A Comparison of New York City Playground Hazards in High- and Low-Income Areas

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Objective: To compare playground hazards in high- and low-income neighborhoods.

Design: Forty-five playgrounds were randomly selected from the 9 New York City community districts that met our study criteria and were divided into high- and low-income groups based on comparison to the median of the median incomes ($24 452 per year) of the 9 districts. Playgrounds are maintained by the City of New York Parks and Recreation Department and were assessed by one of us (S.A.S.) using a standardized on-site survey based on the US Consumer Product Safety Commission’s guidelines for public playground safety.

Main Outcome Measures: Total hazards per play area were subdivided into 3 categories: park design hazards, equipment maintenance hazards, and equipment hazards relating to fall injuries. A play area was defined as an individual set of equipment.

Results: Twenty-five (56%) of the parks were located in low-median-income districts and contained 98 (53%) of the total play areas. High- and low-income playgrounds did not differ significantly in the amount or type of equipment, mean fall injury hazards per play area, or mean park design hazards per play area. Low-income districts had a significantly higher mean total hazards per play area (6.1 vs 4.2; \(P = .02\)) and mean equipment maintenance hazards per play area (2.1 vs 1.0; \(P = .02\)).

Conclusion: Significantly more hazards per play area were identified in the low-income group compared with the high-income group.


Editor’s Note: Add this to the long list of increased hazards associated with low income, but there’s no excuse for this one.

Catherine D. DeAngelis, MD

Playgrounds and playground equipment are important components of many children’s day-to-day environment. Unfortunately, playgrounds are not hazard free. From 1983 to 1987, approximately 305 000 preschool children (ages 1-4 years) in the United States sought care in emergency departments for injuries involving playground equipment. Playground equipment was associated with 994 678 injuries among all age groups during the same period.

Several studies have investigated the causes of playground injuries. Sacks et al studied child care centers in Atlanta, Ga, and found that the likelihood of a playground-related, medically attended injury increased as the number of identified playground hazards increased. Others have found that children living in low-income neighborhoods were at increased risk of severe injury from both unintentional and intentional causes. These risk studies, however, were not specific to playground injuries. To date, no published data exist to our knowledge that compare potential playground hazards in different income areas.

Our objective was to determine whether playgrounds located in districts with low median income have more potential hazards than playgrounds in districts with high median income.

RESULTS

A total of 987 hazards were identified in the 186 play areas contained in the 45 parks surveyed during the fall months of 1996 and 1997. Seven of the playgrounds that were initially selected could not be surveyed: 1 park was unavailable because of park construction, 3 were unavailable because they were adjoined to a school and...
admittance to the school facilities was not permitted, 2 parks could not be located, and 1 park contained no equipment. Each of these 7 parks was replaced by the next randomized selection within its district.

Twenty-five (56%) of the parks were located in low-median-income districts and contained 98 (53%) of the total play areas. The amount and type of equipment surveyed are shown in Table 2. There were no seesaws found in any of the parks. Of 113 total climbing apparatus play areas, 91 (81%) consisted of multiplatform climbers. High- and low-median-income district parks did not differ significantly in the amount or type of equipment (Table 2).

Most common hazards identified are shown in Table 3. Most of these hazards were associated with fall injuries and accounted for 681 (69%) of the total hazards identified in this study. The remaining hazards consisted of 304 equipment maintenance hazards and 2 park design hazards.

Parks in districts with low median income had significantly higher mean total hazards per play area (6.1 vs 4.2; \( P = .02 \)) and mean equipment maintenance hazards per play area (2.1 vs 1.0; \( P = .02 \)) (Table 4). Mean fall injury hazards per play area and mean park design hazards per play area did not differ significantly between the 2 groups.

Although significantly more playground hazards per play area were identified in the low-income group, a large number of hazards were observed in playgrounds located in high-income areas as well. More than half of the total hazards observed in this study were classified as fall injury hazards. Surprisingly, playgrounds in both income groups in our study had similar mean fall injury hazards per play area. Of the total play areas surveyed, 150 (81%) were noted to have fall zone dimensions that did not comply with the guidelines set by the US Consumer Product Safety Commission.12 Investigators focused on specific playground hazards, including fall zone protective surfacing and equipment maximum height, since falls tend to cause most playground injuries.6,14 In a 1988 study6 of urban playgrounds in Boston, Mass, conducted by the Childhood Injury Prevention Program of the Boston Department of Health and Hospitals, the surfacing material in 100% of the playgrounds surveyed was unsafe. In this study, climbing equipment accounted for the greatest proportion of moderate and severe hazards.

Findings in a retrospective study by Mayr et al10 suggest that climbing equipment should not be higher than 1.6 m. Those authors found that 1.6 m was the mean height of falls in which children sustained fractures or concussions. Sacks et al13 note that the undersurfacing for climbing equipment of 1.8 m or more was generally inadequate and was associated with twice the rate of fall injury as climbing equipment of less than 1.8 m. In addition to inappropriate fall zone dimensions, 59% of the

The mean total hazards, park design hazards, equipment maintenance hazards, and fall injury hazards per play area were compared in the high- and low-income groups.

Fish exact or \( \chi^2 \) tests were used to compare categorical variables. Analysis of variance was used to compare continuous variables. Statistical significance was set at \( P < .05 \).

## METHODS

A standardized survey instrument was designed to reflect the US Consumer Product Safety Commission’s guidelines for public playground safety.11 The instrument was used to analyze each playground for general park design hazards and each play area for general equipment maintenance flaws, as well as design and maintenance hazards previously established to be associated with fall injuries4 (Table 1). The types of playground equipment assessed in this study included swing sets, seesaws, freestanding slides, and several types of climbing apparatus, which included standard climbing equipment such as monkey bars and geodesic domes as well as multiplatform climbers—composite structures with linked platforms. All playgrounds were assessed by one of us (S.A.S.) during the fall months of 1996 and 1997 and are property of the City of New York Parks and Recreation Department.

A random-number table was used to select 5 playgrounds from each of the 9 Manhattan community districts that contained at least 5 playgrounds. Playgrounds included in the selection process were chosen from a published list from the City of New York Parks and Recreation Department. District boundaries are determined by the City of New York Department of City Planning.13 Although Central Park has a district assignment, it was excluded from this study because it does not contain any documented inhabitants who provide income information to the Census Department. If a selected playground was unavailable for survey, it was replaced by the next randomized selection within its district. Playground substitutions were necessary when parks were closed for construction purposes, if admittance was prohibited (ie, they were joined to a school), if they could not be located at the listed address, or if they contained no playground equipment.

Median income of the districts maintaining each group of playgrounds was obtained from the City of New York Department of City Planning’s report of the 1990 Census of Population and Housing.12 The 9 districts were divided into high- and low-income groups based on comparison to the median of the median incomes of all 9 New York City districts. Median incomes of the 9 districts surveyed ranged from $16,450 to $94,350 per year. A district was classified in the high-income group if its median income was greater than the median income of the total group ($24,452 per year); any district with a median income less than this amount was classified as a low-income district.

Total hazards per play area were defined as the total number of hazards identified for each park divided by the total number of play areas. A play area was defined as a single area of equipment such as a set of swings or a multiplatform climber.

Total hazards per play area were divided into 3 categories: (1) park design hazards, (2) equipment maintenance hazards, and (3) fall injury hazards (hazards that might cause or worsen a fall).

The mean total hazards, park design hazards, equipment maintenance hazards, and fall injury hazards per play area were compared in the high- and low-income groups.

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TABLE 1. Types of Hazards Surveyed

<table>
<thead>
<tr>
<th>Park design</th>
<th>Median-Income Parks</th>
<th>Type of Hazard</th>
<th>Low (n = 25)</th>
<th>High (n = 20)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inappropriate playground perimeters*</td>
<td>98 88 186 . . .</td>
<td>Paint chips</td>
<td>49 47 48 .55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exit hazards</td>
<td>42 2 24 .003</td>
<td>Trash</td>
<td>29 17 23 .61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrance hazards</td>
<td>22 20 22 .96</td>
<td>Rust</td>
<td>29 10 20 .02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separation of play and nonplay areas</td>
<td>22 16 19 .74</td>
<td>Vandalism</td>
<td>22 16 19 .74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Playgrounds perimeters refer to the barrier fencing that surrounds the entire playground.
† Swing perimeter fencing refers to the fencing that surrounds swing sets.
‡ Dangerous debris refers to objects that might worsen a fall injury, ie, cans, bottles, glass, or nails.
§ Fall zone refers to surface under and around a piece of equipment (where protective surfacing is required) onto which a child falling from or exiting from the equipment would be expected to land.
¶ No-encroachment zones refers to an additional area beyond the fall zone where children using the equipment can be expected to move about and should have no encroaching obstacles.

TABLE 2. Equipment Identified in Playgrounds

<table>
<thead>
<tr>
<th>Type of Equipment</th>
<th>Median-Income Parks</th>
<th>Type of Hazard</th>
<th>Low (n = 25)</th>
<th>High (n = 20)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freestanding slides</td>
<td>25</td>
<td>Fall injury</td>
<td>2.1 ± 1.7</td>
<td>4.0 ± 1.7</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Park design</td>
<td>0</td>
<td>0</td>
<td>.26</td>
</tr>
<tr>
<td></td>
<td>113</td>
<td>Total</td>
<td>6.1 ± 3.1</td>
<td>4.2 ± 2.1</td>
<td>.02</td>
</tr>
</tbody>
</table>

MULTIPLATFORM CLIMBING APPARATUS

Most of the remaining hazards in our study (n = 304) were equipment maintenance problems such as paint chips or splinters. Of the total play areas, 48% contained paint chips, while splinters were noted in 23% of the total play areas. Twenty-four percent of the play areas were littered with some form of trash such as paper or food products. In some of the low-income play areas, excrement was noted. Overall, there were more equipment maintenance hazards per play area observed in the playgrrounds located in the low-income districts. Perhaps playgrounds in areas of low income have more daily use or a smaller maintenance budget than playgrounds in high-income districts. This could play a role in the distribution of hazards in these areas.

In the past, investigators have found that children living in low-income neighborhoods were at increased risk of severe injury. These findings indicate the need for increased attention to injury prevention in high-risk areas. Central Harlem's playground injury prevention project enacted by the Safe Kids/Healthy Neighborhood Coalition is an example of successful injury prevention in such an area. After 1 year, there was a marked decrease in school playground injuries, and a decrease in school playground injuries. Part of the Harlem intervention focused on teach-
ing parents to recognize possible areas of injury using information pamphlets. Parents need to be more aware of potential hazards and how they can be avoided. Younger children need to be supervised in playgrounds. For example, we observed that behaviors such as locking perimeter fences to swing sets did not occur on a regular basis, even in the presence of adults. In fact, in our study, 83% (40/48) of the swing perimeter fences were damaged or unlocked. (Swing perimeter fencing refers to the fencing that surrounds swing sets.) Improved anticipatory guidance is important; however, our study also suggests there are many playground hazards inherent in construction and maintenance that parents may not be able to address.

There were some limitations to our study. Seasonal variability may have a role in determining hazards. Time of day or season of the year might have an effect on the amount and type of hazards identified. The playgrounds in this study were not surveyed at exactly the same time every day. None of the playgrounds were surveyed during the summer months, when children are not attending school full time. In addition, maintenance schedules for each playground were unknown. Playgrounds may be cleaner on certain days or at certain times during the week or month of the year. The ability of children and adults to gain access to the playgrounds varied. Some playgrounds that were initially selected could not be surveyed because they were adjoined to a school. These playgrounds were often locked, and admittance was limited to students and faculty. The playgrounds studied in this survey were freely accessible throughout the day by anyone who wished to gain access. It is unclear whether access to the playgrounds surveyed in this study was successfully prohibited throughout the night. Finally, it is not known whether the amount of hazards correlates directly with the amount of injuries that occur in each park, since injury records for each park were often incomplete or unavailable.

In conclusion, significantly more playground hazards per play area were identified in the low-income group. The low-income group had significantly more mean total hazards and mean equipment hazards per play area. Despite this difference, there were still a large number of hazards in playgrounds located in high-income areas. Both groups had similar amounts of fall injury hazards; however, the low-income playgrounds had significantly more equipment maintenance issues. Perhaps local government needs to improve both equipment maintenance in low-income playgrounds as well as the adherence to fall injury prevention guidelines of both income groups. The playgrounds surveyed in high-income areas often had newer and more challenging equipment, but they still contained a large amount of fall injury hazards. Although new equipment may make a park more exotic and exciting for children, playgrounds must be kept as hazard free as possible. Renewing equipment is important but maintenance issues must be considered as well.

Further studies are necessary to devise improved prevention strategies that are specific to playgrounds in both high- and low-income areas, since hazards appear to differ in these 2 groups. Our data suggest that playgrounds in high- and low-income groups differ primarily in equipment maintenance. Correcting the problems identified in the playgrounds surveyed in this study is an area deserving of increased allotment of funds and time by local government. Providing adequate budgets to maintain parks should be a priority. At a minimum, there should be a more coordinated effort among local agencies and local government to maximize scarce resources that are needed to reduce park hazards.

Accepted for publication September 29, 1998.
We thank Dwayne Breining, MD, Sandra Cunningham, MD, Lorraine Ronca, DO, and Jennifer Weir for their contributions to this article.
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REFERENCES