**Supplementary Material**

**Designing public playgrounds for inclusion: A scoping review of grey literature guidelines for Universal Design**

Alice Moore\*, Bryan Boyle, & Helen Lynch

\* Corresponding Author

**Correspondence to:**

Alice Moore, PhD Candidate, Department of Occupational Science and Occupational Therapy, University College Cork, Ireland

110341541@umail.ucc.ie

**Supplementary Material**

#### **Findings: Theme 3**

#### **Location, layout, and accessibility**

For location, layout, and accessibility, design recommendations primarily pertained to maximising accessibility and inclusion in the built environment and were categorised into nine main issues, presented below.

For **location**, nineteen documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) orientate and position the play space to utilise the site’s unique features (e.g., views, existing vegetation); (b) connect the play space with transport networks (e.g., bus, train, light rail); (c) include appropriate arrival facilities (e.g., pedestrian and cycle routes, accessible parking); (d) connect street footpaths and the play space entry with safe road crossing points; and (e) include an accessible path (without stair-only access) from/to the street, carpark and supporting facilities.

For **parking and other ways to arrive**, twenty-one documents provided recommendations (Supplementary Table 2). For parking, these included the need to: (a) ensure car parks comply with country specific standards; (b) include convenient and designated accessible parking close to playground; and (c) provide an accessible path of travel from the car park to the playground. For other ways to arrive, recommendations included the ned to: (a) locate the playground so that it connects with transport networks (e.g., bus, train, light rail, path/cycle networks); (b) consider including a bus parking/drop-off zone for larger playgrounds; and (c) include appropriate arrival facilities (e.g., pedestrian and cycle routes, bicycle racks).

For **entryway and orientation**, seventeen documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) consider a formal entry point that is accessible and linked by an orientation path to help people connect between all points of entry and exit; (b) incorporate a pause point to observe the layout, become familiar with the space, and decide where to go first; (c) incorporate signage or a map to assist with navigation and decision-making; and (d) add a "parking lot" immediately inside the entry way to park prams, buggies, wheelchairs, and other adaptive equipment.

For **surfacing**, twenty-three documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) utilise surfacing that complies with country specific standards; (b) provide a variety of play surfacing to provide a contrast between activity, fall, and circulation zones; (c) consider the intensity of use, climate, ground profile and ground soil/ conditions when selecting surfacing; (d) incorporate inclusive play surfaces (e.g., wet pour, asphalt, concrete, poured-in-place).

For **pathways**, twenty-four documents provided recommendations (Supplementary Table 2). Recommendations included the need to provide pathways that are: (a) accessible (e.g., free from steep slopes); (b) free from barriers (e.g., kerbing); (c) level; (d) composed of a firm, predictable surface; and (e) wide enough so that two people using a wheelchair or mobility device to pass each other with ease.

For **wayfinding**, twelve documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) develop a wayfinding system to help people easily navigate the play space (e.g., consistent multi-sensory signals and cues; a hierarchy of pathways); (b) provide accessibility features to assist with wayfinding (e.g., tactile map; colour contrast); and (c) provide a clear logical layout from entry to exit with play zones arranged adjacent to a main orientation path.

For **orientation in and around the space**, fifteen documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) link the play space to surrounding elements (e.g., pathways); (b) provide a connection between the play space and the surrounding landscape to broaden the play experience; (c) ensure that there is a “flow of play” from one item to the next; (d) ensure that there is enough space between equipment for all users to navigate and manoeuvre; and (e) divide the larger play space into areas that allow for delineation of activities (e.g., separate vigorous play from quiet play zones).

For **perimeter boundary**, eighteen documents provided recommendations (Supplementary Table 2). Specifically, it was recommended to consider the purpose of the perimeter or boundary for the specific location before making decisions about what is required, i.e., complete / partial / no boundary. If it is decided that a perimeter boundary is required, recommendations included the need to: (a) consider what perimeter boundaries can add in terms of aesthetics and play value; (b) provide a fence or natural boundary (e.g., landform; planting); (c) avoid horizontal components, entrapment spaces, sharp components, cables or wire fencing; and (d) choose gates that are difficult to open by a child but can be operated by an adult using a wheelchair or mobility device.

Finally, for **supervision and surveillance**, sixteen documents provided recommendations (Supplementary Table 2). Specifically, to minimise the risk of children leaving the playground unsupervised, recommendations included the need to: (a) install a perimeter boundary (per above); and (b) allow for adult sight lines so that caregivers can safely supervise and facilitate children’s participation in play when needed. For adult sight lines, the following was recommended: (i) ensure clear line of sight from the entryway to the play space and parking lot; (ii) maximize the use of see-through equipment; and (iii) offer shaded, accessible seating and supervision areas throughout the play environment with a clear line of sight for seated or standing users.

#### **Support features**

Support features largely pertained to supportive infrastructure and amenities to maximise inclusion in the built environment within and surrounding the play space. For support features, design recommendations were categorised into twelve main issues, discussed below.

For **seating,** twenty-four documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) provide seating at regular intervals on a universal route; (b) orient seating for the best vantage points for caregivers to supervise children during play; (c) set seating back far enough to allow for enough clearance space adjacent to the seat to park a pram, wheelchair, or mobility device without blocking the circulation space or path; (d) offer accessible seating options (e.g., some seating with armrests, and some without, to allow someone in a wheelchair to transfer to them); and (e) locate seating so the user is comfortable in all seasons (e.g., shade).

For **tables/ picnic tables**, sixteen documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) locate tables on a universal route; (b) orient tables for the best vantage points for caregivers to supervise children during play; (c) locate tables to promote multigenerational socialization; (d) provide tables that allow for multipurpose use (e.g., chessboard painted on tabletop); (e) include square, round, or hexagonal shaped tables to suit wheelchair users so everyone can sit together (enable a person to roll up to the table and put their legs underneath without getting hit by the tabletop; allow space for more than one wheelchair); and (f) locate tables so the user is comfortable in all seasons.

For **spaces to gather and socialise**, twenty-six documents provided recommendations (Supplementary Table 2). Specifically, inclusive play spaces were recognised to provide good opportunities for adults to relax and socialise with others. In particular, the use of seating, play equipment, play features (e.g., boulders) or other landscaping features were recommended to create gathering spaces where different age groups might choose to congregate, wait, sit, and/or supervise. Moreover, it was recommended to provide shade over gathering places to extend use of playgrounds in hot weather and provide shelter in cold or windy weather.

For **shade and sheltered areas**, twenty-one documents provided recommendations (Supplementary Table 2). Specifically, supporting diverse comfort characteristics was recommended via planning for a range of environmental conditions with a mix of sunlight, shade, and wind protection. Moreover, ensuring that the play space has adequate shade over key play areas and seating to protect from strong sunlight and exposure to inclement weather was recommended via canopies, sails shades, trees, and solid shade structures (e.g., pergola).

For **toilets/ changing facilities**, twenty-one documents provided recommendations (Supplementary Table 2). Specifically, the provision of accessible toilets was regarded as crucial to the development of inclusive play space. Insofar as possible, it was recommended to include toilets with: (a) an accessible pathway and wheelchair access; (b) tactile signage and Braille; (c) doors that are easy to open and lock; (e) an adult-sized change bench in at least one unisex cubicle; (f) baby changing facilities; and (g) regular maintenance. If it is not possible to install toilets and changing facilities, it was recommended to locate the play space near accessible facilities.

For **litter bins**, seven documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) locate bins on accessible routes; (b) not locate bins in clear spaces next to benches (those spaces may be needed for people using wheelchairs); (c) not locate bins within eating areas; (d) include bins that can be operated with one hand (e.g., open tops, push doors); and (e) ensure bins are properly and regularly disposed.

For **drinking fountains**, eleven documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) located drinking fountains on firm, level surfacing; (b) include at least two different fountain heights; and (c) provide drinking fountains that are easy to operate (e.g., lever, sensor).

For **lighting**, eight documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) incorporate streetscape or playspace specific lighting to enhance use and provide safety; and (b) ensure supporting facilities are adequately lit (e.g., car park, toilets, access paths, seating areas).

For **storage facilities**, five documents (Supplementary Table 2) recommended storage facilities to improve accessibility for families needing to bring medical equipment (e.g., oxygen cylinders, changing bags).

For **service/ assistance animals**, three documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) include a designated area on-site provided for animal care, ensuring that it is on a universal route; (b) provide spaces where service animals can relieve themselves and provide for appropriate waste disposal; (c) include signs for owners to dispose of service animal waste; (d) provide a water trough/ basin/ drinking fountain for use by service animals; and (e) provide nearby safe and shady places where service animals can wait and have a clear view of their handlers when they are not assisting them.

For **signage**, twenty-two documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) comply with following internationally specified shapes in signboards (i.e., information signboards should be rectangular; warning signboards triangular; and interdiction signboards circular); (b) include signage that is easy to read and understand (e.g., multiple methods of communication; consistent wording, font, and colouring); and (c) incorporate signage that is welcoming and child friendly (e.g., include local children in the design of signage).

Finally, for **web page/ social media**, eight documents provided recommendations (Supplementary Table 2). Recommendations included the need to: (a) ensure that the dedicated web page for the playground is universally accessible (e.g., easy to navigate, read, and understand; provide the information in multiple formats); and (b) utilise a web page and social media platform to prepare a family to visit (e.g., include directions, information, and printable flashcards).

**Supplementary Tables**

**Supplementary Table 1:** Research on inclusive playground provision

|  |  |
| --- | --- |
| **Focus of study**  | **Reference(s)** |
| Explored user perspectives | Bhuyan 2021; Black and Ollerton 2021; Hill and Chawla 2019; Lynch et al. 2020; Olsen and Dieser 2012; Prellwitz and Skär 2007, 2016; Ripat and Becker 2012; Stanton-Chapman and Schmidt 2019, 2017a, 2016; Sterman et al. 2019; Wenger et al. 2021 |
| Investigated the perspectives of municipality representatives | Lynch et al. 2020, 2019; Prellwitz and Tamm 1999; Prellwitz, Tamm, and Lindqvist 2001; Sterman et al. 2019; Van Melik and Althuizen 2020 |
| Reviewed policy documents | Lynch, Moore, and Prellwitz 2018; Van Melik and Althuizen 2020 |
| Analyzed guidelines | Kim, Kim, and Maeng 2018; Lynch, Moore, and Prellwitz 2018; Lynch et al. 2019; Olsen 2015 |
| Studied research evidence | Alsarawi 2020; Brown et al. 2021; Burke 2013; Casey 2017; Fernelius and Christensen 2017; Moore and Lynch 2015; Moore, Lynch, and Boyle 2020; Prellwitz and Lynch 2018 |
| Developed evaluation tools to assess playground design | Dalprà 2020; Gustat, Anderson, and Slater 2020; Lynch et al. 2019; Parker and Al-Maiyah 2021 |
| Proposed frameworks for creating inclusive playgrounds | Olsen 2015 |
| Evaluated playground design | Lynch et al. 2019; Olsen and Dieser 2012; Perry et al. 2018; Siu, Wong, and Lam 2017; Talay, Akpinar, and Belkayali 2010 |
| Investigated the number of children who played, and time spent playing on a universally designed playground and compared it to children playing on an inclusive playground | Stanton-Chapman et al. 2020 |
| Designed inclusive playgrounds  | Stanton-Chapman and Schmidt 2017b; Yuen 2018 |

**Supplementary Table 2:** Research on inclusive playground provision

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Author(s), Publication year and location**  | **Title**  | ***Design recommendations***  |
| ***Location, layout, and accessibility*** | ***Support features*** |
| ***Location*** | ***Parking and other ways to arrive*** | ***Entryway and orientation***  | ***Surfacing***  | ***Pathways***  | ***Wayfinding***  | ***Orientation in and around the space***  | ***Perimeter boundary*** | ***Supervision and surveillance***  | ***Seating*** | ***Tables/ Picnic tables***  | ***Spaces to gather and socialise***  | ***Shade and sheltered areas***  | ***Toilets/ Changing facilities***  | ***Litter bins***  | ***Drinking fountains***  | ***Lighting***  | ***Storage facilities***  | ***Service and assistance animals***  | ***Signage***  | ***Web page/ social media***  |
| 1 | Alison and Wheway 2004UK | Can play, will play: Disabled children and access to outdoor playgrounds | ● | ● | ● | ● | ● | ● |  |  |  | ● |  | ● |  | ● |  |  |  |  |  |  |  |
| 2  | DESSA 2007Ireland  | Play for all: Providing play facilities for disabled children  |  |  |  | ● | ● |  | ● |  | ● | ● |  | ● | ● |  |  |  |  |  |  | ● |  |
| 3 | Shackell et al. 2008UK | Design for play: a guide to creating successful play spaces  | ● |  |  | ● | ● |  |  | ● | ● | ● |  | ● | ● | ● |  |  |  |  |  |  |  |
| 4 | Touched by Olivia 2012 Australia  | The principles for inclusive play  |  |  |  |  |  |  |  |  |  | ● |  | ● | ● |  |  |  |  |  |  | ● | ● |
| 5 | Play Wales 2016UK | Developing and managing play spaces: A community toolkit  | ● | ● |  | ● | ● |  | ● | ● |  | ● |  | ● |  | ● |  |  | ● |  |  | ● |  |
| 6  | Yuen 2016China  | Inclusive play space guide: Championing better and more inclusive spaces in Hong Kong  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  | ● |  | ● |  |
| 7 | Pooja Hiranandani, Krishnamoorthy, and Gopal 2016India  | Breaking barriers through play: Policy guidelines and a technical manual for making play spaces inclusive |  | ● | ● | ● | ● |  |  | ● |  | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  |
| 8 | Play Wales and Alison John and Associates 2017UK | Creating accessible play spaces: A toolkit | ● | ● | ● | ● | ● |  | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● | ● |  | ● |  |
| 9 | Casey and Harbottle 2018UK | Free to play: A guide to creating accessible and inclusive public play spaces | ● | ● | ● | ● | ● |  |  |  |  | ● | ● | ● | ● | ● |  |  |  | ● |  | ● | ● |
| 10 | Inclusive Play, KIDS, and Wagenfeld 2019UK | PiPA: Plan inclusive Play Areas |  | ● | ● | ● | ● | ● |  | ● | ● | ● | ● | ● | ● | ● | ● | ● |  |  |  | ● | ● |
| 11 | Rick Hansen Foundation 2019Canada | A guide to creating accessible play spaces | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  |  | ● | ● | ● |
| 12 | Christopher and Dana Reeve Foundation n.d. USA  | Toolkit for building an inclusive community playground | ● | ● |  | ● | ● |  |  |  |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| 13  | Rick Hansen Foundation n.d. Canada  | Let's play toolkit: Creating inclusive play spaces for children of all abilities |  | ● | ● | ● | ● | ● | ● |  |  | ● | ● | ● | ● | ● | ● | ● |  |  |  | ● |  |
| 14  | Luce 2015Australia  | Inclusive design manual: A guide to creating play spaces which welcome children of all abilities |  |  |  |  | ● |  | ● |  | ● | ● |  | ● |  |  |  |  |  |  |  | ● |  |
| 15 | HAGS 2018UK | Inclusive play design guide  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  |  | ● | ● | ● |
| 16 | Landscape Structures 2018 USA  | Inclusive playspace design: Planning guide |  | ● |  | ● | ● |  |  | ● |  | ● |  | ● | ● | ● |  |  |  |  |  | ● |  |
| 17 | HAGS 2019UK | Guide to creating inclusive playgrounds  | ● | ● | ● |  |  |  |  | ● | ● |  | ● |  |  | ● |  |  | ● |  |  | ● | ● |
| 18 | Playworld 2019USA  | Inclusive play design guide | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  |  | ● | ● | ● |
| 19  | Kompan Play Institute 2020Denmark  | Play for all: Universal design for inclusive playgrounds  | ● | ● | ● | ● | ● |  | ● | ● |  | ● | ● | ● |  | ● |  |  |  |  |  | ● |  |
| 20 | Dunn, Moore, and Murray 2003UK | Developing accessible play space: A good practice guide  | ● | ● | ● | ● | ● | ● |  | ● | ● | ● | ● | ● | ● | ● |  |  | ● | ● |  | ● |  |
| 21  | State of Victoria 2007Australia  | The good play space guide: “I can play too”  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  |  |  | ● |  |
| 22 | NSW Government 2019Australia  | Everyone can play: A guideline to create inclusive playspaces | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  |  | ● |  |
| 23  | Government of South Australia n.d. Australia  | Inclusive play: Guidelines for accessible playspaces | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● | ● |  |  | ● | ● |
| 24  | PlayCore, GameTime, and Utah State University 2008USA  | EveryBODY plays!  | ● | ● |  | ● | ● |  | ● | ● | ● | ● |  | ● | ● |  |  |  |  |  |  | ● |  |
| 25  | PlayCore and Utah State University 2016USA  | Me2: 7 principles of inclusive playground design  |  | ● |  | ● | ● | ● | ● | ● | ● | ● |  | ● | ● | ● |  | ● |  |  |  | ● |  |
| 26 | CABE Space 2008UK | Public space lessons: Designing and planning for play  | ● |  |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |
| 27  | Liedtke 2016USA  | Creating inclusive play and community spaces: An out-of-the-box approach to social and emotional inclusion | ● |  | ● | ● | ● |  |  |  |  | ● | ● | ● | ● |  |  |  | ● |  |  |  |  |

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