SOCIAL CONNECTEDNESS FELLOWSHIP PROGRAM

DATA DRIVEN ENVIROLAB

Urban Resilience Through Play

Broadening Access to Urban Green Play Spaces

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EXECUTIVE SUMMARY

Play is an integral activity that supports healthy childhood development and resiliency. Initiatives around the globe are being enacted to create child-friendly cities through designing and implementing playful learning experiences. This report, *Urban Resilience Through Play: Broadening Access to Urban Green Spaces*, seeks to understand these trends and developments through the lens of nature-based play opportunities. Through a play survey, educators and directors at nature-based organizations across the Hudson Valley and New York City Area described the variety of nature-based learning and play opportunities they offered for children, and the challenges that their communities face when integrating play into everyday life. Nature-based play locations were identified and mapped across different New York City neighborhoods in an effort to understand the distribution of opportunities for children and families to interact with nature in their communities.

It is important for children to have access to a variety of stimulating and diverse nature-play experiences (e.g. interaction with animals, tending gardens) as part of their everyday lives. Just as cities should carve out ways for children to play beyond the playground, ensuring children have opportunities to play within nature, regardless of their access to green space, can further address the growing decline in play for children around the world, and help to ensure children themselves, and the cities they reside in, are as resilient as possible in the face of future challenges. Possibilities for future developments would be to provide families with more detailed maps and visual aids to educate them on where these spaces exist in their communities, in addition to ensuring that urban planners consider the accessibility of these spaces in the design phase.

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INTRODUCTION

The current research explores the role of child-friendly urban planning on building city resilience. We will first define urban resilience and some frameworks and tools that have been developed to measure this concept. We will then narrow our focus in the following section to exploring psychological resilience at the individual level as a foundation for resilience at the city-level. The final section will explore the critical role that play holds in children's development and in building their psychological resilience. It will also consider how we can broaden our understanding of playable spaces to go beyond the playground, focusing on urban green areas as a way to create more sustainable and inclusive cities.

Urban resilience is a concept that has risen to the forefront of how agencies, nonprofits, and philanthropic foundations map out global agendas for building sustainable urban development, including the United Nations Human Settlements Programme (UN-Habitat)[1] and the Rockefeller Foundation[2]. It is an interdisciplinary concept that can be applied across engineering, ecology, and the social sciences.[3] A city is considered resilient if it has the ability not only to maintain functionality and adapt to changing circumstances, but to simultaneously reshape itself and transform in response to incoming challenges.[4] Resilient cities are also inclusive by nature, "so that the people living and working in cities–particularly the poor and vulnerable–survive and

[1] "Urban Resilience Hub." *Urban Resilience Hub*, https://urbanresiliencehub.org/.
[2] The Rockefeller Foundation and ARUP. *City Resilience Framework.* The Rockefeller Foundation and ARUP, 2014.
https://www.rockefellerfoundation.org/wp-content/uploads/City-Resilience-Framework-2015.pdf
[3] Meerow, Sara, et al. "Defining Urban Resilience: A Review." *Landscape and Urban Planning*, vol. 147, 2016, pp. 38–49., https://doi.org/10.1016/j.landurbplan.2015.11.011.
[4] Ibid

thrive no matter what stresses or shocks they encounter."[5] To be able to withstand unexpected crises, resilient cities should also have internal mechanisms to modify their approach in response, and be flexible, to changes in demand and unforeseen disruptions.[6]

Building resilient cities requires taking a multidimensional approach with a diverse range of experts, but also depends on understanding that, in practice, it is a shared responsibility with partnerships across local communities, the public sector, the nonprofit sector, business, and academia. Several frameworks and tools have been developed over the last few years to measure resilience in urban areas. The Rockefeller Foundation and ARUP designed The City Resilience Framework to measure a city's resilience across 4 broad categories: (1) safeguards to health & well-being, (2) economy and society, (3) leadership and strategy, (4) infrastructure and ecosystems.[7] Progress within each category is measured according to 3 goals.[8]

The UN's Sustainable Development Goal(SDG) 11's aims to, by 2030, "make cities and human settlements inclusive, safe, resilient, and sustainable", with targets to ensure reliable and safe transportation networks, affordable housing, guaranteed essential services such as clean water and sanitation, and plentiful and accessible

[5] The Rockefeller Foundation and ARUP. *City Resilience Framework.* The Rockefeller Foundation and ARUP, 2014.
https://www.rockefellerfoundation.org/wp-content/uploads/City-Resilience-Framework-2015.pdf
[6] Ibid
[7] Ibid
[8] The 4 categories of the City Resilience Framework are evaluated by 12 key goals. Health & well-being is measured by minimal human vulnerability, diverse livelihoods and employment, and effective safeguards to human health and life. The category of economy & society is measured according to collective identity and community support, comprehensive security and rule of law, and a sustainable economy. The category of infrastructure & environment is measured by reduced exposure and fragility, effective provision of critical services, and reliable mobility and communications. The category of leadership & strategy has goals on effective leadership and management, empowered stakeholders, and integrated development planning.

urban green spaces; particularly for the most vulnerable groups.[9] To measure progress towards SDG 11 targets, Data Driven EnviroLab designed The Urban Environmental and Social Inclusion Index, a spatially explicit, data visualization mapping tool that incorporates census data and satellite imagery to generate city-level and neighborhood level environmental performance indicators for 164 global cities, including air pollution, tree cover percentage, and tree loss.[10] A key focal point in the development of the UESI has been to measure social inclusion as it relates to distributional equity as a way for cities to measure progress towards the targets set forth in SDG 11.[11]

PSYCHOLOGICAL RESILIENCE AS A COMPONENT OF URBAN RESILIENCE: THE ROLE OF EARLY CHILDHOOD

Because cities are a collection of multiple interconnected systems at different levels, the resiliency of the individual forms the foundation for the resilience of larger institutions and networks. Psychological resilience is viewed as an "inextricable component of urban resilience. The capacity for institutional and organizational systems within an urban setting to respond resourcefully and flexibly, to adapt and transform in the face of expected and unexpected challenges, assumes that the people who comprise these systems are able to draw on their inner and outer resources to mobilize such responses and to adapt and transform in their thoughts and behaviors."[12] Building resilience is an active, evolving process. As said by Dr. Jack Shonkoff, Professor of Child Health and

[9] "Goal 11 | Department of Economic and Social Affairs." *United Nations*, United Nations, https://sdgs.un.org/goals/goal11
[10] Hsu, Angel et al. "Measuring What Matters, Where It Matters: A Spatially Explicit Urban Environment and Social Inclusion Index for the Sustainable Development Goals." *Frontiers in Sustainable Cities* (2020).
[11] Ibid.
[12] Stroink, Mirella L. "The Dynamics of Psycho-Social-Ecological Resilience in the Urban Environment: A Complex Adaptive Systems Theory Perspective." *Frontiers in Sustainable Cities*, vol. 2, 2020, https://doi.org/10.3389/frsc.2020.00031

Development and the Director of the Center on the Developing Child at Harvard University, “you build it in the context of relationships in an environment that helps you learn how to cope with challenges, cope with stress, cope with hardships. And it starts very early. It starts in infancy.”[13] By understanding the determinants of psychological resilience, particularly as they emerge throughout childhood, we can begin to unravel why some individuals are able to become more resilient than others.

The mechanisms and factors underlying psychological risk and resiliency involve a complex, evolving interaction between biological and psychological processes that begin to unfold during early childhood. Toxic stress, stress that is chronic and ongoing for long periods of time, can be particularly damaging during critical early developmental periods, because it can alter the construction of brain circuits involved in emotional regulation and cognitive function, especially in the absence of protective relationships with attuned caregivers or other social support.[14] This toxic stress can later trigger the emergence of adverse mental health outcomes, a process known as latent vulnerability.[15] In latent vulnerability, behaviors that were once adaptive become maladaptive once the threat has been removed. A diminished capacity for recalling detailed autobiographical memories can function as an adaptive and protective mechanism to dampen the emotional impact from trauma. Following the resolution of a traumatic period, such a diminished memory capacity becomes maladaptive, with children struggling to form a positive and coherent sense of self, because they have

[13] *“The Brain Architects: Building Resilience through Play.”* Center on the Developing Child at HarvardUniversity,23Feb2022, https://developingchild.harvard.edu/resources/podcast-resilience-play/#transcript

[14] Hornor, Gail. “Resilience.” *Journal of pediatric health care : official publication of National Association of Pediatric Nurse Associates & Practitioners* vol. 31,3 (2017): 384-390. doi:10.1016/j.pedhc.2016.09.005

[15] UK Trauma Council. *The Guidebook to Childhood Trauma and the Brain.* UK Trauma Council, 2020. https://uktraumacouncil.link/documents/CHILDHOOD-TRAUMA-AND-THE-BRAIN-SinglePages.pdf

difficulty forming new memories and show a greater propensity for recalling more salient, negative ones.[16] Children who have learned to be hypervigilant to keep themselves safe and mindful of both perceived and actual threats in their environment can also have difficulty concentrating, relating to others and building connections. In this way, hyper-vigilance can be maladaptive when children aren't in threatening scenarios and cause them to withdraw from activities where they can learn new things.[17]

However, adverse events in early childhood do not ultimately determine the course of mental health outcomes into adulthood, and protective factors can lead to trajectories of risk and resilience that result in recovery, and even post-traumatic growth.[18] Psychological resilience "positions the individual in his or her social or community context,"[19] and a child's social relationships can provide a strong and stable foundation for healthy functioning over the course of development into adulthood. Secure attachment to caregivers in the early years of life–an attachment marked by sensitive and emotional responsiveness and attunement to the child's needs–has been shown to build resilience from the internal working models that the child constructs, the mental models that allows the child to perceive themselves as worthy and loveable, their caregivers as available and dependable, and the environment as relatively stable and safe to navigate.[20] A cross-cultural study of resilience in countries such as Sudan,

[16] Ibid
[17] Ibid
[18] Rutten, B. P., et al. "Resilience in Mental Health: Linking Psychological and Neurobiological Perspectives." *Acta Psychiatrica Scandinavica*, vol. 128, no. 1, 2013, pp. 3–20., https://doi.org/10.1111/acps.12095.
[19] Stroink, Mirella L. "The Dynamics of Psycho-Social-Ecological Resilience in the Urban Environment: A Complex Adaptive Systems Theory Perspective." *Frontiers in Sustainable Cities*, vol. 2, 2020, https://doi.org/10.3389/frsc.2020.00031
[20] Rutten, B. P., et al. "Resilience in Mental Health: Linking Psychological and Neurobiological Perspectives." *Acta Psychiatrica Scandinavica*, vol. 128, no. 1, 2013, pp. 3–20., https://doi.org/10.1111/acps.12095.

Zambia, Eswatini, and Norway, examined how family serves as a protective buffer against adversity in accordance to the meaning and values that each culture attaches to it.[21] In Zambia, extended family members such as grandparents, aunts, and uncles often take on the "parent" role, are actively involved in conflict resolution, and play a significant role in child rearing and upbringing.[22]

As we examine psychological resilience, it is important to recognize that resilience is not static, but a dynamic, ongoing process, influenced by variations within individuals, and cross-culturally over time. Protective factors that build resilience can exist within the child themselves, their social support networks, and the culture they grow up in.[23] Some of these factors may include a child's temperament and learned skills, support from trusted adults such as family, friends, teachers, and neighbors, and the cultural norms and values they are raised with.[24] Dr. Masten, from the Institute of Child Development at the University of Minnesota, suggests that it is important to consider these contextual considerations in how we define adaptive function, and that "for some individuals, different protective factors may be important for specific outcomes in specific contexts."[25]

BUILDING PSYCHOLOGICAL RESILIENCE THROUGH PLAY

Play provides a wealth of benefits for a child's development and growth, and helps children build resilience. Social cooperation through play helps children build emotional

[21] Gunnestad, Arve. "Resilience in a Cross-Cultural Perspective: How resilience is generated in different cultures." (2006).
[22] Ibid
[23] Ibid
[24] Ibid
[25] Southwick, Steven M et al. "Resilience definitions, theory, and challenges: interdisciplinary perspectives." *European journal of psychotraumatology* vol. 5 10.3402/ejpt.v5.25338. 1 Oct. 2014, doi:10.3402/ejpt.v5.25338

intelligence and empathy by understanding the perspectives of others, and learning to articulate their own thoughts and feelings.[26] Play acts as a critical component for mastery motivation, allowing children to learn and capitalize on their own lived experiences through active engagement and exploration in their environment, and building confidence and resourcefulness through newly acquired skills and competencies.[27] This fosters resilience through the acquisition of the tools needed to face future challenges and obstacles. For both caregivers and children themselves, engaging in play together reduces stress and builds family connection.[28] It is a fun, joyful activity that helps children understand the complexities and nuances of the world they reside in, and offers them the independent mobility within which to do so.[29]

Play is also a critical component of enabling children to cope with traumatic events, and build resilience and emotional strength. The International Play Association's 2016 report on *Access to Play in Situations of Crisis* revealed how, in the wake of natural disasters and humanitarian crises, play provided refuge and solace, as well as a means for managing stress and fear for children experiencing trauma. Examples of this were seen in the aftermath of the 2011 Japanese Great East Earthquake, and the Nepalese 2015 Gorkha Earthquake, where children in evacuation shelters smashed debris with sticks as a form of 'post-traumatic play,' or built houses and tiny structures

[26] Real Play Coalition: *Value of Play Report.* Real Play Coalition. https://www.ikea.com/ca/en/files/pdf/bb/2f/bb2f0627/the-real-play-coalition_value-of-play-report_a.pdf
[27] Ginsburg, Kenneth R. "The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds." *Pediatrics*, vol. 119, no. 1, 2007, pp. 182–191., https://doi.org/10.1542/peds.2006-2697
[28] Real Play Coalition: *Value of Play Report.* Real Play Coalition. https://www.ikea.com/ca/en/files/pdf/bb/2f/bb2f0627/the-real-play-coalition_value-of-play-report_a.pdf
[29] ARUP.*Cities Alive Designing for Urban Childhoods*. ARUP, 2017. https://www.arup.com/-/media/arup/files/publications/u/cities_alivedesigning_for_urban_childhoods.pdf

from pieces of nearby construction materials amidst the reconstruction efforts.[30] By incorporating play within the natural environment, children have also been able to develop a sense of agency and control. After adolescents from Delhi, India were forcibly evicted from their squatter settlements, they greatly missed their former neighborhood green spaces that once provided them with a sense of independence and meaning. Determined to recreate similar green spaces in their new neighborhoods, they took initiative and constructed their own neighborhood green spaces by " securing plants and guarding the saplings from cattle and the harsh sun in order to recreate a place that they could make their own."[31] Incorporating play within therapy is an effective form of treatment for children, because it provides a safe and secure space with a trusting therapist, or holding environment, where the child can displace intense and painful thoughts and feelings through imaginative play with toys.[32] The child dictates the speed and direction throughout the therapy sessions, allowing them to take ownership over their own treatment.[33]

Despite the ample number of benefits play provides, opportunities for playtime are becoming increasingly eroded in communities around the world. The Real Play Coalition's Play Value Report highlights that, "in the United States, from 1981 to 1997, children's playtime decreased by 25%. In 2018, parents of 6-11-year-olds reported that they were playing with their children less than 5 minutes per day. In the United Kingdom, time playing outside has declined 50% in a generation."[34] This growing

[30] Chatterjee, Sudeshna. "Children's coping, adaptation and resilience through play in situations of crisis." *Children, Youth and Environments* 28, no. 2 (2018): 119-145.
[31] Senko, Kimberly, and Harper Bethany. "PLAY THERAPY: An Illustrative Case." *Innovations in Clinical Neuroscience* vol. 16,5-6 (2019): 38-40.
[32] Ibid.
[33] Ibid.
[34] Real Play Coalition: *Value of Play Report.* Real Play Coalition. https://www.ikea.com/ca/en/files/pdf/bb/2f/bb2f0627/the-real-play-coalition_value-of-play-report_a.pdf

deterioration of play access has emerged for a myriad of reasons, including a reduction in available public spaces, greater demands and time constraints placed on children and caregivers due to work and school obligations, and a shift away from providing adequate time for play during the school day.[35] Other contributing factors include parental risk aversion and fears over child safety, intolerant attitudes towards children and play, and an uneven distribution of available and accessible play spaces; directly impacting children from lower income communities.[36] The growing prevalence of natural disasters and pandemics also hinder childhood play. Children may struggle with PTSD and depression following a crisis, and have limited free time to engage in play due to longer commutes to school, as a result of depopulation of damaged areas and their friends moving away.[37]

Creating more playful cities that are inclusive and equitable requires cities taking the lead in enacting large-scale global initiatives. At the height of the COVID-19 pandemic, the Real Play Coalition and PlacemakingX organized the Real Play City Challenge, an international competition that presents awards to cities, and urban planners and designers, for transforming public spaces into communal hubs for playful learning, what is referred to as "playful placemaking".[38] A total of 4 cities spanning multiple continents were awarded the winning initiatives, including Dhaka, Bangladesh, who established 101 community-based Play Labs headed by trained play facilitators to enable preschool children from low-income settings to engage in safe, affordable, and

[35] Ibid
[36] ARUP.*Cities Alive Designing for Urban Childhoods*. ARUP, 2017. https://www.arup.com/-/media/arup/files/publications/u/cities_alivedesigning_for_urban_childhoods.pdf
[37] Chatterjee, Sudeshna. "Children's coping, adaptation and resilience through play in situations of crisis." *Children, Youth and Environments* 28, no. 2 (2018): 119-145
[38] PlacemakingX and Real Play Coalition. *Real Play City Challenge Report*. PlacemakingX and Real Play Coalition, 2021. https://www.realplaycitychallenge.org/_files/ugd/3102b1_29926e6f18ef4ed890ea319f525dd38e.pdf

intellectually stimulating play in public spaces.[39] Within the United States, OpenStreetMap's Map for Impact program collaborated with KABOOM, a national nonprofit whose mission is to end play space inequity across communities in the United States, to map play spaces across US cities in order to gain a thorough understanding of the distribution of access to safe playgrounds across neighborhoods.[40] This work has been critical because there is often an unequal distribution of play areas across city neighborhoods, with lower income communities and communities of color having less safe and available play areas than white, higher incomes parts of the city.[41] The Block-by-Block program, a collaborative effort between Minecraft's developer Mojang and the United Nations Human Settlements Programme, provides neighborhood residents the opportunity to collaborate on revitalizing neglected or underutilized urban spaces in their communities, through the application of Minecraft design principles.[42] This includes those in marginalized communities who may lack the digital and design skills that often results in a barrier against participation.

SOCIAL CONNECTEDNESS & PLAY

Broadening conceptions of what constitutes a play space is crucial for urban planners and policy makers as they devise strategies to scale playful learning opportunities through coordinated efforts across city agencies and organizations. By embedding playful learning experiences in everyday spaces where families congregate,

[39] Ibid
[40] "Mapping for Playspace Equity in Philadelphia with KABOOM!" *OpenStreetMap US*, https://www.openstreetmap.us/2021/07/map-for-play-equity
[41] Ibid
[42] United Nations Human Settlements Programme (UN-Habitat). *The Block by Block playbook: Using Minecraft as a participatory design tool in urban design and governance. U*nited Nations Human Settlements Programme (UN-Habitat), 2021. https://unhabitat.org/sites/default/files/2021/09/1-bbb_playbook_publication_final.pdf

communities have the capacity to become more integrated and socially connected, with greater opportunities for interaction among not only children and their caregivers, but also across generations.[43] Denmark's *Families at Play in the Library* project re-imagined what play and social connection could look like in local libraries through the role of storytelling, emphasizing "that to create play at the library is, therefore, just as much about creating stories which can create dialogue and shared experiences for the families as it is the availability of toys."[44] In the Randers Library's Musical Quiz Suitcase installation, suitcases representing different decades in music history contain treasure hunts that prompt the entire family to locate photos representing that time period from around the library. This activity encourages family members, both young and old, to learn about each other's lived experiences and perspectives, strengthening family ties by making people feel heard and valued.[45] The Vejgaard library created a pirate-themed world with a constructed pirate ship, treasure chests, and a sensory room, allowing children to not only develop their motor skills, creativity and imagination, but also providing a space for free, unstructured play that the whole family could join in with.[46] Even the local laundromat can be a location for family engagement. The Laundry Literacy Coalition, powered by the Laundry Cares Foundation and Too Small To Fail, helps distribute books to local laundromats within under-served communities across the

[43] Anne T. and Robert M. Bass Center for Transformative Placemaking and The Center for Universal Education at Brookings. *Scaling Playful Learning: How cities can reimagine public spaces to support children and families.* Anne T. and Robert M. Bass Center for Transformative Placemaking and The Center for Universal Education at Brookings, 2020. https://www.brookings.edu/wp-content/uploads/2020/09/Scaling-Playful-Learning_Hadani-Vey_Final.pdf
[44] Citizen's Services and Libraries. *Experiences & Reflections Families at Play in the LIbrary.* 2011. Available from: https://www.aakb.dk/sites/www.aakb.dk/files/files/file_attachments/2013-06-24_1337/families_at_play_in_the_library_experiences_reflections_2.pdf
[45] Ibid.
[46] Ibid.

US to promote literacy development, and even host Laundry and Literacy Events for the community.[47] To stimulate relationship building among caregivers and children, organizers included posters containing conversation prompts to initiate meaningful dialogue and interaction.[48]

Creating public play spaces can reimagine community and cultivate belonging through the role of co-creation and collaboration. By having parents and caregivers co-design urban play projects as a shared mission with neighborhood business and city leaders, they develop a greater sense of ownership and connection to those spaces, making them more likely to remain invested in their upkeep and build trust in their community.[49] For example, Playful Learning Landscape's Urban Thinkscape installation transformed a vacant lot next to a bus stop in the Belmont neighborhood of West Philadelphia into an interactive learning hub filled with puzzles and games for caregivers and their children. Architectural designs and final evaluation of the space evolved through stages of ongoing, active participation and revision among researchers and designers with local community members, and even the children themselves, promoting strong civic engagement and inclusion within the community.[50] By equipping citizens with the tools and resources needed to share their ideas and visions for urban design,

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[47] "The Laundrycares Foundation, Too Small to Fail, and Libraries without Borders Launch New Coalition to Promote Early Literacy through Laundromats Nationwide." *Clinton Foundation*, 10 Aug. 2021, https://www.clintonfoundation.org/press-and-news/too-small-to-fail/laundrycares-foundation-too-small-fail-and-libraries-without-borders-launch-new/

[48] Ibid.

[49] Anne T. and Robert M. Bass Center for Transformative Placemaking and The Center for Universal Education at Brookings. *Scaling Playful Learning: How cities can reimagine public spaces to support children and families.* Anne T. and Robert M. Bass Center for Transformative Placemaking and The Center for Universal Education at Brookings, 2020.

[50] "Urban Thinkscape: Creating Opportunities for Playful Learning." *Center on the Developing Child at Harvard University*, 18 May 2020, https://developingchild.harvard.edu/innovation-application/innovation-in-action/urban-thinkscape/.

people from all educational backgrounds, ages, and socioeconomic status feel empowered to actively participate in reshaping their communities. During the Block by Block Program's Minecraft Co-Design Workshops, local communities convene and co-design 3D representational models in Minecraft to visually showcase how nearby public spaces could be revitalized.[51] These workshops culminate in group presentations presenting the final designs with city leaders and urban planners, allowing participants of the program to have a platform and voice to address their needs and concerns.[52]

PLAY WITHIN URBAN GREEN SPACES

It is important to broaden our understanding of what defines green space, and think about how we can carve out unique opportunities for play, for children and their families, within the natural landscape. The natural environment provides a wealth of sensory diversity and exploration opportunities for children. Access to green spaces, which can include street trees, neighborhood gardens, playgrounds in parks, and shrubbery in vacant lots, has been shown to improve children's mental health and well-being, encourage empathy, promote cognitive development and academic performance, build environmental stewardship and a love of nature.[53] Increasing the amount of available green spaces in urban areas also builds community tolerance and perceptions of safety, supports more inclusive and equitable spaces for marginalized groups, lessens caregiver stress, and leads to improvements in air quality.[54]

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[51] United Nations Human Settlements Programme (UN-Habitat). *The Block by Block playbook: Using Minecraft as a participatory design tool in urban design and governance. U*nited Nations Human Settlements Programme (UN-Habitat), 2021
[52] Ibid.
[53] UNICEF.*The Necessity of Urban Green Space for Children's Optimal Development.* UNICEF, 2021. https://www.unicef.org/media/102391/file/Necessity%20of%20Urban%20Green%20Space%20for%20Children%E2%80%99s%20Optimal%20Development.pdf
[54] Ibid.

Play spaces in the natural environment do not have to be limited to green spaces in nearby parks, but can instead encompass a wide range of spaces that kids, their families, and the community at large can interact with, as part of everyday life, building belonging and connection. Green spaces can cultivate children's feeling of belonging to a place, with spots in nature nurturing "a strong affective relationship with place in which the place acts as a friend of the child."[55] Engaging kids with nature-based play activities can even begin within spaces in the home. The National Wildlife Foundation and the Natural Learning Initiative's Nature Play Space Design project provided a guide for families on how to infuse nature play spaces in their own backyards and patios, with readily available materials already at their disposal. Some options included guides for designing sensory gardens, growing edible plants, creating miniature backyard habitats with birdhouses and bird feeders, building vine teepees, and creating space for water and sand play stations.[56]

Community gardens and urban farms are spaces within the community that can provide diverse play experiences for children to interact with the earth. The Design Trust for Public Space, in conjunction with the City University of New York's Children's Environments Research Group project entitled *Child's Play: Designing for Children in Community Gardens,* provided a comprehensive guide on best practices for infusing community gardens in New York City with children's play areas. When designing with children in mind, it is important to provide them with autonomy and a sense of

[55] Chatterjee, Sudeshna. "Children's coping, adaptation and resilience through play in situations of crisis." *Children, Youth and Environments* 28, no. 2 (2018): 119-145

[56] National Wildlife Federation and Natural Learning Initiative. *Nature Play at Home: A Guide for Boosting Your Children's Healthy Development and Creativity.* National Wildlife Federation and Natural Learning Initiative, 2012. https://www.nwf.org/-/media/PDFs/Be-Out-There/NPatHome_Guidelines20120823.ashx?la=en&hash=29825E325AD8DEFE90093F629D5FA51EF44D5098.

ownership of the space, by allowing them to become active decision makers in the design process, through children's meetings where they could draw pictures or create physical models of their ideal play garden.[57] These child-centered spaces can also be balanced with integrating children within the larger communal areas, such as including chairs of different heights to help children feel like active participants alongside the adults.[58] One of these community gardens, the Lotbusters Garden in the Bronx, had the adults collaborate and engage with the children to build a sailboat play structure, equipped with a sandbox and water play area.[59] Alma Backyard Farms, an urban farm in Los Angeles converted from a neglected lot, organizes a Peas for Pods Program, an experiential, hands-on, outdoor learning space which teaches children about growing and harvesting food, and understanding the connection between people and nature.[60] The program fosters connection with caregivers and neighbors, as children share knowledge they've learned with their parents, and engage in songs about the fun of gardening. [61]

Ensuring nature-based play that is inclusive and accessible to all children and families is also key. In collaboration with KABOOM! and Ralph C. Wilson, Jr. Foundation, the Rural Outreach Center in Western New York designed the Play Path to offer a unique play space for children in the community living in poverty.[62] The space,

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[57] Design Trust for Public Space and Children's Environments Research Group. *Playgardens: Designing Community Spaces for Young Children.* Design Trust for Public Space and Children's Environments Research Group, 2004. https://designtrust-prod.s3.amazonaws.com/media/files/DesChild-2004.07.21playgardens_1.pdf

[58] Ibid.

[59] Ibid.

[60] Barajas, Henry. "Urban Farm Serves up Fresh Produce and Outdoor Play for Local Families." PBSSoCal, 10 June 2022, https://www.pbssocal.org/education/urban-farm-serves-up-fresh-produce--and-outdoor-play-for-local-families

[61] Ibid.

[62] "Play Everywhere Winners Expand Access to Nature Play." *KABOOM!*, 4 Mar. 2022, https://kaboom.org/stories/play-everywhere-winners-expand-access-to-nature-play

embedded within a natural park environment, provided children with colorful play objects that could be attached and re-attached together like lego pieces, and could even be attached nearby trees in unique and innovative ways, offering an opportunity for kids to develop spatial and visual skills, foster teamwork with others, and giving them a sense of ownership over the space.[63] The Autism Nature Trail at Letchworth State Park in Michigan created an inclusive play space for children with autism to engage with the natural landscape.[64] Tunnel Tops Park within San Francisco's Presidio, designed with input from residents historically under-represented or excluded from community dialogue, includes art installations emphasizing cultural diversity and the need for equal access to nature spaces, as well as the importance of reflecting on the indigenous peoples who first inhabited the local land.[65] Designers creatively crafted the architectural design and layout of the space to promote inclusion by including a walkway to allow for easy passage across the highway.[66] Designing public play spaces with the natural world in mind can help children feel more connected to the place they inhabit and feel more socially connected to their families and wider communities.

METHODS

Part 1: Play Survey for Organization in NYC & the Hudson Valley Survey Design

The survey conducted for this report was designed in partnership with the Samuel Centre for Social Connectedness and Data Driven Lab. Nature centers and museums, urban farm projects, farms/apple orchards, and community/school gardens across the

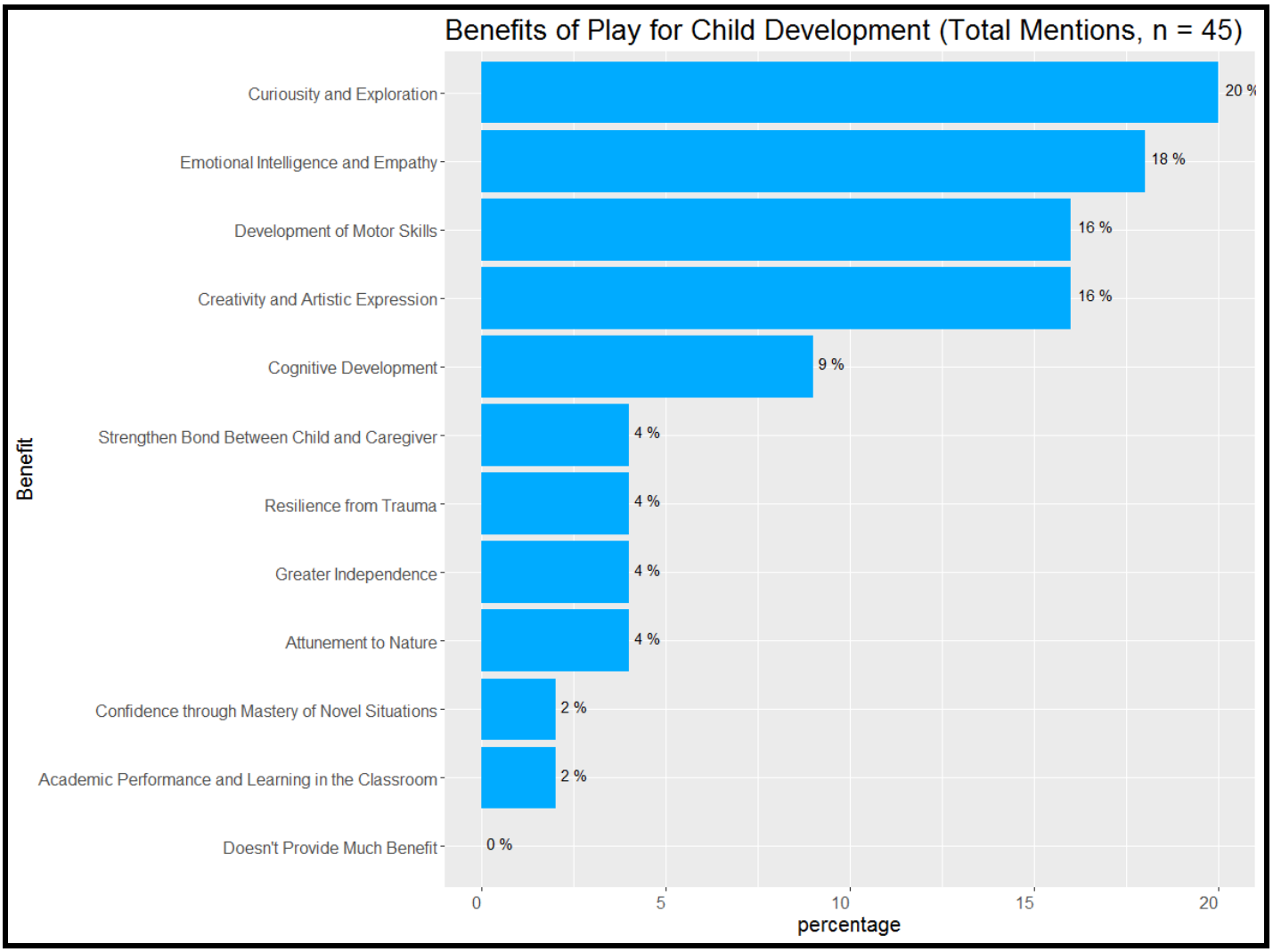
[63] Ibid.
[64] Ibid.
[65] Cortright, Guananí Gómez-Van. "Presidio Tunnel Tops Park Supports Inclusive Future." *Bay Nature*,23 July 2022, https://baynature.org/2022/07/14/soon-to-open-tunnel-tops-park-supports-a-more-inclusive-future/
[66] Ibid.

Hudson Valley (Kingston, Rye, Ghent, Newburgh, New Paltz) and across New York City (Brooklyn, Harlem, Staten Island, Queens) participated in the survey, with a total of 18 responses. Respondents included Education Directors, Early Childhood teachers, Nature Center Coordinators, Garden Coordinators, and Communications Managers. We selected this geographic region due to researcher familiarity and to complement the geographic mapping project in Part 2 of this analysis. These results can likely be extrapolated to support larger urban play and resilience research, and future cross-city comparisons would be highly beneficial.

The survey first collected demographic data pertaining to the children who visit the organization, the type of site, and the professional role of the survey respondent at each respective organization. The rest of the questions assessed the perceived benefits of play, the kinds of playful activities that each organization organizes for the children, some of the respondents' most memorable playful learning experiences with the kids they work for, the challenges in communities that make it difficult for children to play, and recommendations for improvements for the future.

Analysis

When asked about the most impactful benefits of play for a child's development, emphasis on emotional intelligence and empathy, and curiosity and exploration garnered the highest number of responses.



The following open-ended questions in the survey asked about the kinds of programs and activities held by each organization to support playful learning with kids, as well as the respondent's most memorable experience working with the children. Activities that were mentioned included going for nature walks and garden exploration, making fairy villages, live animal interactions, "*pretending to be bees in the garden*", "*making salads in the garden from the vegetables we planted and harvested*" and even "*simulate crater impacts using corn starch, cocoa powder, and marbles*." One respondent remarked how, even in the absence of toys, children eagerly played and

explored in a nearby lot by having fun picking up sticks, turning over logs, and searching for worms.

Respondents suggested that nature and science encourage free exploration and discovery through trial-and-error, and iterating on different approaches as a way to learn about the natural world. Another key idea expressed was to allow young children to learn naturally, with adults helping to facilitate and introduce ideas, rather than dictate them. These ideas echo themes found in existing literature on the importance of play as being child-directed, and children being afforded self-ownership in their learning and growth.

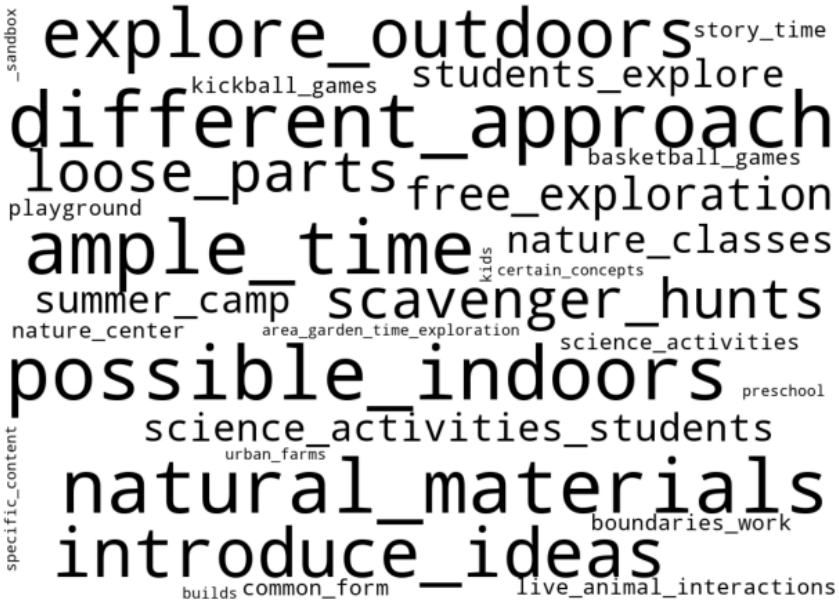


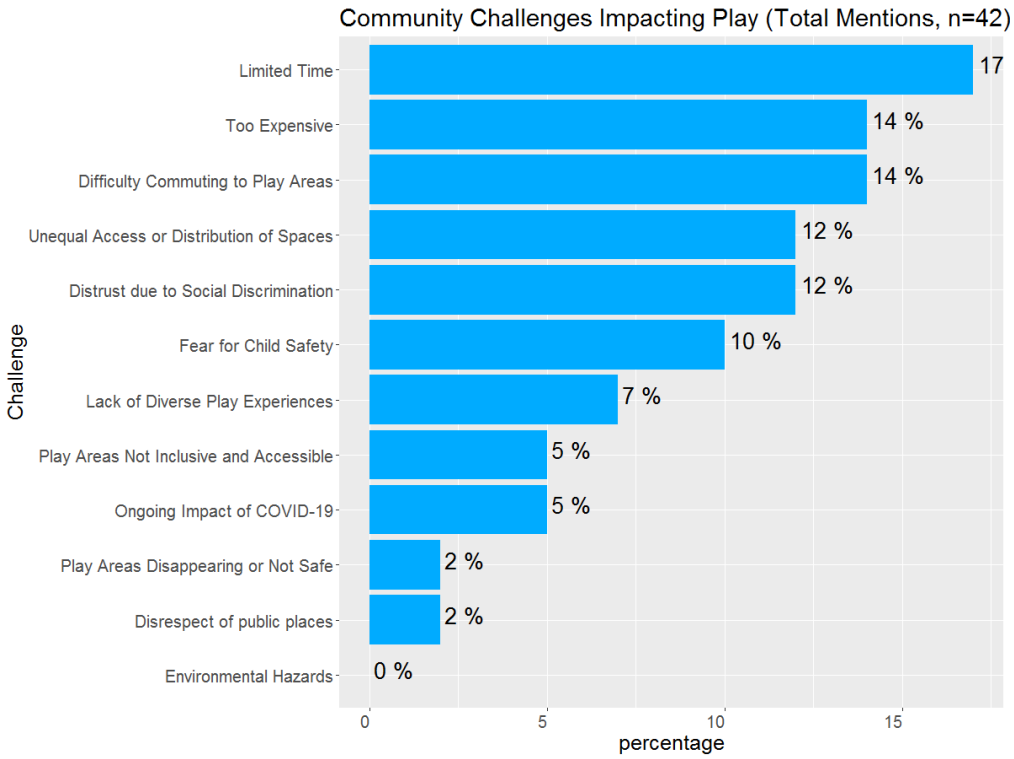
Figure 1: Word Cloud of noun phrases respondents gave from open-ended questions asking about playful activities and programs their organization provides for children.

Challenges to Creating Playful Cities and Future Improvements

Respondents indicated that the top challenge impacting play opportunities for kids and families is limited time available for incorporating play into daily routines. Programs and activities being too expensive for kids to participate in, and difficulty commuting to play

areas (e.g. no access to a vehicle, limited public transportation options, no play areas within walking distance) were other challenges respondents selected.

Unequal access/distribution to green spaces as well as distrust due to social discrimination were categories that also resonated with respondents, highlighting how systemic inequities translate to continued injustices, barring children from having the same access to play spaces as other children. Power dynamics in accessing urban green space has been a concern evident in cities globally, with groups being restricted entry to green spaces because of age, gender, and socioeconomic status.[67]



Respondents were asked how their organizations adapted to the ongoing impact of the COVID-19 pandemic. In addition to adhering to NYC guidelines on mask wearing, sanitization procedures, and quarantines, centers offered virtual classes and outdoor

[67] UNICEF. *The Necessity of Urban Green Space for Children's Optimal Development.* UNICEF, 2021. https://www.unicef.org/media/102391/file/Necessity%20of%20Urban%20Green%20Space%20for%20Children%E2%80%99s%20Optimal%20Development.pdf

programs, such as outdoor experiences in gardens, or online lessons about garden education.

Shared points of difficulty centered around building social connectedness and belonging from the physical isolation and mask wearing (difficulty seeing facial expressions), and maintaining community participation and attendance levels within a virtual atmosphere. The isolation impacted very young children the most, who were deprived of social interaction with others during the lockdown. To tackle this challenge, one respondent described how their organization "*introduced a new curriculum unit about emotions for our youngest students, who were about a year old when the pandemic started and have not really had much opportunity to socialize with other children or in public places."*

When asked about areas for improvement in the future, respondents spoke of the importance of having more widely available play spaces and free community events for children to have access to. Responses emphasized many of the same underlying reasons as the literature that are causing a decline in play, such as:

- **Community fear and distrust** - one respondent remarked how they wished *"the culture more widely would stop clutching its pearls the moment a child or group of children is seen without an adult nearby, especially outdoors."*

- **Lack of prioritization of play during school hours** - as one respondent noted "*Schools on the statewide and citywide level can promote play and belonging and deemphasize testing.*"

- **Lack of equitable access to play spaces** - In addition to having more play space for kids, one respondent remarked that their community could really "*benefit from catering play experiences to children with disabilities or children who are in minority groups that often don't have programs catered to their wants and needs*."

Figure 2: Word Cloud of noun phrases respondents gave from open-ended questions asking about recommendations for future improvements.

Part 2: Mapping Urban Green Spaces in New York City

To complement the urban play survey, the goal of the mapping project was to quantify and visualize the amount of free and open urban green play space opportunities across neighborhoods in NYC. This task was inspired by the Map for Impact project conducted by OpenStreetMap and KABOOM.[68] Play areas of interest included playgrounds nested

[68] "Adding Playgrounds to the Map: Improving Equity in Children's Health by Locating Play-Deserts." OpenStreetMap US.https://www.openstreetmap.us/2019/10/maptime-bmore.

within city parks, neighborhood community gardens/urban farms, and nature centers. We selected these spaces because they are green spaces that are publicly accessible, low/no cost, and are embedded within the local community and/or are built and maintained through ongoing community efforts.

Data Collection

To identify the locations of play spaces within the city, we used New York's Open Data Portal[69] to obtain a directory of nature centers, playgrounds, park facilities (to locate playgrounds within park spaces), and community gardens. Using the US Census 2020 American Community Survey, we collected child population data for children 5 years and under, 5 to 9 years of age, and data on median annual income.[70] The steps taken to collect the census data was as follows:

1. Merge census data with the corresponding geographical shapes representing each census tract.
2. Group census tracts that lie within New York City neighborhoods geographies.
3. Aggregate population values for tracts within each neighborhood.

The steps taken for data extraction on green play spaces included:

1. Obtain latitude and longitude values from location addresses provided to create geometric points representing each green space location (gardens, playgrounds, and nature centers).

[69] City of New York, NYC Open Data. "NYC Open Data." *NYC Open Data WP Engine*, https://opendata.cityofnewyork.us/.
[70] U.S. Census Bureau; American Community Survey, 2020 American Community Survey 5-Year Estimates, Table B01001; using data.census.gov;

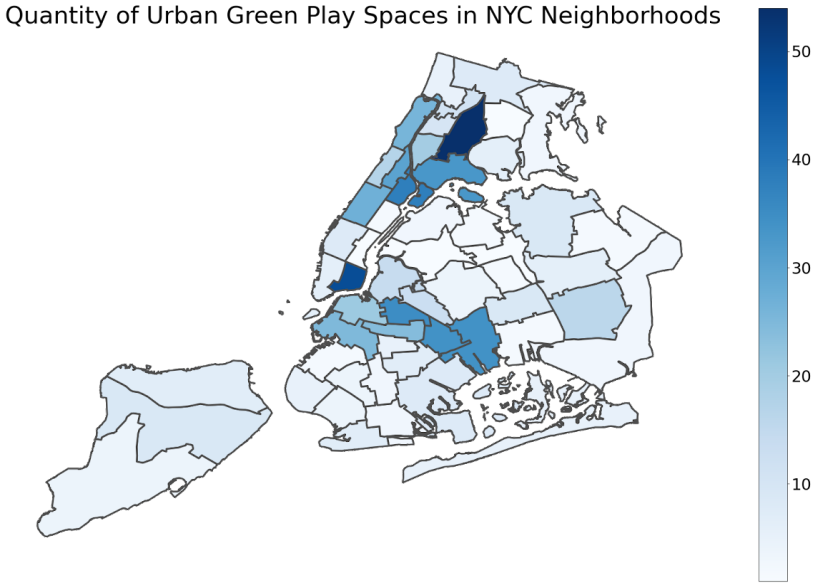
2. Join these points with NYC neighborhood geometry to determine in which neighborhood each location belongs.
3. Compute the total number of community gardens, playgrounds within city parks, and nature centers for each neighborhood.
4. Combine green play space data with the census data for each city neighborhood.

Analysis

Distribution of Green Play Areas Across NYC Neighborhoods

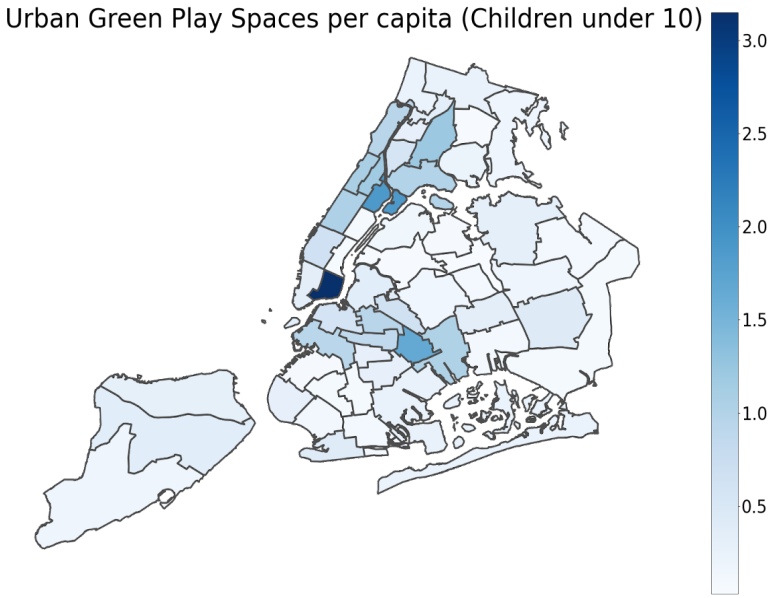
The highest concentration of playgrounds inside parks, nature centers, and community gardens were found to exist across neighborhoods in the Bronx and Brooklyn, particularly in the Belmont, Crotona Park East & East Tremont section of the Bronx, followed by Chinatown & the Lower East Side, Harlem, and the Bedford-Stuyvesant section of Brooklyn. These areas in particular have a high concentration of community gardens.

Figure 3: Map of total nature-play locations (nature centers, gardens, playgrounds in parks) within each NYC neighborhood.



Darker blue areas in Figure 3 indicate a higher quantity of play spaces and lighter blue areas indicate lower quantity of play spaces.

Figure 4: Map of total neighborhood nature-play locations (nature centers, gardens, playgrounds in parks) for every 1000 children under 10



Darker blue areas in this map (Fig. 4) indicate a higher quantity of neighborhood play spaces available for every 1000 children under 10 years old and lighter blue areas indicate lower quantity of play spaces available for every 1000 children under 10 years old. This map highlights that although the quantity of locations per capita are highest in neighborhoods in the Bronx and Brooklyn, we can still see that, across the board, many neighborhoods only appear to have a handful of green play sites available for every 1,000 kids that live in a neighborhood.

Mapping Inclusion and Accessibility of Urban Green Play Areas

Play Space equity and inclusion has been a central component of the research conducted into scaling playful learning opportunities. Respondents who completed the

play survey also stated that it is important to cater to children with disabilities and diverse needs, and to create inclusive spaces. The New York City Parks system provides labels to highlight the level of accessibility that a play area has for children with disabilities or who have sensory needs.[71] There are markers that designate whether a space has inclusive play elements for children with autism-spectrum disorder or other sensory related disorders, whether a location is wheelchair accessible, and whether a location has an ADA Comfort Station.

The following table highlights NYC neighborhoods that have the highest percentage of playgrounds within city parks, and the percentages of how many of those playgrounds meet the criteria for being the most accessible and inclusive.

Neighborhood	**Total Playgrounds**	**Total Playgrounds Within City Parks**	**Percentage Playgrounds in Parks**	**Total Inclusive Playgrounds (wheelchair accessible, ADA station available & sensory-friendly)**	**Percentage**
Washington Heights, Inwood & Marble Hill	19	13	68%	1	7.7%
Upper West Side & West Side	39	23	60%	4	17.4%
Richmond Hill & Woodhaven	13	7	54%	0	0%
Bedford Park, Fordham North & Norwood	13	6	46%	4	67%

[71] "Playgrounds." *Playgrounds : NYC Parks*, https://www.nycgovparks.org/facilities/playgrounds?boro=bronx.

Belmont, Crotona Park East & East Tremont	42	18	43%	0	0%
New Springville & South Beach	15	6	40%	4	67%
Wakefield, Williamsbridge & Woodlawn	15	6	40%	0	0%

Although there were many playgrounds that did meet the criteria for being wheelchair accessible or having sensory elements for kids, many neighborhoods, including the neighborhoods that had the most playgrounds in city parks, did not have many playgrounds that met the criteria for all three categories.

RECOMMENDATIONS

The following recommendations are informed by the findings from the literature, survey data, and mapping information detailed in the prior sections of this report. Although this report narrowed its focus to New York City and Hudson Valley vicinity, these recommendations should be considered and expanded upon in ways that are best applicable to the diverse needs of communities.

- **Design and expand upon existing comprehensive mapping tools for mapping playgrounds** to provide families with clear and digestible visualizations to easily locate green play spaces within their neighborhoods. One survey respondent echoed this sentiment by mentioning how "*a town or county map of different public rec. centers along with facilities and programs they offer could be helpful, as well as road signs*."

- **Make inclusion and accessibility key focal points when conceptualizing how to best design public spaces.** Ensure cities provide detailed information when mapping play sites, to include information regarding a site's accessibility for children with a variety of needs, so families can easily determine which locations they can access within their communities.

  Another problem is that this information may not be documented or exist to begin with. While there was data pertaining to wheelchair accessibility and inclusive play elements for NYC playgrounds and other facilities, there was a lack of available data for community gardens, even though community gardens serve as vital greenspaces, especially for communities with limited access to quality green areas.

  On the ground mapping campaigns through community mobilization in collaboration with a team of public and private organizations can help, not only with identifying local community needs for spaces, but also help the community feel engaged and gain a sense of self-ownership and pride over the spaces they inhabit. Community engagement and outreach initiatives can also help provide educational resources and materials on best practices for how to design for inclusion so that more spaces can accommodate all residents.

- **Create partnerships between urban and more rural communities to create more opportunities for children to experience a diverse range of nature experiences.** For example**,** through field-trips to locations outside immediate metropolitan areas or extending field trips to nearby farms/nature

preserves/apple orchards that exist outside major US cities. This can be especially important for racialized, and lower income children who may not have as many opportunities to visit different green spaces due to systemic exclusion. One survey respondent noted how *"children from New York City (primarily black students between the ages of 6-12) visited on a field trip, and many mentioned to me they had never been out of the city. They were instantly in awe of all of the wide open space as we walked into the orchard, and they just took off running down the dirt roads laughing and screaming with pure joy."*

- Although this report focused specifically on the availability of green play areas such as nature centers, community gardens, and playgrounds in parks, we should **continue to explore how cities can scale playful nature learning, both within ample green space and neighborhoods with limited access.** Expanding on the ideas in this report, we can continue to find ways to incorporate nature into everyday, commonplace settings that children and their families frequent.

- **Continue to strengthen partnerships and ongoing collaboration across city agencies, to ensure green play areas are readily maintained and don't fall into disrepair or get demolished.** As one survey respondent noted, *"not placing the burden on a few nonprofits"* also helps to keep these opportunities for play available, and equally distributes the load and responsibility across different levels of governance. Taking action to ensure

government agencies help to ensure the survivability of such spaces that exist on city land is also critical.

IMPACT

The key findings and recommendations of this report sought to expand upon the work being done by national non-profits and institutions towards creating more playful cities, by narrowing the focus on how to incorporate more playful interaction and learning with nature. When children can dig in the dirt, plant flowers in a garden, and climb on logs, they can connect to the earth and their homes in tangible and palpable ways. To maximize the potential for nature-based play to be an experience which all children have access to, we need to, not only maximize the potential usage of already existing green spaces, but also continue to design and carve out creative pockets of nature-play where green space may be severely limited, while also ensuring the protection and proliferation of such spaces for the future.

To further global initiatives of expanding playful nature-based learning, The Samuel Centre for Social Connectedness (SCSC) could partner with local community organizations and hold focus groups to gain feedback from residents across Montreal to understand community needs, and identify where nature-deserts may be located across the city, as well as where to target future revitalization and design efforts. In collaboration with other public and private agencies, SCSC could consider longer-term possibilities and strategies for how to partner with national organizations, and leverage their support for future city-wide initiatives.

CONCLUSION

Nature-based playful learning functions as an important component of child-friendly urban planning and city resilience. Just as it is critical to expand our definitions of play beyond the playground, expanding on our conceptualization of how children can play in nature in their communities (regardless of the amount of green space they may have access to), also creates pathways to building psychological resilience which can then be transformed into resilience at the city-scale. The above recommendations provide some initial considerations for how cities can progress in making access to nature an integrated and inclusive opportunity for everyone.

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