The State of Inclusive Play Across the United States

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August 31, 2016

Abstract

Boston strives to be one of the most disability inclusive cities in the United States. We wanted to see how the city compares to other major cities throughout the country, and what factors are drivers of the quality of play. We ran a survey of the most inclusive playgrounds in 14 major cities (Phoenix, San Diego, Los Angeles, San Francisco, Portland, Seattle, Boston, New York City, Philadelphia, Washington, D.C., Nashville, Birmingham, Jackson, New Orleans), measuring each playground's features, maintenance and safety, inclusivity, and overall quality. The data reveal that higher per capita spending on parks and higher quality of services for disabled populations correlate with a higher overall score but do not correlated directly with higher levels of inclusivity. Boston performed just above the average city that we visited, finishing seventh overall and sixth for inclusivity. Using the information that we gathered from other cities, we provided recommendations for Boston to improve its quality of play.

Introduction

Playgrounds play an important role in children's development and quality of life. Many researchers have found that playgrounds help children develop physical, cognitive, and social skills by encouraging decision making, problem solving, independence, and social interaction (Kodjebacheva 2008). Unfortunately, many playgrounds across the United States do not provide inclusive opportunities for children with disabilities to grow and play. While there currently is no comprehensive study of the quality and inclusivity of different cities' playgrounds, Boston's Parks and Recreation Department strives to make Boston the most inclusive city in the United States, and The Playground Project: INDIGO seeks to use research and advocacy to aid Boston in this effort.

Towards this end, we conducted a study of the quality of playgrounds with a focus on inclusivity in several major cities across the United States. We were then able to determine how Boston compares to other cities and analyze our data in conjunction with other sets of data related to the quality of playground services overall and the quality of services for the disabled overall to reveal which factors seem to be driving differences in inclusivity. Isolating the drivers of these differences will help us better understand which barriers need to be focused on in order to provide inclusive play opportunities to all, as we expand our advocacy efforts within and beyond Boston.

We initially hypothesized that the inclusivity of playgrounds is driven by the quality of playgrounds in the city overall (measured via proxy variables such as per capita park spending and park access) and the visibility of and level of services available for people with disabilities (measured via proxy variables such as the quality of medical care for people with disabilities the relative employment rate of individuals with disabilities).

Methodology

To identify the change agents of the quality and inclusivity of playgrounds in major cities across the United States, we visited four to six playgrounds in each city. Since there is no clear determinant of the inclusivity of play spaces beyond ADA Compliance, we selected them based on visibility from online databases like local Parks and Recreation websites, a National Public Radio accessible playground database, and other websites that highlight spaces suitable for children of all abilities ("Playgrounds For

Everyone"). We used this method for its practicality, as parents with disabled children would use these same websites to find a playground suitable for their kids. While using this selection system might not allow us to be completely accurate in identifying the most accessible playgrounds, we feel that visibility to the community is important, and that any undocumented accessible play space is of little benefit to parents who are searching for a place to bring their children.

At each playground we visited, we ran a survey that we have created over the past two years. This survey measures a playground's quality based on its features, maintenance and safety, and inclusivity. This provides us with quantitative data to analyze and find trends. With this information, we were able to identify strengths and weaknesses across cities. Due to the time it takes to run the survey, approximately 45 to 60 minutes, and the transit time, we were limited in the number of play spaces we were able to include in our dataset. However, we were sure to have a minimum of four playgrounds per city. Once all the data was gathered, we compiled city averages and ran statistical analyses to find the strengths and weaknesses of each city and to test our hypothesis that the inclusivity of playgrounds would be driven by a city's park spending per capita, park access, and the level of support for people with disabilities.

Data

Table 1: City Level Data

City	Park Access	Spending Per Capita	UCP	LTS	Employment Ratio	Features	Maintenance and Safety	Inclusivity	Overall S
Phoenix	45	$98.23	1	21	24.5	4.54	3.87	2.93	3.77
San Diego	77	$108.31	16	9	22.6	4.17	3.94	2.79	3.59
Los Angeles	55	$67.62	16	9	22.6	4.25	3.88	3.82	4.00
San Francisco	99	$229.29	16	9	22.6	4.18	4.16	3.50	3.92
Portland	85	$144.50	18	3	22.6	4.43	4.25	3.43	4.01
Seattle	93	$265.11	26	2	24.2	4.24	4.02	3.38	3.86
Boston	98	$118.30	14	18	26.8	4.19	3.82	3.40	3.80
New York	97	$172.40	4	25	24.5	4.47	3.76	4.08	4.15
Philadelphia	93	$61.41	22	42	21.9	4.14	3.83	3.35	3.77
Washington	97	$343.35	8	11	24.0	4.54	4.28	3.88	4.23
Nashville	38	$73.49	32	48	17.5	4.02	3.63	3.27	3.64
Birmingham	.	.	13	50	17.8	4.11	3.72	2.97	3.58
Jackson	.	.	51	49	19.2	3.34	2.92	2.75	3.01
New Orleans	76	$84.06	24	37	22.7	3.75	3.75	3.22	3.55

We collected data from several different sources, and all data is presented in Table 1. A city's Park Access score refers to the percentage of city residents who live within a 10 minute walk of a public park. A city's Spending Per Capita refers to the per capita spending, in United States dollars, on public parks within the city. Both of these sets of data were collected from The Trust for Public Land.

A city's UCP Ranking refers to the 2015 ranking of the state that the city is in, according to United Cerebral Palsy in its highly regarded and frequently cited annual set of rankings assessing the extent to which states' Medicaid programs are meeting the needs of individuals with intellectual and developmental disabilities. These rankings are based on assessments of accessibility of services, quality of environment, and community participation by those with disabilities.

A city's LTS Ranking refers to the 2014 ranking of the state that the city is in, according to AARP, the Commonwealth Fund, and the SCAN foundation in their annual rankings of states based upon the states' services for the physically impaired. These rankings are based on assessments of a variety of experiences of older adults, people with physical disabilities, and family caregivers. A city's Employment Ratio refers to the ratio between the employment rate of adults with disabilities and the employment rate of adults without disabilities. This data also came from the LTS Report.

A city's Features, Maintenance and Safety, Inclusivity, and Overall scores were generated by taking the average of the individual scores of all of the playgrounds that we surveyed within the city. A playground's Features score reflects the extent to which the playground provides basic amenities. This section contains a section of "Yes" or "No" questions indicating whether or not the playground has features such as bathrooms, water fountains, and gathering spaces. This section also contains a section asking the surveyor to rate the playground on a scale of 1-5 on its other basic qualities, such as the noisiness of the

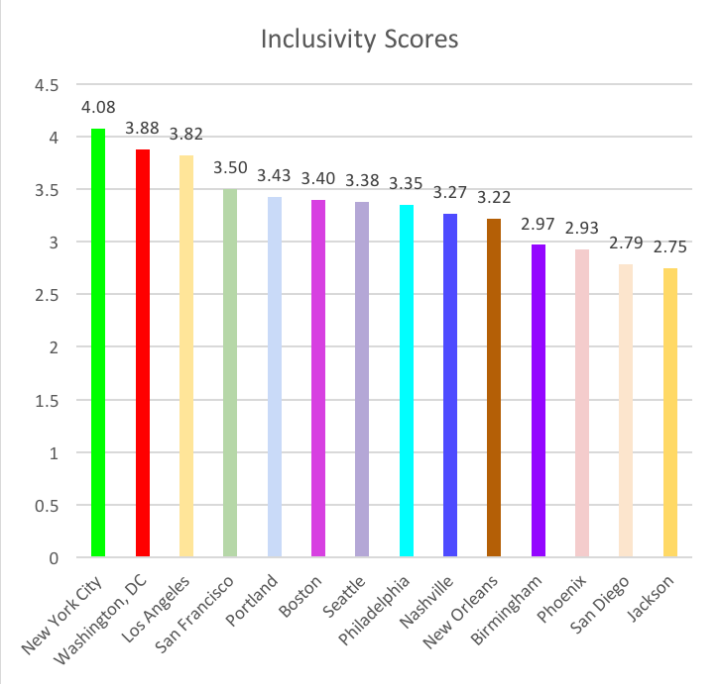

Figure 1: Average Inclusivity Score for each city

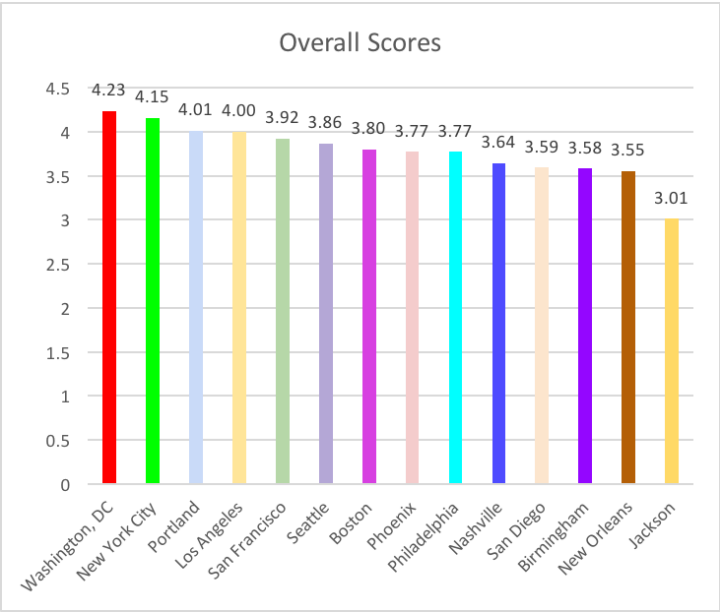

Figure 2: Average Overall Score for each city

surrounding area. A playground's Maintenance and Safety score averages the surveyor's assessment, on a scale of 1-5, of its performance on a variety of questions. Questions pertaining to maintenance assess qualities such as the presence of broken elements and the general appearance of all equipment surfaces. Questions pertaining to Safety assess qualities such as the presence of hazards and the quality of fencing. A playground's Inclusivity score averages the surveyor's assessment, on a scale of 1-5, of its performance on a variety of questions pertaining to the existence of sufficient shade, the navigability of the surfacing, and the existence and integration of equipment meant to provide a variety of different experiences (such as audible play or cognitive play) to all children. A playground's Overall Score reflects the weighted average of its Features Score (⅜), Maintenance and Safety Score (¼), and Inclusivity Score (⅜). Figures 1 and 2 show each city's average Inclusivity Score and average Overall Score.

Results

Upon analyzing the data, we found that the overall quality of playgrounds is positively correlated with per capita spending on public parks and with the resources available towards and the visibility of people with disabilities (See Appendix 1 for all Pearson Correlation Coefficients.) None of the explanatory variables are correlated with inclusivity in statistically significant ways, however, which suggests that the inclusivity of playgrounds does not appear to be driven by attitudes within the cities towards people with disabilities. Instead, increased inclusivity seems to be correlated with general higher levels of services and investment, with raise the quality of all aspects of playgrounds concurrently.

Park spending per capita is positively correlated with all subscores and the overall score (See Figure 3). We found the strongest evidence that spending per capita was positively correlated with the overall score (Pearson Correlation Coefficient of .635, significant at the 5% level) and the maintenance and safety score (Pearson Correlation Coefficient of .717, significant at the 1% level.) Similarly, superior employment ratios, UCP rankings, and LTS rankings are all correlated with higher subscores and a higher overall score (See Figure 4). We found the strongest evidence that a state's UCP ranking is negatively correlated with the overall score (Pearson Correlation Coefficient of -.747, significant at the 1% level), features score (Pearson Correlation Coefficient of -.877, significant at the 1% level), and the maintenance and safety score (Pearson Correlation Coefficient of -.678, significant at the 5% level).

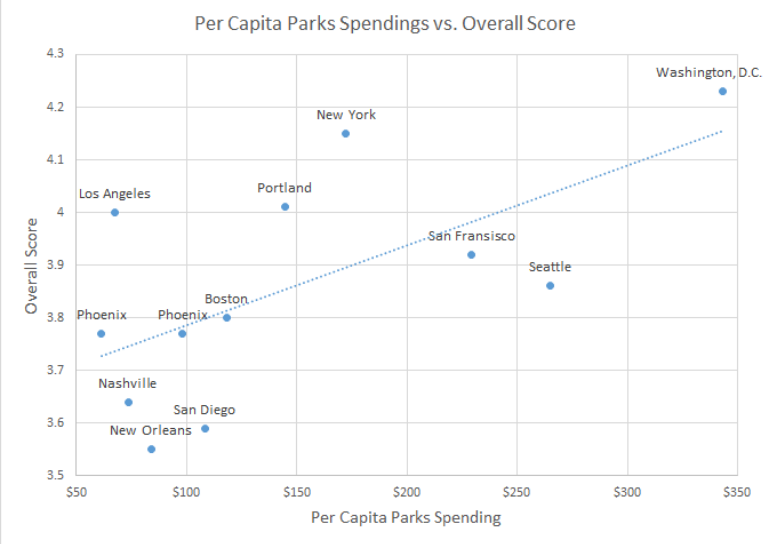

Figure 3: Positive correlation between a city's per capita parks spending and its average overall playground score

Although the inclusivity scores of cities are all correlated with the explanatory variables in the same directions as the overall scores, these correlations are not statistically

significant. Meanwhile, the correlation between inclusivity and overall score is .847 (significant at the 1% level.) This suggests that measures like per capita spending on parks and superior disability services are not directly increasing inclusivity, but rather that superior public service provision raises the quality of playgrounds overall, which then raises the inclusivity of playgrounds alongside all other aspects of playground quality.

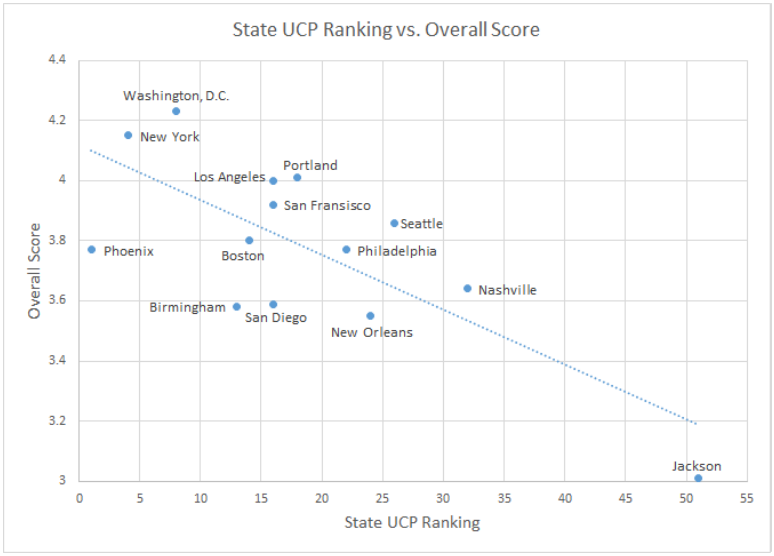

Figure 4: Negative correlation between a city's state UCP ranking and its average overall playground score

Simple linear regression models also demonstrate that per capita park spending and disability resources (as measured by a city's state's UCP ranking) can be used to explain overall quality, but not inclusivity. While the regression explaining variance within overall scores has an adjusted R-squared of .45, spending per capita is found to be significant at the 5% level, and UCP ranking is significant at the 15% level, the regression explaining variance within inclusivity scores has an adjusted R-squared of only .03, and neither per capita spending nor UCP ranking are significant at even the 20% level (See Table 2).

Table 2: Regression Outputs with Spending Per Capita and UCP Ranking as Independent Variables

	Dependent Variable: Overall Score	Dependent Variable: Inclusivity Score
Adjusted R-squared	0.4541	0.0265
Spending per capita (t; p)	2.36; 0.043	1.27; 0.234
UCP Ranking (t; p)	-1.74; 0.116	-0.50; 0.632

City Analyses

Phoenix, Arizona

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.54	3.87	2.93	**3.77**
Rank (Out of 14)	1	7	12	**8**

Figure 5: The lizard and shade structure at Pecos Park

While Phoenix ranks third to last in inclusivity, it is the highest performing city for features. This is likely a result of a lot of the playgrounds having larger footprints. This allows for a larger number of unique elements to be integrated into structures. The playgrounds, or parks where they are located, all have designated parking lots, which helps with accessibility for the surrounding community, especially in a city where public transit is not a viable option. Phoenix also has some thematic elements across its playgrounds. Three out of five playgrounds have sand surfacing to fit in with the desert surroundings. Pecos Park also features a concrete lizard (Figure 5).

Even though it is among the worst cities for inclusivity, Phoenix scores third overall for shaded structures (with a score of 3.00 out of 5), with around half of its play equipment protected from direct sunlight. Since the city does not have a lot of natural shade coverage from trees, more intentional effort has been placed on putting structures to cover the play areas (Figure 5). Shade is very important, not only for children with disabilities, but also for any kid playing in the hot 110°F+ summers so that they can stay cool and so that the play equipment can still be usable, as elements in direct sunlight often become too hot to touch. While this problem may be unique to Phoenix, it is important that all cities include shaded areas for play.

Phoenix also ranks second in cognitive play (4.60), and its playgrounds feature some unique elements we had not seen before. All five parks incorporate elements from Miracle Recreation. There are spinning panels that teach children about planets (Figure 6) and dinosaurs, as well as flat panels that have the alphabet with braille or sign language on one side and a riddle with the solution encoded so that the child has to actively translate the letters to understand the message. This is a much better cognitive play implementation than from other panels we have seen, where only the alphabet or numbers will be present, not actively encouraging a child to translate and use the new language. However, with the exception of these two categories, Phoenix underperforms in all other marks for inclusivity, which causes it to rank below average for its overall quality.

Figure 6: The spinning planet panels

San Diego, California

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.17	3.94	2.79	**3.59**
Rank (Out of 14)	9	5	13	**11**

San Diego's playgrounds are highly affected by the city's proximity to the Pacific Ocean in ways that reduce these playgrounds' ability to be truly inclusive. Many of the playgrounds that we visited are either located near beaches, or seek to incorporate beach-themed elements into their design. These sandy, sunny beaches suffer from two striking issues related to inclusivity: wheelchair accessibility and provision of shade. All four of the playgrounds that we visited within San Diego's city limits have flooring largely composed of sand. This sand, in conjunction with a lack of ramps onto main structures, earn San Diego the lowest average for wheelchair accessible surfaces (2.00) and wheelchair accessible structures (1.00). San Diego also ties with Jackson for the lowest score for wheelchair accessible active play equipment (1.00), as there is not a single piece of qualifying equipment at any of the playgrounds that we visited. Only one of the playgrounds that we visited has at least 20% of its area under shade, and San Diego also scores below average for percentage of shaded equipment (2.00). San Diego also has the lowest inclusive seating score (3.75) due to deficiencies that further demonstrate the lack of wheelchair accessible amenities and shade – Mission Bay Playground does not have shaded seating or seating with a backrest, and Pepper Grove Playground does not have any seating with a backrest.

Figure 7: The sand sifter compliments sand surfacing well

Figure 8: San Diego fences off broken elements

Although these sandy, sunny, beach-themed playgrounds pose serious inclusivity concerns, these qualities do provide other benefits. Half of the playgrounds in San Diego provide water play opportunities, since they

are located adjacent to a beach, and San Diego is tied for having the highest score for constructive play equipment (4.00) due to the widespread presence of sand and of play equipment, such as sand sifters, which help incorporate sand into play (Figure 7). Moreover, San Diego generally scores well on most metrics of maintenance, and even maintenance issues that lower its scores are not ignored by the city. Instead, broken elements are regularly fenced off to prevent children from potential accident or injury (Figure 8).

Unfortunately, San Diego ranks within the bottom four cities overall, and within the bottom two cities for inclusivity due to its deficiencies. Moreover, San Diego seems to have a dearth of play areas for its children. San Diego has a slightly below average number of playgrounds per capita and percentage of its residents that live within a 10 minute walk of a public park. In our preliminary research, we struggled to find playgrounds marketed as being disability friendly, and its highly promoted New Children's Park was closed when we attempted to visit, and seems to be only open to the public for a couple of daytime hours Friday through Sunday. San Diego could do a better job of ensuring that adequate play opportunities are available to the community.

Los Angeles, California

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.25	3.88	3.82	**4.00**
Rank (Out of 14)	5	6	3	**4**

Although we have identified that park spending per capita has a strong correlation with the overall scores for playgrounds, Los Angeles is a statistical outlier. While it is the second lowest city in park spending, it ranks fourth overall. Even more surprisingly, it places third in inclusivity. One of the driving factors of these anomalies is that there is a major inclusivity advocacy group in Los Angeles called Shane's Inspiration. Founded in 1998, it has been involved in the creation and renovation of several playgrounds around the world, most notably Shane's Inspiration Playground (Figure 9) at Griffith Park in Los Angeles, which was built in 2000 (Shane's Inspiration). This playground laid the groundwork for the future of Los Angeles playground design. As a result of both the city's and the group's focus on inclusive design, the Los Angeles area has 29 universally accessible playgrounds, which is the terminology commonly used to identify play spaces that are inclusive beyond ADA Compliance ("Universally Accessible Playgrounds").

The unique aspect of the playgrounds we observed throughout Los Angeles is that many of them incorporate the same elements, which is a clear marker of Shane's Inspiration's influence on the design. From our observations, it seems like they found a successful set of elements to promote inclusive play in the design of Shane's Inspiration Playground, which has the ninth highest inclusivity score (4.08) of all the playgrounds we visited. Several of the other playgrounds in the city implement subsets of the same elements from this play space, resulting in a strong inclusivity score for the city.

Figure 9: The rocket structure at Shane's Inspiration

Major notable downsides of Los Angeles playgrounds include the lack of recycling bins, severity of external hazards, and water play areas. None of the playgrounds we visited have recycling bins, which is surprising given the culture of the city toward conservation and environmental protection. Los Angeles is tied with San Diego for the most severe hazards near its playgrounds (2.00). Due to the play spaces mainly being located in the center of the city, they are all located near major roads with high traffic density. Due to major drought issues throughout the state, the city is being responsible with its water usage by excluding water play elements. The only playground we visited with one is part of the LA Orthopaedic Hospital. In spite of these flaws, the reuse of inclusive and unique elements has boosted Los Angeles into one of the top cities we visited.

San Francisco, California

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.18	4.16	3.50	3.92
Rank (Out of 14)	8	3	4	5

San Francisco ranks within the top four cities for inclusivity, and especially stands out for its impressive wheelchair accessibility. All of the playgrounds that we visited have a wheelchair accessible surface, and San Francisco is the only city in which every playground that we visited has at least 80% of its equipment accessible by wheelchair. This is achieved through a widespread use of ramps onto main structures and of the use of easily navigable rubber playground surfacing in every playground that we visited. San Francisco also exhibits impressive audible play. Beyond being within the top 5 cities for audible play (3.50), the city also has several large and impressive musical elements that receive more use

Figure 10: The large xylophones at Helen Diller

than the audible play elements regularly seen in playgrounds, such as the large xylophones at Helen Diller Playground (Figure 10).

Although San Francisco generally scores well in metrics of inclusivity, a lack of shade and constructive play equipment negatively impacts the city's scores. San Francisco is the only city in which none of the playgrounds that we visited have at least 20% of the area in shade, and the city has one of the lowest scores (1.25) for the percentage of equipment located under shade. In addition, none of the playgrounds in San Francisco that we visited have water play elements, and lack of water play combined with a general dearth of sand play or wood chips cause the city to receive one of the three lowest scores for constructive play (1.75). Both of these issues could be driven partially by San Francisco's unique climate. Summers in San Francisco are generally cool and overcast, with average maximum daily temperatures between 60°F and 70°F, and with widespread overcast mornings that only progress into sunny days in certain parts of the city (Golden Gate Weather Services 2009). These conditions may create a lack of demand for water play or shade, and California's problems with water supply would exacerbate this disincentive towards providing water play.

Despite this, the playgrounds in San Francisco generally perform well, and San Francisco is our third highest rated city for maintenance and safety. Very few elements are broken, and San Francisco has one of the highest scores for protective fencing, as none of its playgrounds that we visited have any fencing issues more severe than an open gate. Conscientious changes made to correct for the inclusivity concerns that appear to be driven by the city's climate could make these impressive playgrounds more accessible towards all members of its diverse community.

Portland, Oregon

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.43	4.25	3.43	**4.01**
Rank (Out of 14)	4	2	5	**3**

As a wooded city, Portland does a good job of incorporating more natural looking play elements into its play spaces. Even without building shade structures, the city performs among the best cities for shade coverage (3.00), due to the dense tree coverage. It scored just as well as Phoenix, which shows that a city that has the ability to use natural materials and plants can use them to create inclusive playgrounds. Also, since the playgrounds are in more residential areas, they are all free from loud and distracting noises, giving the city our second best score for noise (4.80), just behind Phoenix (5.00).

The playgrounds we visited are all smaller compared to those in the other cities. Even though they are small, they seem to be designed for inclusivity, as they incorporate several passive-sensory (4.20) and wheelchair active-play (4.00) elements we look for, like spinning elements and disc swings. However, the playgrounds do not have many audible play elements (1.80), which is also likely due to the proximities to quiet neighborhoods. The smaller play spaces also contribute to a higher maintenance and safety subscore. It is much easier to maintain a playground when there are a smaller number of elements to maintain. As a result of better maintenance and the inclusive play focus, Portland ranks in the top three cities overall.

Seattle, Washington

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.24	4.02	3.38	3.86
Rank (Out of 14)	6	4	7	6

Figure 11: The seesaw and garden at the Playgarden

Seattle's playgrounds perform about average in terms of inclusivity. Their main strengths with regards to inclusivity are the existence of wheelchair accessible active play equipment and various nature-themed elements. Seattle has the second highest score for wheelchair accessible active play equipment (3.83), and many of the playgrounds are home to uncommon, high-quality pieces of equipment such as a wheelchair-accessible merry-go-round and inclusive swing at the Artists at Play playground, a seesaw with a backrest at the Seattle Playgarden, and an Omnispinner at the Roxhill playground (Figure 11). Seattle also incorporates a variety of natural elements into their playgrounds. 50% of the playgrounds that we visited have water play elements. Additionally, the playgrounds have a diverse set of constructive play elements, including woodchips, sand pits, and water play, which enable Seattle to be tied for having the highest score for constructive play equipment (4.00). Natural elements like gardens, best exemplified by the expansive and diverse gardens at the Seattle Playgarden, also help Seattle rank above average for passive sensory stimulation (3.17) (Figure 11).

Other aspects of Seattle's playgrounds, however, are less inclusive. Seattle scores below average for wheelchair accessible equipment (3.17), and none of the playgrounds that we visited have a main structure that is accessible by ramp. Seattle also scores very poorly in metrics of shade, with the second lowest number of playgrounds with adequate shade (17%) and the second lowest score for having shaded equipment (1.17). The lack of adequate shade structures could be partially due to the fact that Seattle is one of the cloudiest major cities in the United States, where clouds cover over a quarter of the sky 84% of days and over three quarters of the sky 62% of days (Osborn), which reduces the demand for shade. Additionally, Seattle's playgrounds are comparatively modest in size and have fewer different elements fulfilling different functions. Seattle scores below average for imaginative play (3.67), and within the bottom three cities for cognitive play (2.67).

Although the size of Seattle's playgrounds hurt their scores regarding inclusivity, smaller playgrounds are easier to maintain and have fewer elements that can be broken, which contributes to

Seattle's rank as the city with the fourth highest score for maintenance and safety. Seattle could improve the inclusivity and quality of their playgrounds by focusing on adding ramps, shade structures, and small numbers of non-active play elements that could help provide a broader array of experiences to all children.

Boston, Massachusetts

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.19	3.82	3.40	3.80
Rank (Out of 14)	7	9	6	7

Boston is just above the average city we visited. The city's strength is in inclusive play. It is the second best city for audible play elements (3.60), as its playgrounds contain a wide variety of xylophones, drums, and spinning noise makers. Also, Boston frequently uses various types of rope elements throughout its play spaces, which boosts its inclusivity subscore while most other questions in the section score near the average. Boston also integrates its inclusive elements (4.60) into the rest of the structures seamlessly. While this can partly be attributed to the rope structures either replacing normal play structures or being attached to them, several of the play spaces that do have normal structures also have their other inclusive play elements on the structures rather than below or beside them.

However, even though Boston scores just above average in the features category, it is being held back by its lack of certain amenities, most notably shaded equipment (1.00), bathrooms (40%), and recycling (20%). The lack of shaded equipment in Boston is the worst of any city we visited, and while it may not get as hot as in cities like Phoenix, it is still important to provide shaded areas for children to be able to play in while avoiding direct sunlight. The city also lacks designated park restrooms. The 40% that the city earns for restrooms is not representative of the existence of park facilities since Spaulding Rehabilitation center has one inside the building and Harambee Park has a couple portable restrooms. Unlike any other city in the region, there are no designated bathroom buildings in any of the parks. This, along with poor maintenance of its play elements and the second lowest litter score (3.20), meaning the playgrounds had noticeable litter as we were surveying, shows that general maintenance is more of a problem in Boston than other cities. However, the gains from its efforts in inclusivity have lessened the impact of these issues, still putting Boston above average.

New York City, New York

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.47	3.76	4.08	4.15
Rank (Out of 14)	3	10	1	2

New York City has the highest inclusivity score of any city we visited. Interestingly, where many city Parks and Recreation websites feature universally accessible playgrounds and ADA Compliant playgrounds, New York City uses a different system. They have four tiers of access, and there are a large number of playgrounds in Level 1, the Playgrounds For All Children level (*Playgrounds : NYC Parks*). New York exhibits great wheelchair access (4.75), as every main play structure has ramps onto them. It also has good passive sensory stimulation elements (3.40), and every playground has small spaces for children to go into when they get overwhelmed (5.00) as well as designated restroom facilities. They also all have water play elements, which is the most of any city we visited. The city also has the highest shade coverage (4.00) with a mix of shade structures and natural shading provided by trees. While it does not have the most audible play elements, it has some very unique ones, like levered bells and a ground stepping bell element (Figure 12), which not only work very well, but also provide unique methods of interaction.

Figure 12: Floor-level bells ring when stepped on

The only reason New York City is not the highest rated city is due to its maintenance and safety subscore. Unlike the number one city, Washington, D.C., the playgrounds in New York City are very large. We have found that larger playgrounds inevitably suffer more maintenance issues, and the city has one of our lowest ratings for the maintenance of static (2.25) and non-static equipment (1.50). Every playground we visited has at least one static or non-static element completely broken. If not for those issues, it might have been the best city we visited.

Philadelphia, Pennsylvania

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.14	3.83	3.35	**3.77**
Rank (Out of 14)	10	8	8	**9**

Philadelphia scores slightly below average for overall quality as well as for inclusivity. Playgrounds in Philadelphia, however, are generally a good example of how playgrounds can be accessible without being truly inclusive. Two of Philadelphia's strengths are shade and wheelchair accessibility. 80% of the playgrounds that we visited have at least 20% of areas under shade, and Philadelphia scores above average

for having shaded equipment (2.40). In addition, Philadelphia scores above average for wheelchair accessible structures (3.60) and most of the playground floors are comprised of easily navigable materials, such as rubber. Both of these qualities are important to making sure that individuals with certain needs are able to move throughout the play space, and Philadelphia does a noteworthy job of ensuring baseline access.

Unfortunately, despite this strength, the playgrounds in Philadelphia do not necessarily have equipment that provides these children with exciting opportunities within the play areas. Most playgrounds in Philadelphia have a lack of wheelchair accessible active play equipment or non-active play equipment for use by all children. Philadelphia scores below average for wheelchair accessible active play equipment (2.60), and has one of the lowest four scores for audible play (2.20), and one of the lowest three scores for imaginative play (3.40). The divide between Philadelphia's relative strength in accessibility and relative weakness in true *inclusivity* illustrates the need to go beyond ADA Compliance in playground design and ensure that children of all abilities are able to find meaningful and exciting things to do on public playgrounds.

Washington, D.C.

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.23	3.88	4.28	**4.54**
Rank (Out of 14)	1	2	1	**2**

Washington, D.C. is our highest rated city overall and our second highest rated city for inclusivity, and its playgrounds exemplify many ways of providing optimal opportunities for all community members. One of Washington, D.C.'s main strengths is ensuring that all equipment can be accessed by children in wheelchairs. All five of the playgrounds that we visited have surfaces made primarily of rubber, which is easy for children in wheelchairs to move across. Although not all of the main structures in Washington, D.C. have ramps, there was enough of ground-level play equipment in all of the playgrounds that the city still scores above average for wheelchair accessible structures (4.20). Washington, D.C. also has an impressive number of pieces of equipment fulfilling almost every function. The city has the highest score for audible play (5.00), and some of the playgrounds feature unique and exciting pieces of equipment, such as solar-powered information panels in the Rosedale Playground, which include information about various national monuments

Figure 13: Information panel with audio in several languages

written in English and Braille, where the descriptions can be heard aloud in a variety of different languages, including Spanish, Chinese, and French upon the push of a button (Figure 13). Washington, D.C. also has the third highest score for cognitive play (4.40), and every playground that we visited has a small semi-private space for a child.

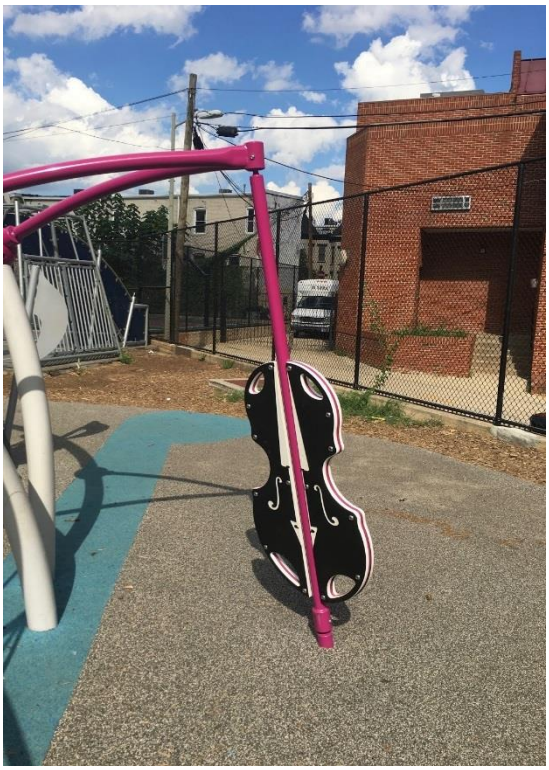

Figure 14: Instrument-themed spinner

Even in areas where Washington, D.C. has comparatively mediocre scores due to a lower number of features, the city stands out for the quality of the features that it does have. Although Washington, D.C. did not receive a standout score for imaginative play (3.80), many of the playgrounds are designed with strong themes. The Rosedale playground is themed around the National Monuments, and features equipment and decorations designed to look like the National Monuments, such as written information panels and the audible information panels mentioned above. The Harrison playground has a strong musical theme that penetrates all aspects of the playground such that most other pieces of equipment, like the water play features and spinners, are designed to look like musical instruments (Figure 14). The Palisades Spray Park features a comprehensive nature-based theme, including multiple natural themed huts and rock climbing walls.

Although impressive, the playgrounds in Washington, D.C. are not perfect, and generally lack sufficient shade. Only one of the five playgrounds in Washington, D.C. that we visited has 20% of its area under shade, and the city has one of the five lowest scores for shaded equipment (1.80). In addition, as mentioned before, although there are plentiful ground-level pieces of equipment, the lack of ramps to main structures prevents all children from accessing all parts of the playground. While playgrounds in Washington, D.C. contain many interesting play opportunities, the incorporation of additional ramps and shade structures could help ensure that all of these opportunities are accessible to all children.

Nashville, Tennessee

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.02	3.63	3.27	**3.64**
Rank (Out of 14)	12	13	9	**10**

Nashville scores below average in the majority of questions on our survey. While it is rarely the worst, it does not have many areas countering the negatives to raise its score. It does have the best

maintained seating options (5.00), as well as the least amount of litter (4.00) and no hazardous material in any of its playgrounds. However, the comparatively poor maintenance of the structural (4.20), non-static (1.80), static (3.00), and constructive play elements (2.67) and barriers (4.60) themselves far outweighed the gains from the other questions. While Nashville has a lot of constructive play options (3.40), like sand, sand filters, and wood chips, it does not have a lot of passive sensory stimulation (2.00) or audible play (1.60). This overall lack of features and poor maintenance can be attributed to the lack of park funding in the city, as well as other cities in the South. Also of note is that the city, along with the rest of the South, does not have any recycling bins in its park. While there were not many highs or lows in Nashville, the effect of budgeting can be seen in the below average trend across the survey.

Birmingham, Alabama

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	4.11	3.72	2.97	**3.58**
Rank (Out of 14)	11	12	11	**12**

While Birmingham lacks bathrooms, water play elements, and water fountains in many of the playgrounds we visited, the features subscore is boosted by the vast number of elements for toddlers (5.00) and preteens (5.00). Several of the play spaces have separate structures for two to five year olds and five to twelve year olds. This is an important distinction for our survey, because an element could be catered to a toddler, but if it is on a structure where older kids would be located, it could be unsafe for the toddler to be there, so it is not counted. By having separated areas, more elements can be counted for toddlers. Birmingham also exhibited a lot of different climbing structures as well as a spinning log element that can keep older kids active on the playground (Figure 15).

Figure 15: Rotating monkey bars and spinning log

Unfortunately, with the exceptions of the best equipment surfaces in the dataset (4.60), Birmingham's maintenance and safety subscore is among the worst. It suffers from poor constructive play maintenance, as its sand pits are often filled with other materials like branches, leaves, and trash. The city also does not have good barriers, providing children open access to hazards like roads and parking lots. It also lacks many inclusive elements, finishing last among all cities for passive sensory stimulation (1.20) and small spaces for a child (1.80). Unfortunately, what Birmingham does have is frequently separate from the main structures or exclusive to one structure and not the other. The combination of these inclusivity problems are ultimately what hurts its score the most.

Jackson, Mississippi

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	3.34	2.92	2.75	3.01
Rank (Out of 14)	14	14	14	14

The playgrounds in Jackson are drastically failing to meet the needs of the community, especially of community members with disabilities. Jackson is our lowest rated city within all broad categories, and it scores significantly more poorly than the second worst city in a variety of categories. The maintenance and safety of Jackson's playgrounds are more than 2 standard deviations below the mean, earning a 2.92, which is significantly lower than the second to worst city, Nashville, which has a score of 3.63. Many of the playgrounds have missing swings, overgrown grass flooring, badly vandalized equipment surfaces, and a variety of hazardous materials, such as broken glass (Figure 16).

Beyond being poorly maintained, the playgrounds in Jackson are also lacking in equipment for all children, especially children with special needs. Not a single playground that we visited has ramps onto its main structures, and this lack of ramps in conjunction with a lack of ground-level play equipment earn Jackson one of the three lowest scores for wheelchair accessible equipment (1.80). There is also not a single piece of wheelchair accessible active play equipment, audible play equipment, or constructive play equipment in any of the playgrounds that we visited.

Although there are certainly less disappointing playgrounds located in Jackson, for our study we visited all ADA Accessible parks with playgrounds listed on Jackson's Parks and Recreation website. One of these parks, Battlefield Park, has a playground in which all of the equipment either has been broken apart by a heavy storm, or was never fully assembled, but is entirely unusable as a result. The other five playgrounds, while intact, are nearly unusable due to their poor maintenance. Although budgetary constraints are surely impeding the ability of Jackson's Parks and Recreation department to provide adequate play opportunities to its children, the current state of play is quite dire. Even investing minimal resources in pointing people in the direction of the few, better maintained playgrounds that may exist could help families access these opportunities and have a place to at least play in safety.

Figure 16: Missing swings and overgrown grass

New Orleans, Louisiana

	Features	Maintenance and Safety	Inclusivity	Overall
Score (Out of 5)	3.75	3.75	3.22	3.55
Rank (Out of 14)	13	11	10	13

Although New Orleans scores below average for maintenance and safety and for inclusivity, its lack of amenities cause it to be our second lowest rated city overall. None of the five playgrounds that we visited have water play areas, bathrooms, or recycling receptacles; only one of the playgrounds has a gathering space; and only two of the playgrounds even have water fountains.

Regarding inclusivity, although New Orleans does score below average, there are some strengths that the city exhibited. The city has the third highest score for imaginative play (4.60), and four of the five playgrounds that we visited are mostly covered in rubber surfacing, which encourages easy access by individuals in wheelchairs. Despite this, the city is largely underwhelming. We did not see a single piece of constructive play equipment, the city has the third lowest score for passive sensory stimulation (1.80), and New Orleans has slightly below average scores across most other metrics of inclusivity.

New Orleans playgrounds' performance is disappointing given that the city appears to be offering numerous play opportunities at first glance. Many of the playgrounds that we visited in New Orleans are larger than the playgrounds in other cities, and New Orleans does a good job of connecting its residents to playgrounds - 76% of residents live within a 10 minute walk of a public park, and it has an unusually high per capita number of playgrounds with 2.6 playgrounds per 10,000 residents. Focusing on ensuring that the equipment fulfills different functions by incorporating more musical elements, mirrors, interactive games, and other non-active play elements could help New Orleans ensure that its numerous playgrounds are actually meeting the needs of all community members.

Conclusions

By visiting these different cities across the United States, we have been able to identify play elements and design decisions that are having a positive impact on the overall quality and inclusivity of the playgrounds. Many of these lessons could benefit Boston as it strives to become the most inclusive city in the United States. While the city is making progress, especially with its recent renovations, it still has areas to improve to become a top tier city.

One of the most striking revelations during our playground tour was that there are so many thematic play spaces (Figures 3, 5, 7, 11, 12). While basing a playground around a single theme might not inherently make it better, it frequently results in better inclusivity due to higher cognitive, imaginative, and constructive play scores. Kellogg Playground, in San Diego, has marine life facts and ocean safety tips, a model whale for children to play on, and beach sand to build sand castles and find hidden shells in with filters. Boston, as an oceanside city, could incorporate many of these elements into a playground in an inclusive manner. While having an entire playground surface made of sand debilitates a playground's

wheelchair access, having a sand pit on the side is an alternative that would not negatively affect access. The cognitive aspects from the San Diego playground are all done by Landscape Structures, a commonly used manufacturer throughout Boston play spaces. Boston could do more to integrate its own geography and wildlife into its playgrounds with these educational panels and model animals. In Washington, D.C., Rosedale Playground has monument-inspired and historical education elements and solar-powered audible elements that would share clips about historical events. Boston also has a rich history, and as the playground in this example was also made with Landscape Structures, a playground in Boston could easily implement similar elements. Outside of thematic elements, the city should investigate Miracle Recreation, which is a popular manufacturer in the Southern and Southwestern cities we visited. It has some good examples of panels for cognitive play, as shown in Fig. 2. Including panel components rather than standard guard railing on playgrounds with standard structures is a great way to make the space more inclusive.

In all of the playgrounds that we visited in Boston, less than 20% of the equipment is covered by shade, ranking it last among the cities we visited. Unlike areas in the Southwest, Boston has natural foliage that could provide adequate natural shading. We recommend either using a natural approach of using trees to provide the necessary shade or building shade structures over the play equipment. As mentioned earlier, Phoenix does a good job of covering its play areas in shade, and many of the manufacturers offer these in their catalogs. The city also had widespread litter issues, broken play equipment, and frequent occurrences tripping hazards from poor surface maintenance. There seems to be a lack of emphasis on the maintenance of playgrounds after they are built. While this may be due to budget constraints, we feel that a well maintained playground is as important as a well designed one. If elements are unusable due to maintenance issues, the play opportunities within a park can be limited, and these issues in conjunction with visible litter and vandalism can make playgrounds less welcoming towards families. Lastly, Boston was the only city in the Northeast not to have designated bathroom facilities at its parks. We feel that this is a necessity, especially since the community has vocalized a desire for them. Parents with small children often do not have much time to search for a restroom when their child suddenly tells them that they need to use one. While actual buildings would be costly to set up, we would recommend installing portable restrooms as an alternative.

Boston is clearly heading in the right direction, and during the community meetings for playground renovations that we have been to, we have seen that there is an active effort to improve the inclusivity and quality of the play spaces throughout the city. Hopefully, these findings and recommendations can be of use in helping Boston's Parks and Recreation department improve the quality of inclusive play throughout the city.

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Appendix 1: Pearson Correlation Coefficients between Independent and Dependent Variables

		Park Access	Spending Per Capita	Employment Ratio	UCP	LTS	Features	Maintenance and Safety	Inclusivity	Overall
Park Access	Correlation	1	.576*	.554	-.154	-.354	.132	.476	.391	.423
	Sig.		.050	.062	.633	.259	.682	.117	.209	.171
Spending Per Capita	Correlation	.576*	1	.335	-.238	-.548	.460	.717**	.426	.635*
	Sig.	.050		.287	.457	.065	.132	.009	.167	.027
Employment Ratio	Correlation	.554	.335	1	-.554*	-.695**	.533*	.486	.425	.556*
	Sig.	.062	.287		.040	.006	.050	.078	.129	.039
UCP	Correlation	-.154	-.238	-.554*	1	.442	-.877**	-.678**	-.433	-.747**
	Sig.	.633	.457	.040		.114	.000	.008	.122	.002
LTS	Correlation	-.354	-.548	-.695**	.442	1	-.615*	-.747**	-.396	-.643*
	Sig.	.259	.065	.006	.114		.019	.002	.161	.013
Features	Correlation	.132	.460	.533*	-.877**	-.615*	1	.808**	.546*	.887**
	Sig.	.682	.132	.050	.000	.019		.000	.044	.000
Maintenance and Safety	Correlation	.476	.717**	.486	-.678**	-.747**	.808**	1	.485	.832**
	Sig.	.117	.009	.078	.008	.002	.000		.079	.000
Inclusivity	Correlation	.391	.426	.425	-.433	-.396	.546*	.485	1	.847**
	Sig.	.209	.167	.129	.122	.161	.044	.079		.000
Overall	Correlation	.423	.635*	.556*	-.747**	-.643*	.887**	.832**	.847**	1
	Sig.	.171	.027	.039	.002	.013	.000	.000	.000	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 2: Playground Subscores

Playground Name	Playground Features	Maintenance and Safety	Inclusivity	Overall Score
Lily's Garden	4.403	3.385	4.583	4.216
Playground for All Children	4.810	3.500	4.417	4.335
Robert Bendheim Playground	4.307	3.923	4.250	4.190
Smith Memorial Playground	4.524	4.250	4.167	4.321
Rosedale Community Center	4.351	4.167	4.167	4.236
Telephone Pioneers of America	4.420	3.750	4.167	4.157
Orthopaedic Hospital	4.281	3.917	4.167	4.147
Seattle Children's Playgarden	4.022	3.692	4.167	3.994
Spaulding Rehabilitation Hospital	4.662	4.000	4.083	4.280
Shane's Inspiration at Griffith Park	4.446	3.692	4.083	4.122
Harrison Playground	4.784	4.417	4.000	4.398
Sherwood Recreation Center	4.351	4.333	4.000	4.215
Balboa Park	4.377	3.917	4.000	4.120
Aidan's Place	4.281	3.846	4.000	4.067
Harambee Park	4.307	3.083	4.000	3.886
J.J. Byrne Playground	4.905	3.692	3.833	4.200
Harper's Playground	4.307	4.385	3.833	4.149
Matthew P. Sapolin Playground	3.874	3.917	3.833	3.870
Rose Garden Children's Park	4.307	4.231	3.750	4.079
Stanley Ray Playground	4.108	3.500	3.750	3.822
Stead Community Center	4.498	4.333	3.667	4.145
Lake Street Community Center	3.658	3.615	3.667	3.651
Palisades Spray Park	4.714	4.167	3.583	4.153
Helen Diller	4.255	4.385	3.583	4.036
Martin Luther King Jr. Therapeutic Recreation Center	4.281	4.231	3.583	4.007
Beacon Hill Playground	4.377	3.769	3.583	3.927
Mount Airy Playground	4.255	3.692	3.583	3.863
Westchester Recreation Center	4.567	4.000	3.417	3.994

Red Caboose Playground	3.996	3.385	3.417	3.626
John Story Jenks Elementary School	3.251	3.462	3.417	3.366
Khunamokwst Park	4.593	4.308	3.333	4.049
St. Mary's Playground	4.325	4.417	3.333	3.976
Dawson Park	4.333	4.167	3.333	3.917
Artists at Play	4.186	4.308	3.333	3.897
Cabrini Park	3.918	4.417	3.250	3.792
Kellogg Park	3.944	3.923	3.250	3.678
Jefferson Park	4.593	4.077	3.167	3.929
Roxhill Park	4.186	3.769	3.167	3.700
Mother's Rest Park	3.580	4.250	3.167	3.593
Palmer Park	3.606	3.333	3.167	3.373
Broadmoor Park	3.346	2.583	3.167	3.088
Views West Neighborhood Park	4.472	4.500	3.083	3.958
Mission Hill Playground	4.567	3.500	3.083	3.744
Danneel Park	4.134	3.833	3.083	3.665
Triangle Park	4.229	3.615	3.083	3.646
Alvarado Elementary School	3.779	3.917	3.083	3.553
Fairview Park	4.013	4.000	3.000	3.630
Greenwood Park	3.892	4.000	3.000	3.584
West End Middle School	3.918	3.615	3.000	3.498
East Recreation Center	3.753	3.667	3.000	3.449
Laurelhurst Park	4.593	4.167	2.917	3.858
Crestwood Park	4.039	4.000	2.917	3.608
Flowers Park	2.792	2.333	2.917	2.724
Cal Anderson Park	4.065	4.500	2.833	3.712
Herron Sprayground	4.351	4.000	2.833	3.694
Fountain Heights Park	4.377	3.000	2.833	3.454
Alhambra Park	2.983	3.667	2.833	3.098
Francisco Highland Park	4.688	3.750	2.750	3.727
Encanto Park	4.117	4.250	2.750	3.638
Markward Playground	4.307	3.750	2.750	3.584
Pepper Grove Playground	4.377	3.333	2.750	3.506

Charlestown Naval Shipyard Park	3.848	4.250	2.667	3.506
Medgar Evers Park	3.372	2.833	2.667	2.973
Pecos Park	5.000	3.667	2.500	3.729
Arcadia Park	4.498	3.917	2.500	3.603
Fondren Park	3.684	3.667	2.500	3.236
Grove Park	3.494	3.167	2.500	3.039
Eastland Playground	4.013	4.083	2.333	3.401
Mission Bay	3.874	4.000	2.083	3.234

Key
Phoenix
San Diego
LA
San Francisco
Portland
Seattle
Boston
New York City
Philadelphia
Washington, DC
Nashville
Birmingham
Jackson
New Orleans

Appendix 3: Averages Scores by City for Each Survey Question

	Phoenix	San Diego	Los Angeles	San Fran	Portland	Seattle
N	**5**	**4**	**6**	**4**	**5**	**6**
Flat, hard-surface area for organized games	100%	75%	100%	100%	100%	100%
Flat, soft-surface area for organized games	80%	100%	83%	50%	100%	83%
Water play area(s)	40%	50%	17%	0%	60%	50%
Shaded area(s)	80%	25%	67%	0%	80%	17%
Gathering space(s)	100%	100%	83%	100%	100%	83%
Seating	80%	75%	100%	100%	100%	100%
Bathroom(s)	100%	100%	100%	100%	100%	100%
Water fountain(s)	100%	100%	100%	100%	100%	83%
Trash receptacle(s)	100%	100%	100%	100%	100%	100%
Recycling receptacle(s)	80%	25%	0%	50%	80%	100%
Public transportation or sufficient parking	100%	75%	100%	100%	100%	100%
Appeal	4.00	3.75	4.67	4.50	3.80	4.17
Layout	5.00	4.50	5.00	5.00	4.80	4.67
Visibility from seating	4.60	3.75	3.33	3.50	4.20	3.50
Noise	5.00	4.50	3.83	4.00	4.80	4.00
Engaging equipment targeted for toddlers	4.20	4.25	4.33	3.75	4.00	4.67
Physically challenging equipment for preteens	4.60	4.75	4.17	5.00	3.80	3.83
Social equipment	4.60	4.25	5.00	4.50	4.60	4.50
Features Subscore	**4.54**	**4.17**	**4.25**	**4.18**	**4.43**	**4.24**
Guardrails and barriers on play equipment	5.00	4.00	5.00	4.75	4.80	5.00
Structural equipment	4.40	5.00	5.00	4.75	5.00	5.00
Non-static elements	5.00	5.00	3.67	2.75	4.40	3.17
Static elements	3.40	4.00	3.67	5.00	4.60	3.67
Constructive play elements	N/A	5.00	5.00	5.00	4.67	4.20
Equipment surfaces	3.00	3.00	3.33	4.00	3.80	4.17
Seating	5.00	5.00	4.50	4.75	4.80	4.33
Litter	4.00	3.75	3.83	3.50	3.80	4.00
Hazardous or illegal material(s)	4.20	5.00	4.33	5.00	5.00	5.00
Protective barriers separating play from hazardous areas	2.40	2.25	3.50	4.25	2.80	3.33

Severity of external hazards	3.60	2.00	2.00	3.50	3.60	3.00
Tripping hazards	3.40	4.00	3.83	3.75	4.00	3.67
Playground surface	3.00	3.75	3.17	3.75	4.20	3.67
Maintenance and Safety Subscore	**3.87**	**3.94**	**3.88**	**4.16**	**4.25**	**4.02**
Wheelchair accessible surface (choose 1 or 5)	2.60	2.00	3.00	5.00	2.60	4.33
Inclusive Seating	4.60	3.75	4.83	5.00	5.00	4.67
Wheelchair accessible structures	1.60	1.00	4.83	5.00	4.40	3.17
Wheelchair accessible active play equipment	1.40	1.00	3.17	2.50	4.00	3.83
Audible play	2.40	2.50	3.33	3.50	1.80	3.33
Passive sensory stimulation	1.40	2.00	2.00	2.75	4.20	3.17
Imaginative play	3.00	4.50	5.00	4.25	3.20	3.67
Constructive play equipment	3.00	4.00	3.83	1.75	3.20	4.00
Small semi-private spaces for a child	2.60	3.00	3.67	3.00	2.60	3.00
Cognitive play excluding elements already credited in this section	4.60	4.00	5.00	3.50	2.60	2.67
Integration of inclusive equipment	5.00	3.75	4.83	4.50	4.60	3.50
Shaded equipment	3.00	2.00	2.33	1.25	3.00	1.17
Inclusivity Subscore	**2.93**	**2.79**	**3.82**	**3.50**	**3.43**	**3.38**
Activity during visit	2.00	3.75	3.17	4.00	4.40	2.83
Present conditions	2.60	4.50	4.50	4.75	5.00	5.00
Overall Score	**3.77**	**3.59**	**4.00**	**3.92**	**4.01**	**3.86**

	Boston	New York	Philadelphia	Washington DC	Nashville	Birmingham	Jackson	New Orleans
N	**5**	**4**	**5**	**5**	**5**	**5**	**5**	**5**
Flat, hard-surface area for organized games	100%	100%	100%	100%	100%	80%	60%	80%
Flat, soft-surface area for organized games	80%	75%	60%	100%	100%	100%	100%	100%
Water play area(s)	80%	100%	80%	60%	20%	0%	0%	0%
Shaded area(s)	40%	100%	80%	20%	40%	40%	80%	40%
Gathering space(s)	80%	75%	100%	80%	80%	80%	100%	20%
Seating	100%	100%	100%	100%	100%	100%	80%	60%
Bathroom(s)	40%	100%	60%	100%	60%	40%	20%	0%
Water fountain(s)	60%	75%	40%	100%	60%	40%	20%	40%

Trash receptacle(s)	100%	100%	100%	100%	100%	100%	80%	100%
Recycling receptacle(s)	20%	75%	40%	80%	0%	0%	0%	0%
Public transportation or sufficient parking	80%	100%	100%	100%	100%	100%	100%	100%
Appeal	4.40	4.50	4.00	4.40	3.40	3.40	2.00	3.80
Layout	4.60	5.00	4.40	5.00	4.60	5.00	5.00	4.40
Visibility from seating	4.80	4.50	3.20	4.20	3.80	4.40	4.60	3.60
Noise	3.40	4.25	4.00	3.80	4.00	4.20	4.60	4.00
Engaging equipment targeted for toddlers	4.80	4.00	4.80	5.00	4.20	5.00	2.60	4.40
Physically challenging equipment for preteens	4.40	4.25	4.40	4.80	4.40	5.00	2.00	4.80
Social equipment	4.20	4.25	4.20	5.00	4.60	4.00	2.60	4.00
Features Subscore	**4.19**	**4.47**	**4.14**	**4.54**	**4.02**	**4.11**	**3.34**	**3.75**
Guardrails and barriers on play equipment	5.00	5.00	5.00	5.00	4.60	4.80	5.00	5.00
Structural equipment	4.40	4.25	4.00	5.00	4.20	4.20	4.20	4.20
Non-static elements	1.80	1.50	2.40	2.60	1.80	2.60	1.60	2.60
Static elements	4.60	2.25	4.00	5.00	3.00	3.60	2.20	4.60
Constructive play elements	5.00	5.00	3.50	N/A	2.67	3.00	N/A	N/A
Equipment surfaces	3.60	3.25	4.20	4.00	3.60	4.60	2.20	3.60
Seating	4.60	5.00	3.80	5.00	5.00	4.20	3.40	4.20
Litter	3.20	3.50	3.80	3.60	4.00	3.60	2.60	3.60
Hazardous or illegal material(s)	4.20	5.00	4.20	5.00	5.00	4.20	1.00	5.00
Protective barriers separating play from hazardous areas	4.60	4.50	4.00	4.60	2.60	2.60	2.80	2.40
Severity of external hazards	2.80	3.25	3.60	3.80	3.20	3.40	4.00	3.60
Tripping hazards	3.00	3.50	3.60	4.20	3.60	3.60	3.40	2.80
Playground surface	3.80	3.50	3.40	3.60	3.40	3.40	2.60	3.40
Maintenance and Safety Subscore	**3.82**	**3.76**	**3.83**	**4.28**	**3.63**	**3.72**	**2.92**	**3.75**
Wheelchair accessible surface (choose 1 or 5)	4.20	4.00	4.20	5.00	5.00	5.00	5.00	5.00
Inclusive Seating	5.00	5.00	5.00	4.80	4.80	4.40	4.80	4.80
Wheelchair accessible structures	3.80	4.75	3.60	4.20	3.40	3.20	1.80	3.00

Wheelchair accessible active play equipment	2.60	3.75	2.60	3.80	3.00	1.40	1.00	2.80
Audible play	3.60	3.50	2.20	5.00	1.60	3.60	1.00	2.80
Passive sensory stimulation	3.40	3.75	3.80	3.20	2.00	1.20	2.20	1.80
Imaginative play	4.40	4.75	3.40	3.80	4.40	4.20	3.60	4.60
Constructive play equipment	2.60	2.75	2.20	1.40	3.40	2.00	1.00	1.00
Small semi-private spaces for a child	2.60	5.00	3.40	5.00	3.40	1.80	4.20	3.40
Cognitive play excluding elements already credited in this section	3.00	3.25	3.40	4.40	2.80	4.00	2.20	3.40
Integration of inclusive equipment	4.60	4.50	4.00	4.20	3.60	2.60	2.80	3.80
Shaded equipment	1.00	4.00	2.40	1.80	1.80	2.20	3.40	2.20
Inclusivity Subscore	**3.40**	**4.08**	**3.35**	**3.88**	**3.27**	**2.97**	**2.75**	**3.22**
Activity during visit	1.20	2.75	2.20	2.80	2.20	1.20	1.00	1.80
Present conditions	2.40	3.50	1.00	1.00	3.40	2.20	4.80	3.60
Wheelchair usable play equipment	3.00	3.50	1.80	3.60	2.20	2.40	1.60	2.60
Wheelchair accessible play equipment	5.00	5.00	4.80	4.80	5.00	5.00	5.00	5.00
Ramps to main structures	3.40	4.00	1.00	1.80	1.80	1.00	1.00	1.00
Physically engaging wheelchair equipment	1.80	1.50	1.00	1.00	1.00	1.00	1.40	1.00
Physically engaging and motion based wheelchair equipment	3.00	4.00	2.60	3.80	3.00	1.40	1.40	2.80
Overall Score	**3.80**	**4.15**	**3.77**	**4.23**	**3.64**	**3.58**	**3.01**	**3.55**

Appendix 4: Averages Scores by City for Each Survey Question Converted into Z-Scores

	Phoenix	San Diego	Los Angeles	San Fran	Portland	Seattle
N	**5**	**4**	**6**	**5**	**5**	**6**
Flat, hard-surface area for organized games	7%	-18%	7%	7%	7%	7%
Flat, soft-surface area for organized games	-7%	13%	-4%	-37%	13%	-4%
Water play area(s)	1%	11%	-22%	-39%	21%	11%
Shaded area(s)	29%	-26%	16%	-51%	29%	-34%
Gathering space(s)	16%	16%	-1%	16%	16%	-1%
Seating	-13%	-18%	7%	7%	7%	7%
Bathroom(s)	28%	28%	28%	28%	28%	28%
Water fountain(s)	28%	28%	28%	28%	28%	11%
Trash receptacle(s)	1%	1%	1%	1%	1%	1%
Recycling receptacle(s)	41%	-14%	-39%	11%	41%	61%
Public transportation or sufficient parking	3%	-22%	3%	3%	3%	3%
Appeal	0.09	-0.17	0.78	0.61	-0.12	0.26
Layout	0.37	-0.48	0.37	0.37	0.03	-0.20
Visibility from seating	0.59	-0.23	-0.63	-0.47	0.21	-0.47
Noise	1.20	0.49	-0.47	-0.23	0.92	-0.23
Engaging equipment targeted for toddlers	-0.10	-0.05	0.03	-0.52	-0.28	0.34
Physically challenging equipment for preteens	0.30	0.43	-0.10	0.66	-0.43	-0.40
Social equipment	0.28	-0.07	0.68	0.18	0.28	0.18
Features Subscore	**0.87**	**0.00**	**0.20**	**0.04**	**0.60**	**0.16**
Guardrails and barriers on play equipment	0.24	-1.61	0.24	-0.22	-0.13	0.24
Structural equipment	-0.24	0.71	0.71	0.32	0.71	0.71
Non-static elements	1.18	1.18	0.42	-0.10	0.84	0.14
Static elements	-0.27	0.11	-0.10	0.75	0.50	-0.10
Constructive play elements	N/A	0.57	0.57	0.57	0.30	-0.07
Equipment surfaces	-0.64	-0.64	-0.29	0.41	0.20	0.58
Seating	0.45	0.45	-0.02	0.21	0.26	-0.18
Litter	0.49	0.15	0.26	-0.18	0.22	0.49
Hazardous or illegal material(s)	-0.16	0.41	-0.06	0.41	0.41	0.41
Protective barriers separating play from hazardous areas	-0.73	-0.85	0.14	0.74	-0.41	0.01

Severity of external hazards	0.44	-1.46	-1.46	0.32	0.44	-0.28
Tripping hazards	-0.25	0.51	0.30	0.20	0.51	0.09
Playground surface	-0.45	0.28	-0.29	0.28	0.71	0.20
Maintenance and Safety Subscore	**0.05**	**0.22**	**0.09**	**0.71**	**0.92**	**0.40**
Wheelchair accessible surface (choose 1 or 5)	-0.87	-1.22	-0.63	0.55	-0.87	0.15
Inclusive Seating	-0.24	-1.60	0.13	0.39	0.39	-0.14
Wheelchair accessible structures	-1.21	-1.60	0.94	1.05	0.65	-0.17
Wheelchair accessible active play equipment	-0.85	-1.12	0.34	-0.11	0.89	0.78
Audible play	-0.30	-0.24	0.30	0.41	-0.69	0.30
Passive sensory stimulation	-0.93	-0.47	-0.47	0.10	1.20	0.41
Imaginative play	-0.84	0.37	0.77	0.17	-0.68	-0.30
Constructive play equipment	0.25	0.89	0.79	-0.55	0.38	0.89
Small semi-private spaces for a child	-0.36	-0.16	0.17	-0.16	-0.36	-0.16
Cognitive play excluding elements already credited in this section	0.64	0.29	0.87	0.00	-0.51	-0.48
Integration of inclusive equipment	0.90	-0.24	0.75	0.44	0.54	-0.47
Shaded equipment	0.56	-0.17	0.07	-0.71	0.56	-0.78
Inclusivity Subscore	**-0.72**	**-0.97**	**0.84**	**0.28**	**0.16**	**0.06**
Activity during visit	-0.35	0.88	0.47	1.06	1.34	0.24
Present conditions	-0.54	0.67	0.67	0.83	0.99	0.99
Overall Score		**-0.51**	**0.61**	**0.40**	**0.65**	**0.23**

	Boston	New York	Philadelphia	Washington DC	Nashville	Birmingham	Jackson	New Orleans
N	**5**	**4**	**5**	**5**	**5**	**5**	**5**	**5**
Flat, hard-surface area for organized games	7%	7%	7%	7%	7%	-13%	-33%	-13%
Flat, soft-surface area for organized games	-7%	-12%	-27%	13%	13%	13%	13%	13%
Water play area(s)	41%	61%	41%	21%	-19%	-39%	-39%	-39%
Shaded area(s)	-11%	49%	29%	-31%	-11%	-11%	29%	-11%
Gathering space(s)	-4%	-9%	16%	-4%	-4%	-4%	16%	-64%
Seating	7%	7%	7%	7%	7%	7%	-13%	-33%
Bathroom(s)	-32%	28%	-12%	28%	-12%	-32%	-52%	-72%
Water fountain(s)	-12%	3%	-32%	28%	-12%	-32%	-52%	-32%

Trash receptacle(s)	1%	1%	1%	1%	1%	1%	-19%	1%
Recycling receptacle(s)	-19%	36%	1%	41%	-39%	-39%	-39%	-39%
Public transportation or sufficient parking	-17%	3%	3%	3%	3%	3%	3%	3%
Appeal	0.50	0.61	0.09	0.50	-0.53	-0.53	-1.98	-0.12
Layout	-0.31	0.37	-0.65	0.37	-0.31	0.37	0.37	-0.65
Visibility from seating	0.79	0.50	-0.76	0.21	-0.18	0.40	0.59	-0.37
Noise	-1.09	0.13	-0.23	-0.51	-0.23	0.06	0.63	-0.23
Engaging equipment targeted for toddlers	0.46	-0.28	0.46	0.65	-0.10	0.65	-1.59	0.09
Physically challenging equipment for preteens	0.11	-0.02	0.11	0.48	0.11	0.66	-2.07	0.48
Social equipment	-0.12	-0.07	-0.12	0.68	0.28	-0.32	-1.71	-0.32
Features Subscore	**0.06**	**0.71**	**-0.07**	**0.86**	**-0.35**	**-0.13**	**-1.91**	**-0.96**
Guardrails and barriers on play equipment	0.24	0.24	0.24	0.24	-0.50	-0.13	0.24	0.24
Structural equipment	-0.24	-0.48	-0.87	0.71	-0.56	-0.56	-0.56	-0.56
Non-static elements	-0.64	-0.81	-0.30	-0.19	-0.64	-0.19	-0.76	-0.19
Static elements	0.50	-1.01	0.11	0.75	-0.53	-0.14	-1.04	0.50
Constructive play elements	0.57	0.57	-0.64	N/A	-1.32	-1.05	N/A	N/A
Equipment surfaces	-0.01	-0.37	0.62	0.41	-0.01	1.03	-1.47	-0.01
Seating	0.07	0.45	-0.68	0.45	0.45	-0.30	-1.05	-0.30
Litter	-0.59	-0.18	0.22	-0.05	0.49	-0.05	-1.39	-0.05
Hazardous or illegal material(s)	-0.16	0.41	-0.16	0.41	0.41	-0.16	-2.41	0.41
Protective barriers separating play from hazardous areas	1.02	0.94	0.54	1.02	-0.57	-0.57	-0.41	-0.73
Severity of external hazards	-0.51	0.02	0.44	0.67	-0.04	0.20	0.91	0.44
Tripping hazards	-0.75	-0.12	0.01	0.77	0.01	0.01	-0.25	-1.00
Playground surface	0.32	0.03	-0.06	0.13	-0.06	-0.06	-0.83	-0.06
Maintenance and Safety Subscore	**-0.06**	**-0.19**	**-0.03**	**0.99**	**-0.48**	**-0.27**	**-2.08**	**-0.21**
Wheelchair accessible surface (choose 1 or 5)	0.07	-0.04	0.07	0.55	0.55	0.55	0.55	0.55
Inclusive Seating	0.39	0.39	0.39	0.07	0.07	-0.56	0.07	0.07
Wheelchair accessible structures	0.25	0.88	0.12	0.52	-0.01	-0.15	-1.07	-0.28

Wheelchair accessible active play equipment	-0.04	0.73	-0.04	0.76	0.22	-0.85	-1.12	0.09
Audible play	0.47	0.41	-0.43	1.38	-0.82	0.47	-1.21	-0.05
Passive sensory stimulation	0.59	0.85	0.89	0.44	-0.47	-1.08	-0.32	-0.62
Imaginative play	0.29	0.57	-0.52	-0.20	0.29	0.13	-0.36	0.45
Constructive play equipment	-0.01	0.09	-0.26	-0.78	0.51	-0.39	-1.03	-1.03
Small semi-private spaces for a child	-0.36	0.85	0.04	0.85	0.04	-0.76	0.44	0.04
Cognitive play excluding elements already credited in this section	-0.28	-0.14	-0.05	0.52	-0.40	0.29	-0.74	-0.05
Integration of inclusive equipment	0.54	0.44	-0.01	0.17	-0.38	-1.30	-1.11	-0.20
Shaded equipment	-0.90	1.29	0.12	-0.31	-0.31	-0.02	0.85	-0.02
Inclusivity Subscore	**0.10**	**1.30**	**0.01**	**0.95**	**-0.13**	**-0.66**	**-1.04**	**-0.22**
Activity during visit	-0.91	0.18	-0.21	0.22	-0.21	-0.91	-1.05	-0.49
Present conditions	-0.67	0.03	-1.56	-1.56	-0.03	-0.80	0.86	0.10
Wheelchair usable play equipment	0.29	0.62	-0.51	0.69	-0.24	-0.11	-0.64	0.02
Wheelchair accessible play equipment	0.02	0.02	-0.06	-0.06	0.02	0.02	0.02	0.02
Ramps to main structures	1.04	1.43	-0.54	-0.01	-0.01	-0.54	-0.54	-0.54
Physically engaging wheelchair equipment	0.72	0.35	-0.25	-0.25	-0.25	-0.25	0.23	-0.25
Physically engaging and motion based wheelchair equipment	0.16	0.73	-0.07	0.62	0.16	-0.75	-0.75	0.05
Overall Score	**0.07**	**1.03**	**-0.03**	**1.25**	**-0.39**	**-0.53**	**-2.12**	**-0.63**