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Places for Healthy Play: A Multi-Pronged Evaluation of Context, Design, and Perceptions for Play Space Improvements

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Abstract

Community design interventions have prioritized the creation of quality play space, especially in easy to access public places, to improve health outcomes and to reduce health inequities. Evaluations of health-relevant play interventions often fail to assess essential context, design, and perceptions. The Play Everywhere Philadelphia Challenge, led by KABOOM!, funded 16 play spaces to support child health and development and literacy skills for low-income neighborhoods across Philadelphia. In June-October 2022, our interdisciplinary team conducted a process evaluation of completed play space installations (k=9) to identify site aspects that facilitated greater use. We mapped neighborhood context (e.g., child amenities, sociodemographics, pedestrian and bike accessibility), and conducted direct and systematic observations of play space design (e.g., signage, shade), visitation (i.e., number of visitors/hour), and engagement. We summarized visitation and engagement across contextual and design data. While many visitors passed through sites, over half of the children we observed engaged with the installation. Installations with poor condition (i.e., cleanliness and maintenance) had the lowest visitation and engagement. More active/kinetic installations drew more children and engagement. This process evaluation comprehensively analyzed play space design elements and neighborhood context and provides evidence to inform recommendations to increase use of urban play spaces.

Keywords: play, public space, evaluation, health inequities, systematic observation, children

Play is understood as an activity that is for enjoyment and recreation (Nijhof et al., 2018). Regardless of form, play is essential for children's cognitive and social development and beneficial for physical and mental health (Dankiw et al., 2020; Hartig et al., 2014; Lillard et al., 2013). Play is hypothesized to enhance overall health through multiple pathways, including cognitive development (e.g., problem solving, language development), social development (e.g., social interaction, conflict resolution), physical development (e.g., fine and gross motor skills, physical fitness), and mental health and wellbeing (e.g., stress reduction, resilience) (Nijhof et al., 2018).

Evidence suggests that opportunities for play have declined in quality and number, especially in urban areas (Krishnamurthy, 2019). Additionally, opportunities for play are not equitably distributed, with children living in poor and racially segregated neighborhoods having significantly lower access to high quality play spaces (Abercrombie et al., 2008). The inequitable distribution of high quality play spaces was established more than 20 years ago, but continues to play a role in exacerbating health inequalities among children that can persist into adulthood (Geronimus, 2000).

Public health and community design interventions have prioritized the creation of quality play space, especially in easy to access, public places, to improve health outcomes and to reduce health inequities(Brown et al., 2019). Many relevant interventions have evaluated the influence of school or clinical play-based interventions to improve health outcomes (Lee et al., 2020). The "Play Everywhere Philly Challenge", led by KABOOM!, funded 16 play spaces to support child development and literacy skills in communities across Philadelphia. The 16 spaces were selected to ensure access for low-income neighborhoods. Play Everywhere Philly builds on the evidence presented in the 2019 report "Philadelphia Playful Learning Landscapes: Scaling Strategies for a Playful Learning Movement" that documented the use of playful learning landscapes to enhance STEM and literacy in child-caregiver interactions and build social and mental capital (Robinson, 2019).

Despite existing guidelines and best practices for the design of these spaces (Moore et al., 2022), the original plan for KABOOM's evaluation of interventions did not include an assessment of how key design and contextual features influence the use of the space. Without these data, it is difficult to determine which elements of the play space are most important for promoting play and ultimately improving health outcomes. Recent studies evaluating process outcomes of similar interventions to create or enhance play spaces have focused on qualitative research but have not quantified the potential design characteristics that may influence use and engagement (Dankiw et al., 2020; Elliott et al., 2018; Miller et al., 2022). To fill this gap, our team designed a multi-pronged process evaluation to assess the design and contextual features of the new installations developed as part of the "Play Everywhere Philly Challenge" and children's use and engagement with these spaces. This paper describes the findings from our process evaluation.

Methods

Design

The evaluation protocol was developed by an interdisciplinary group of public health and urban design researchers and consisted of a three-pronged methodology. This included: (1) Geospatial mapping and analysis of neighborhood context; (2) systematic observations of spaces and people; and (3) intercept surveys of adult, English-speaking visitors. To focus on findings most relevant to children, we do not include data from the intercept surveys in this analysis and we report analysis of observational data specific to children only.

Sample

Community groups responded to the Play Everywhere Philly Challenge call for proposals issued by KABOOM to receive funding for a play space that would be in a publicly available space within the neighborhood. KABOOM for made all decisions regarding funding and approved the plan for each of the play installations. For our process evaluation, we assessed neighborhood context for all 16 funded installation locations using geospatial mapping in summer of 2022. Seven play space installations were either incomplete, unavailable, or the installation had been damaged between installation (summer 2021) and our evaluation, thereby limiting the evaluation team's ability to complete the observational protocol for those spaces. Thus, the full protocol was completed for 9 sites.

Measures

We calculated quarter mile (400-meter) walking network buffers from each installation site using ArcGIS Pro 2.9 and Python 3.9.7. Data on sociodemographic characteristics (racial composition, age distribution, housing burden), built environment (bus routes, rapid transit, bike infrastructure, walkability), and amenities (child amenities, parks, greenness) were linked to these buffers using areal weighting. Data sources included US Census American Community Survey 2016-2020 (sociodemographic characteristics); Delaware Valley Regional Planning Commission 2012, 2021 (rapid transit); Pennsylvania Spatial Data Access 2016 (bus routes, parks, greenness); OpenDataPhilly 2018, 2022 (bike infrastructure); WalkScore™ (walkability); and National Establishment Time Series 2019 (child amenities). A technical report describing the details for data sources and GIS analyses available upon request from first author.

We used two existing systematic observation tools to collect information on the physical environment of the play spaces and use of the space. For the physical environment, we modified the Environmental Assessment of Parks and Recreations Spaces (EAPRS) Measurement Tool (Geremia et al., 2019; Saelens et al., 2006). To align with the urban spaces being observed, we eliminated elements that are

more appropriate for natural environments, such as hiking trails. For each remaining element, we evaluated the presence (yes/no), condition, and cleanliness using the criteria from the original EAPRS tool. EAPRS was performed on all completed sites June 28-July 5, 2022. To evaluate use of the space, we adapted the System for Observing Play and Leisure Activity in Youth (SOPLAY) for this study (McKenzie, 2016; McKenzie et al., 2000). Specifically, the team used momentary time sampling to systematically and periodically scan and count adults and children in the play space site and engaging with the installation. Specifically, we assessed the number of children and adults present and the number of children and adults who were engaged with the installation in any way. The type of engagement varied based on the installation, but it could be active/physical (climbing) or passive/non-physical (watching, reading). The original SOPLAY instrument additionally characterizes intensity and type of activity (e.g., jumping, soccer, etc.) for those persons observed during each scan but our modified instrument did not include that additional data points because they were not relevant to the goals of our process evaluation. From July-August 2022, two field observers performed scans on completed installations every 15 minutes during three shifts: morning (8-11am); afternoon (12-3pm); and evening (4-7pm). Where possible, this was done across weekdays and weekends to understand time and weekly patterns. This resulted in 18 hours-worth of observation for most sites. One site was a pop-up play space that removed all play materials at 5 pm and another site was closed to the public after 5 pm so we were not able to conduct full evening observations of these sites.

All data were collected by trained observers using computer-assisted technology (i.e., iPads). The project hired field observers who were trained by two main project leads (YLM, JAH) in two 4-hour sessions, which included training on the protocol, including safety and logistics, and practice collecting in the field. Modification of the observational tools was conducted by two project leads (YLM, JAH) and all the project's instruments are available by first author upon request.

Analysis

To understand context, we calculated averages of neighborhood characteristics and described them independently as well as compared to city-wide averages (where relevant). We created categories of design characteristics from combinations of EAPRS observed variables based on key design principles (Kaboom, 2023). These design elements included: (1) presence of interactive components to climb, jump on, or otherwise move (active/kinetic), (2) presence of shade, and (3) condition. Presence of interactive components were evaluated based on the presence of 2 or more of the following elements: playset or structure; things to hang from (part of playset; non-playset); things to slide down (part of playset; non-playset); functional stairs, ladders & ramps; fun things to climb on/up/through; things to stand or walk on; swings. Shade was assessed based on the percent of the installation that was shaded during full sun (low: 0-33%, moderate: 34-66%, high: 67-100%). Condition was determined by the ratings for play space and neighborhood conditions and cleanliness. For all elements present at the installation, we summed the scores for condition (rated 1 (poor) to 3 (excellent)) and cleanliness (rated 1 (not at all) to 3 (mostly/extremely)). The sum was categorized using terciles to represent "excellent", "moderate", and "low".

SOPLAY counts were summed within each hour of observation and average visitation (i.e., children/hour) and engagement (i.e., percentage of children engaging) were calculated across installation, day of week, time of day, contextual factors, and design elements.

Results

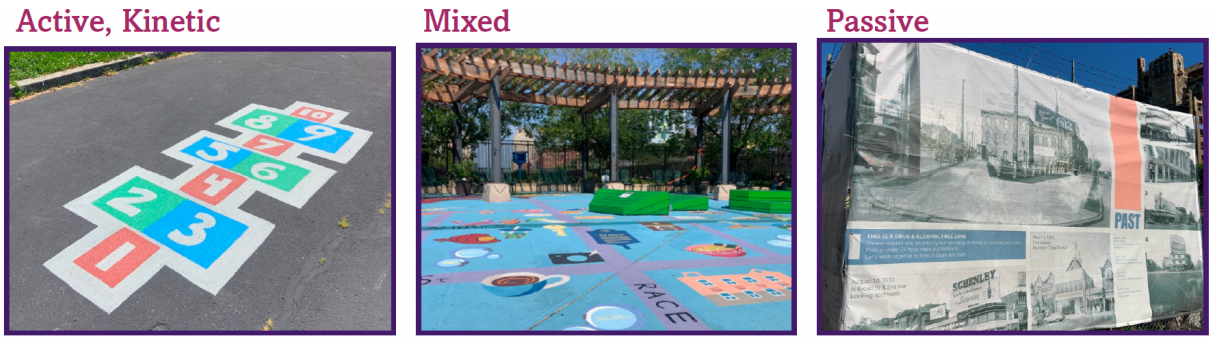
Context

Installations were in areas with higher average proportions of non-Hispanic Black (44.5%), Hispanic (17.2%), and Asian (7.5%) populations than the city as a whole (40.1%, 15.1%, 7.4%, respectively) (Supplemental Figure S1). An average of 3724 people live within a ¼-mile of an installation, including 252 children under 5 and 222 children aged 5 to 9. Installations were often located near other child-related amenities; within ¼-mile of installations there were an average of 2 child physical activity facilities, 0.4 preschools, 1.5 schools, 3.2 daycares, and 2.0 parks. Most installations were accessible for those without a vehicle; 81% of sites had at least 4 bus routes within ¼-mile, 44% had rapid transit within 0.5 km, and 81% are in areas deemed "Very Walkable" or "Walker's Paradise" by WalkScore™.

Design

Of the nine complete installations, three had interactive components to climb, jump on, or otherwise move ("active/kinetic"), three were primarily reading or presentation of other visual information that were fixed features requiring the child or caregiver to initiate the activity ("passive") and the remaining three were "mixed" but lacked enough kinetic components to be considered active (see Figure 1). Three sites had greater than a third coverage of shade and some trees present ("shaded"). Four sites were in "excellent" condition, two "moderate", and three "low" representing a combination of play space and neighborhood conditions and cleanliness.

Figure 1. Examples of Play Spaces Designed as part of the KABOOM! Play Everywhere Philadelphia Challenge



Active, kinetic installations had interactive components. They may have involved things to climb, jump on, or otherwise move. Mixed sites had both active and passive features but not enough kinetic components to fall into the active category. They may have things for kids to touch, grab, or experiment with. Passive installations were primarily reading or presentation of other visual information. They were usually fixed features that require the child or caregiver to initiate the activity.

Use

On average, we observed 2.5 children/hour and 52% of the children engaged with the installations. The busiest time was weekdays in the afternoon (12pm-3pm). Engagement was substantially higher in "Very Walkable" locations (61% children) compared to "Walker's Paradise" locations (32% children), potentially reflecting spaces where people pass quickly through on their way to another errand or activity. The site with the largest population of children living nearby also had the highest visitation and engagement. There was no discernible pattern of visitation or engagement by shade. Sites with low condition had the lowest number of visitors (0.3 children). Active, kinetic installations had an average of 5.5 children visitors/hour, 62% of whom engaged with the installation. The team saw that even though visitation dropped for mixed sites (1.2 children/hr.), engagement remained higher (48%). Passive sites had low visitation (1.3 children/hr.) and engagement (19%) (Supplemental Figure S2).

Discussion

Summary

In this study, our interdisciplinary group of public health and design professionals developed and implemented an integrated set of tools to comprehensively assess specific design and contextual features of urban play spaces. We identified aspects of installations associated with greater use of the spaces. Our multi-pronged approach can serve as a model to improve evaluations of play-based interventions by identifying specific elements linked to play that reduce inequities in the social, physical, and cognitive health of children.

Prior research has primarily focused on identifying individual-level or intra-individual factors associated with use of new or modified play space. For example, recent research on the factors that influence children's use and engagement with play spaces identified individual-level factors, including adults who support use, limited time for play, and distance to the closest play space, or policy-level factors including funding and scheduling. In contrast, we have focused on using quantifiable observational data to identify contextual- and design-level factors that influence use and engagement (Dankiw et al., 2020; Elliott et al., 2018; Miller et al., 2022).

Limitations

While we implemented all possible tools at each installation, our observations were limited to a subset of sites due to access hours or play space improvement completion. Nonetheless, our methods provided meaningful information across a range of contexts including type of improvement (kinetic/passive) and installation location (indoor/outdoor). The evaluation was limited to post-installation and covered a short time period (two months) which occurred a year after installation. Thus, we are unable to evaluate change in use and our data may not represent conditions or visitation at the play spaces in other seasons or at other points in time (e.g., immediately after or a few years post improvement). We ensured observations covered days of week (i.e., weekday, weekend) and times of day (i.e., morning, afternoon, evening), but they still represent only a snapshot of activity and engagement. For example, some play spaces may have events or staffing to increase visitation or engagement at other times. Additionally, due to installation-specific schedules, total hours observed varied between installations where observations took place. While we adjusted for site-specific hours when calculating visitation and engagement, this may have introduced measurement error into our results. GIS data came from numerous administrative sources, which have temporal lags that may result in a mismatch between dates of observations and contextual factors. However, we would expect any misclassification error this introduces to be uniform across play spaces. Finally, we did not collect individual-level data from children thus we cannot provide any insight on individual characteristics that influence use or engagement with the play spaces.

Significance

This evaluation helped to clarify design aspects of spaces and neighborhoods that facilitate greater use and

engagement of play space improvements. Several recommendations emerge from our findings and provide quantitative evidence to support the KABOOM! Playbook Fundamentals (Kaboom, 2023). First, the location of installations is important; sites should be in areas of deep need, with larger child populations, and easy access without a car. Second, our data supports development of spaces that include active play opportunities.

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Conflicts of Interest
The authors state that there are no conflicts of interest associated with this work.

Contributions
Conceptualization, Y.L.M and J.A.H.; Methodology, Y.L.M, D.N., D.R., N.E, J.A.H.; Investigation, Y.L.M, D.N., D.R., S.T.D., J.A.H.; Writing – Original Draft, Y.L.M, J.A.H., Writing – Review & Editing, D.N., D.R., N.E, S.T.D. Funding Acquisition, J.A.H.

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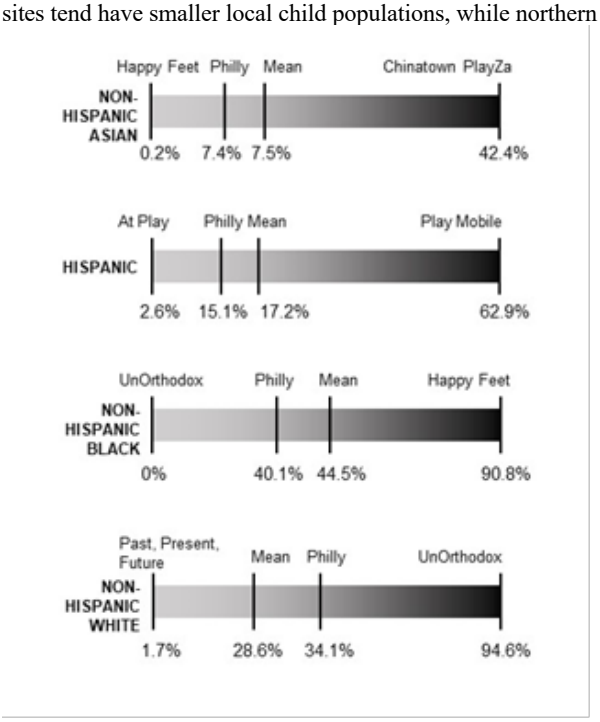
Supplemental Figure S1: Demographic Characteristics of the Neighborhoods Surrounding KABOOM! Play Everywhere Installations in Philadelphia, PA (summer 2022)
Data collected within 1/4 mile of installations found a higher mean for installations of percentage of Hispanic, Non-Hispanic Asian, and Non-Hispanic Black residents and a lower mean percentage of Non-Hispanic White residents compared to city demographics. On average, the Non-Hispanic Black population represented the largest racial/ethnic group in the surrounding area (47.5%), while the Non-Hispanic Asian population represented the smallest proportion (8.0%). The mean proportion of children living near installations is roughly reflective of the broader city-wide age distribution. However, this varies across sites; central sites tend have smaller local child populations, while northern sites have comparatively more children.



Supplemental Figure S2: Child Visitation and Engagement by Design Type to KABOOM! Play Everywhere Installations in Philadelphia, PA (summer 2022)
Active, kinetic installations had an average of 5.5 children visitors per hour, 62% of whom engaged with the installation. The team saw that even though visitation dropped for mixed sites (1.2 children/hr.), engagement remained higher (48%). Passive sites had low visitation (1.3 children/hr.) and engagement (19%). Visitation patterns were not as clear for adults (not shown), although engagement was 29% for adults in active sites and only 11% in passive sites.