcome design limitations considering ergonomics and accessibility, and playgrounds should highlight inclusivity even though the study did not provide direction for the last approach. Some studies concentrated on the nexus between playground usage and children with autism and highlighted that playgrounds need more socialization opportunities and imaginary play for these users (Lillard, 2015). Some other studies developed methods to observe children with disabilities by focusing on playground safety, structure, and supervision (Massey et al., 2018; Grady-Dominquez et al., 2019).

Program elements and a variety of design features might also be indicators for frequent playground use. Little & Eager (2010) conducted a behavioral analysis with 38 children in Sydney, Australia, to observe children’s playground element usage preference. The study documented that children prefer attractive and exciting equipment. Furthermore, they build up new experiences with the more sophisticated program elements. In another study, Dyment and O’Connell (2013) studied four pre-school playgrounds in Australia to understand the locations and elements of the playgrounds that were more preferable to children. After obtaining almost 2,500 observations, the study revealed that children prefer natural elements the most, with sandpits being the least. Children preferred softball fields and paved areas the most in one playground while spending most of their time in sandpits in another. Sandpit areas were the subject of mixed findings. Cohen et al., (2020) documented that having a plethora of playground equipment tends to invite more children, particularly spinners, and that splash pads within playgrounds attract more children than those that do not include such activities.

2.3 Accessibility (physical)

In addition to non-physical features, physical accessibility to the playground plays an essential role in inclusivity. Understanding the physical aspects of the playground provides a snapshot of the overall pattern for children, parents, playground managers, and local officials. For this purpose, Talen & Anselin (1998) performed spatial accessibility calculations for playgrounds. Other studies included commuting time to access the point of interest (POI), in this case, playgrounds (Lindsey et al., 2001; Yildirim et al., 2021; Sister et al., 2009) analyzed the service area of the playground by utilizing digital tools, i.e., Thiessen polygons, and found that playground users consider proximity and specific program elements for their preference. The importance of proximity is also in line with many other studies (Giles-Corti & Donovan, 2002; Jansson, 2010). Proximity also results in more social engagement among the parents who accompany children for commuting and walking to the playgrounds (Bennet et al., 2012; Smoyer-Tomic et al., 2004) also measured the spatial accessibility to the playgrounds by computing buffer zones and other gravity models. Mar tori et al., (2020) expanded this approach by considering the congestion factor into the playground accessibility context. In line with other studies, the study also found that there was no significant association between accessibility and ethnicity (McCarthy et al., 2017). However, other studies found a strong relationship between ethnic
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Based on this, low socio-economic groups and minorities tend to have limited access to such areas.

3 Study Approach

The study performed a mixed-methods approach in a playground in San Antonio, Texas. The study area replaced a 1970s-era children’s play structure with a series of linked and flexible spaces that provide opportunities to play and socialize for people of all ages, abilities, and backgrounds (Fig. 1) (Aman & Yildirim, 2019).

The approach combined more than one data source and methodology in order to obtain a more comprehensive understanding of the inclusivity of the playground (Creswell & Creswell, 2018; DePoy & Gitlin, 2016). With regard to qualitative methodologies, the study conducted bilingual questionnaires (English and Spanish) both online and on-site from randomly selected playground users, including employees, visitors, and parental respondents who had visited the study area with children from 0 to 18 years. At the same time, the online version was distributed by the Hemisfair Park Area Redevelopment Corporation (HPARC) via their social media platforms and e-mail newsletters. The interview questions concentrated on playground use habits, preferences, and socio-demographic information of users by including open-ended, semi-structured, and rating questions (Table 1). Each participant took between

Fig. 1 Study area with assessed program elements. (Source: MIG, Inc.)
5 and 15 min to complete the survey. A total of 132 participants were surveyed even though the researchers aimed to have more participants.

Regarding non-participant observation and behavioral mapping, the primary goal was to understand patterns of interaction between children and the program elements of the playground (McKenzie et al., 2000; Flick, 2009; Marušić, 2011). Since the survey questions were not able to address all research interests of this study, particularly for aspects of inclusivity, the study opted for performing such supportive analyses. This method also helped to visualize the concept of inclusivity.

On-site surveys, observation, and behavioral mapping approaches took place at the same time within the study area, both on weekdays and weekends as well as during different time intervals each day. While a party of researchers conducted surveys, the other party performed behavioral mapping analyses and observation by taking notes and sketching children’s interactions within specific program elements.

### 4 Findings

#### 4.1 The routine of playground use and preferences

Regarding the use of the playground, as can be seen in Table 2, almost 60% of the participating parents stated that they were residents of the city, followed by visitors (slightly more than 20%). The rest of the participants were employees of various playground-related and adjacent businesses. Parents preferred to visit the study area primarily for the playground (68%) while other participants preferred to walk around (10%) and enjoy the local restaurants and food trucks (6%). The majority of participants (55%) visited the playground at least weekly or monthly. This frequency of visitation was followed by daily use of the playground (15%). Since the playground included water features, the study aimed to understand the preference for water features as program elements. Thus, more than half of the participants (56%) mentioned they visited the playground for the water features. Regarding the accessibility of participants, there was a surprising pattern. More than 70% of the participants commuted to the playground with their personal vehicles, while almost 20% accessed the playground by walking. On top of that, only 24% of the participants had access to the park within 5 to 10 min. About 5% of the participant parents mentioned their children...
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Table 2: Descriptive statistics of park use habit

| Features                                                                 | Questionnaire (N=132) % (100) |
|--------------------------------------------------------------------------|--------------------------------|
| **Resident Or Other**                                                   |                                |
| Resident                                                                 | 78                             | 59.1 |
| Visitor                                                                  | 28                             | 21.2 |
| Employee (Of The Playground)                                            | 10                             | 7.6  |
| Employee (Of Business Within The Playground)                            | 7                              | 5.3  |
| Employee (Of Business Nearby The Playground)                            | 9                              | 6.8  |
| **What-To-Do**                                                          |                                |
| Walking                                                                  | 13                             | 9.8  |
| Playground                                                               | 90                             | 68.2 |
| Other (Working)                                                         | 21                             | 15.9 |
| Having Lunch/Brunch/Dinner                                              | 8                              | 6.1  |
| **When-To-Do**                                                          |                                |
| First Time                                                               | 20                             | 15.2 |
| Daily                                                                    | 20                             | 15.2 |
| Weekly                                                                   | 36                             | 27.3 |
| Monthly                                                                  | 37                             | 28.0 |
| Annually                                                                 | 6                              | 4.5  |
| Other                                                                    | 13                             | 9.8  |
| **What Time-To-Do**                                                     |                                |
| First Time                                                               | 14                             | 10.6 |
| Morning                                                                  | 50                             | 37.9 |
| Afternoon                                                                | 33                             | 25.0 |
| Evening                                                                  | 33                             | 25.0 |
| Night                                                                    | 2                              | 1.5  |
| **Program Elements**                                                    |                                |
| Water Features                                                           | 75                             | 56.8 |
| Others                                                                   | 57                             | 43.2 |
| **Commuting Mode**                                                      |                                |
| First Time                                                               | 12                             | 9.1  |
| Walking                                                                  | 24                             | 18.2 |
| Public Transportation                                                    | 1                              | 0.8  |
| Personal Vehicle                                                        | 94                             | 71.2 |
| Other                                                                    | 1                              | 0.8  |
| **Commuting Time**                                                      |                                |
| First Time                                                               | 8                              | 6.1  |
| 5–10 min                                                                 | 32                             | 24.2 |
| 10–20 min                                                                | 63                             | 47.7 |
| 30 min                                                                   | 22                             | 16.7 |
| 60 min                                                                   | 6                              | 4.5  |
| Greater Than 60 min                                                     | 1                              | 0.8  |
| **Having Disability**                                                   |                                |
| Yes                                                                      | 5                              | 3.8  |
| No                                                                       | 127                            | 96.2 |

having a disability; therefore, the study assessed their verbal responses in detail rela-
tive to playground inclusivity aspects.

4.2 Socio-demographic profile

With regard to socio-demographics, more than half of the parents (52%) were between the ages of 25 and 44, with the lowest ranking parental group between the ages of 65 and 74 (2%). With no surprise, female participants were much higher than male at almost 70%. Furthermore, almost half (48.5%) of parental participants stated they were Hispanic, while 60% of the participants selected White as ethnicity (Table 3).

Regarding behavioral observation within the study area, 369 observations of children were recorded in one weekday and one weekend period throughout different times of the day. The observations generally concentrated on the engagement of different age groups within program elements and activities, as well as their socio-demographic characteristics. Both girls and boys played within the Waterworks area the most, among other program elements. Of these 369 observations, more than 30% played in the Waterworks area with girls as the majority (65%). All age groups were observed within each time interval except for teenagers in this area. Approximately 46% of children were White and 44% Hispanic. In terms of activity, 60% of total observed children in the Waterworks area were very active, and 22% were doing

| Table 3 | Descriptive statistics of participants |
|---------|---------------------------------------|
| Category | Questionnaire (N=132) | % (100) |
| **Age** | | |
| 18–24 | 15 | 11.4 |
| 25–34 | 35 | 26.5 |
| 35–44 | 34 | 25.8 |
| 45–54 | 17 | 12.9 |
| 55–64 | 8 | 6.1 |
| 65–74 | 3 | 2.3 |
| 75–84 | 10 | 7.6 |
| 85-Above | 10 | 7.6 |
| **Gender** | | |
| Women | 92 | 69.7 |
| Men | 39 | 29.5 |
| No Response | 1 | 0.8 |
| **Hispanic, Latino** | | |
| Yes | 64 | 48.5 |
| No | 66 | 50.0 |
| No Response | 2 | 1.5 |
| **Ethnicity** | | |
| American Indian | 10 | 7.6 |
| Asian | 3 | 2.3 |
| Black/African American | 3 | 2.3 |
| White | 79 | 59.8 |
| Other(Hispanic) | 25 | 18.9 |
| No Response | 12 | 9.1 |
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sedentary activities. The observation of the frequently-used Waterworks area was followed by the Play Square area that included 17% of the total observation numbers. About 70% of the total observations were girls, and all age groups were observed on this site. Considering the ethnicity, 56% of children were Hispanic while 31% were White. Regarding activity level, 45% of the children were sedentary, and 32% were active.

The least number of observations were counted in the Teen Gathering areas, which only accounted for 7% of the total observations. About 46% of these were Hispanic, and 35% were White. Children were generally sedentary (42%) or walking (38%) in this area. The Play Lawn area followed the Teen Gathering area with 9% of the total observations. About 50% of the children were White, and 37% of them were Hispanic. The majority of the children were walking within this area (41%) or sedentary (34%).

F: female, M: male, C: children, T: teenager, A: adult, O: older, H: Hispanic, AA: African-American, W: White, Ot: Other, S: sedentary, W: walking, V: Vigorous.

Notably, most of the observed children were girls in all program elements (only the Sand Play area had an even number of girls and boys). From this, the study observed that girls have been utilizing the park elements more than boys, which is somehow a different pattern than other studies. While the Waterworks area was the favorite program element for both girls and boys, girls tended to play within the Play Square and Play Village areas while boys were more interested in the Sand Play and Net Play areas (Fig. 2).

Regarding patterns within age groups, there were no children observed in the Teen Gathering and Play Lawn areas (Fig. 3). Perhaps the former was predictable; however, the latter was surprising. Similarly, there were no teenagers observed in the Net Play and Waterworks areas. No adults or members of the older population were observed in the Play Village or the Play Lawn area.

Looking at the nexus between ethnicity and playground elements, there was a noteworthy pattern. Observing African-Americans children showed that they generally used the Net Play, Waterworks, Play Village, and Sand Play areas, respectively, while Hispanic and White children played mostly in the Waterworks, Play Square, and Play Village areas. Furthermore, African-American children rarely utilized the Play Square and Play Lawn areas while Hispanic and White children rarely utilized the Teen Gathering areas (Fig. 4).

In terms of activity types, sedentary play occurred within the Play Square and Waterworks areas the most; the Sand Play and Net Play had the least observed sedentary activities (Fig. 5). Walking as an activity yielded a similar pattern of sedentary observations for both the greatest and least observations. However, vigorous activity emerged in the Waterworks, Sand Play, and Net Play areas where the majority of observations were conducted.
Table 4  Non-participant behavior observation results

| Target Area                        | #Observation | Age Group | Ethnicity | Activity Level |
|-----------------------------------|--------------|-----------|-----------|----------------|
|                                   |              | C | T | A | O | H | AA | W | Ot | S | W | V |
| Net Play                          | F: 25        | 4 | 0 | 0 | 1 | 11| 4  | 8 | 3  | 9 | 1 | 15|
|                                   | M: 18        | 4 | 0 | 1 | 0 | 6 | 7  | 6 | 0  | 0 | 3 | 15|
| Play Village                      | F: 30        | 4 | 4 | 0 | 0 | 15| 4  | 11| 0  | 16| 5 | 9 |
|                                   | M: 18        | 4 | 0 | 0 | 0 | 7 | 4  | 6 | 1  | 8 | 2 | 8 |
| Play Square                       | F: 44        | 4 | 3 | 0 | 3 | 24| 2  | 14| 4  | 22| 13| 9 |
|                                   | M: 18        | 4 | 0 | 2 | 3 | 11| 2  | 5 | 0  | 6 | 7 | 5 |
| Waterworks                        | F: 77        | 4 | 0 | 4 | 3 | 37| 7  | 31| 2  | 16| 14| 47|
|                                   | M: 41        | 4 | 0 | 0 | 1 | 15| 2  | 23| 0  | 11| 6 | 24|
| Teen Gathering / Community Garden | F: 15        | 3 | 1 | 1 | 2 | 8 | 2  | 5 | 0  | 6 | 7 | 2 |
|                                   | M: 11        | 3 | 1 | 1 | 2 | 4 | 3  | 4 | 0  | 5 | 3 | 3 |
| Play Lawn                         | F: 18        | 3 | 1 | 2 | 0 | 7 | 2  | 9 | 0  | 7 | 9 | 2 |
|                                   | M: 14        | 3 | 0 | 3 | 0 | 5 | 2  | 7 | 0  | 4 | 4 | 6 |
| Sand Play                         | F: 20        | 4 | 2 | 1 | 0 | 8 | 3  | 9 | 0  | 3 | 2 | 15|
|                                   | M: 20        | 4 | 2 | 0 | 1 | 7 | 4  | 9 | 0  | 3 | 0 | 16|
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5 Discussion

5.1 Child right
To achieve better playground environments from a child rights perspective, it is important to design and plan program elements and various facilities through the lens of child rights. Active participation of children as well as following the recent trends by adopting local history and cultural aspects increases the use of such environments (Francis & Lorenzo, 2002; Pearson & Howe, 2017). In other words, playground design and planning needs a thorough understanding that prioritizes child rights, participation of children, and inclusive playground design with state-of-art facilities based on the needs of the community.

5.2 Socio-demographic characteristics matter

This study aimed to understand the complex dynamics of inclusiveness within a playground context as a critical category of urban green spaces. The study found that 70% of participants visit green spaces for playground-related purposes. Some surprising observations were revealed with this study. One observation was that the percentage of female users (62%), which also accounted for 70% of survey participants, was much greater than male users, as opposed to Refshauge et al., (2015). Also, the playground was mainly used by Whites and Hispanics. Behavioral observation identified that 40% of users were White and 45% were Hispanic; this was further confirmed by survey participants as 60% of participants self-identified as White, and 19% self-identified as Hispanic.

5.3 Accessibility characteristics matter

Perhaps the most surprising contribution of this study is in regard to modes of access and travel time to the playground. Given that several other studies and public projects suggest that access and travel time to urban green spaces should be within ten minutes, this study calls special attention to this concern. The reason behind this concern was that almost three out of four people commuted with their vehicles to the playground, while walking, the ideal mode of access to urban green spaces, was less than one out of five people. Similarly, three out of four people had travel times greater than ten minutes to the area. Considering median values of access to green spaces by walking at both the national (73%) and City of San Antonio (43%) levels (TPL, 2020), this study shows that there is a greater need for planning, policy, and design strategies as such areas should be within a walkable proximity for all people to serve as an ideal inclusive environment.
Since the majority of park users commuted to the playground using their personal vehicles, it is noteworthy to mention potential reasons. The key reason might be due to the presence of state-of-the-art playground equipment, as 70% of park users who used a personal vehicle mentioned that they came to the playground for their children to use such equipment. The other 30% consisted of various other activities, including having lunch and/or dinner at the adjacent restaurants, working within the playground, or birthday and family gathering events. Based on these, it can be concluded that users opted to drive to the playground with longer access times because of the variety of state-of-the-art equipment and options for dining and other activities nearby.

5.4 Playground program design and elements matter

As many other studies suggested, the design and quality of urban green spaces have positive effects on attracting more users for activities and events (McCormack et al., 2010). For this reason, the study aimed to assess the nexus between state-of-the-art playground elements and user preferences. The majority (57%) of participants mentioned that they preferred water features among other program elements of the area. This is in line with many other studies (Giles-Corti & Donovan, 2002; Bozkurt & Woolley, 2020). Water features were followed by Adirondack Seating (36% of the total participants), Swings (27%), and Boomerang Climbers (25%). Based on the behavioral observation analysis, program elements offered various activity levels including sedentary options and walking. Vigorous activity levels were observed the least, and therefore designers and planning teams should work to increase those opportunities within playground design. On top of that, to provide a diverse playground environment, different ethnicities should be brought together. As the same analysis detected, the play habits of African-American children were relatively different from those of Hispanic and White children, except for interactions with water features.

While the study did not concentrate on the nexus between characteristics of playground users and the scarcity of certain components of play, the profile of play equipment along with particular areas in the playground demonstrated that all socio-demographic and socio-economic features were somehow addressed for children, except for the lack of African-American playground users. However, to tackle issues of component scarcity, the study proposes that the participation of children and the observation of playground behaviour be critical in the playground design process. Based on the feedback from true users of the playground, designers should then take into account how each component may address the variety of characteristics and needs of users.

6 Conclusions

This research aimed to highlight the extension of the inclusive aspects of urban green spaces to playgrounds through the consideration of socio-demographic characteristics, physical accessibility, commute time, and program elements of playground
design. Among the variables assessed, the study results identified that the playground studied was well balanced with regard to visitation frequencies throughout the day. Children tended to utilize water features more as expected as well as some other unique design elements of the playground. However, the mode of access and travel time for users needs special attention by park management, designers, and planners as most people drive with their personal vehicles to access the playground, often for over ten minutes. Also, children who have a physical disability need more program elements to engage with in the playground.

Looking at the socio-demographic features of the study, there was a balance between the age groups of parents between 18 and 54 years, though female parents were much more prevalent than male parents, as might be expected. However, ethnic diversity was lacking within the park as Whites comprised almost 60% of the total participants. So, it is suggested to invite other ethnicities into the playground.

Behavioral observation provided critical recalls for designers, managers, and planners of urban green spaces. As such, children and parents seemed more interested in water features and unique design elements. Also, as the observation identified, in order to enhance inclusivity within playgrounds, group play or team-related activities, such as Sand Play areas, should be encouraged and designed for. Moreover, program elements that offer more activities for different age groups, such as the Play Square, may also help to create more inclusive urban green spaces. In addition, design solutions that further facilitate socialization between parents, may also establish connections between children.

The implications of this study are two-fold. From a child rights perspective, each child has the right to play and use all play equipment in a playground. To address this concern, children and parental participation in the playground design process should be prioritized, in addition to the focus on play elements, socio-demographics, socio-economics and many other attributes in order to establish a more inclusive environment. From a planning and design perspective, as the findings of the study indicate, designers and planners should consider various aspects, including age-appropriate equipment, disability-appropriate equipment, and activity-appropriate equipment criteria from a child’s point of view to create more intentional and successful design strategies and management practices for playgrounds. Furthermore, observing the playground use behavior of children provides an extended understanding for research and practice. This approach may be enhanced by technological and participatory approaches for further implication.

The study is also subject to some limitations. First and foremost, there are numerous behavioral observation techniques, each with their own advantages and disadvantages. This study modified those methods and incorporated surveying playground users. Even though it is not possible to observe and record all human behavior or action, this study aimed to offer a snapshot of how a playground might better serve users through inclusivity. It is a complex phenomenon that should include a series of noble design, management, planning, and actionable intentions.

**Declarations**

**Conflict of interest** The authors have no relevant financial or non-financial interests to disclose.
Research involving Human Participants and/or Animals The questionnaire and methodology for this study was approved by the Human Research Ethics committee (aka. Office of Research Administration Regulatory Services) of the University of Texas at Arlington (Ethics approval number: 2019-0345)

Informed consent The University of Texas at Arlington (UTA) Informed Consent for Minimal Risk Studies with Adults

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My name is Yalcin Yildirim, and I am asking you to participate in a UT Arlington research study titled, “Perception of Park Users.” This research study is intended to identify and examine the amenities and services preferred by people visiting this park. You can choose to participate in this research study if you are at least 18 years old.

Reasons why you might want to participate in this study include to share your perceptions of park amenities and experiences as a visitor in order to help improve parks in other cities. Your decision about whether to participate is entirely up to you. Even if you choose to begin the study, you can also change your mind and quit at any time without any consequences. If you decide to participate in this research study, you will simply just need to answer the questions in the provided survey. This will only take between...
5 and 10 minutes.

The research team is committed to protecting your rights and privacy as a research subject. We may publish or present the results, but your name will not be used. If you have questions about the study, you can contact me at 817-522-6817 or yalcin.yildirim@mavs.uta.edu. For questions about your rights or to report complaints, contact the UTA Research Office at 817-272-3723 or regulatoryservices@uta.edu.

Please take all the time you need to read through this document and decide whether you would like to participate in this research study.

If you decide to participate, the completion and return of this survey indicates your voluntary agreement and consent. Please keep this form for your records.

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