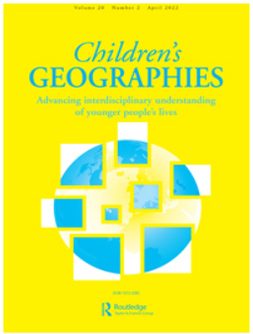
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Alice Moore, Bryan Boyle & Helen Lynch

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# Designing public playgrounds for inclusion: a scoping review of grey literature guidelines for Universal Design

Alice Moore, Bryan Boyle and Helen Lynch

Department of Occupational Science and Occupational Therapy, University College Cork, Cork, Ireland

**ABSTRACT**

Universal Design (UD) is promoted internationally for the design of public playgrounds that support outdoor play, social participation, and inclusion. Despite this international recognition of UD, there is a lack of research evidence concerning the applicability of UD for playground design. Instead, municipalities need to rely on best practice guidelines to inform the design of public playgrounds for inclusion. Internationally, numerous grey literature guidelines have been produced for designing public playgrounds for inclusion, resulting in a lack of consensus on core principles for applying UD. Thus, this scoping review study aimed to synthesise findings from a review of international grey literature guidelines to strengthen the knowledgebase for designing public playgrounds for inclusion. Three themes were identified that characterise core considerations for good design: (1) design approaches, (2) design principles and (3) design recommendations. Although UD is recognised as having potential to support the design of public playgrounds, inconsistent design approaches, principles, and recommendations, were communicated within these guideline documents. Still, the core concept of inclusion underpinned all guideline documents and a tailored application of UD dominated. Consequently, to fully realise the design of public playgrounds for inclusion, UD may need to be tailored for play; however, further research is required.

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Play; playground; playground design; inclusive design; universal design

## Introduction

Play is a universal and important process that is known to confer extensive benefits for children's health and wellbeing. This point is made in the UN Convention on the Rights of the Child (UN 1989), Article 31, the right to play, and further reinforced by play researchers (e.g. Ginsburg 2007; Moore and Lynch 2018). Public playgrounds, the focus of this paper, are outdoor play environments intended for community use, which in most countries differentiates them from school playgrounds (Burke 2013). Public playgrounds are key geographies for families and children (Refshauge, Stigsdotter, and Cosco 2012) as they enable gathering, socialising, resting and importantly, participating in play (Lynch et al. 2020).

Yet, many children are not afforded equal opportunities to benefit from participating in a play in public playgrounds due to incongruencies between children's play needs and formal play environments typically designed, planned and managed by adults (Moore, Lynch, and Boyle 2020; Stafford

**CONTACT** Alice Moore 110341541@umail.ucc.ie
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2017). Researchers have identified that public playgrounds can inadvertently perpetuate social and spatial marginalisation and exclusion, particularly for children with disabilities and their families, because of inadequate access, unsatisfactory play options, poor play value and insufficient opportunities for social interaction (e.g. Burke 2013; Jeanes and Magee 2012; Moore, Lynch, and Boyle 2020; Stafford 2017; Woolley 2012). Hence, there is a fundamental need to strengthen inclusive playground provision in the public realm.

Although much of the research on inclusive playground provision has taken place within schools (e.g. Bundy et al. 2008, 2011; Doak 2020; Kretzmann, Shih, and Kasari 2015; Sterman et al. 2020; Yantzi, Young, and Mckeever 2010), research is evolving on inclusive playground provision in the public realm. For example, researchers have explored user perspectives, investigated the perspectives of municipality representatives, reviewed policy documents, analysed guidelines, studied research evidence, developed tools to assess playground design, proposed frameworks for creating inclusive playgrounds, evaluated playground design, investigated the frequency and duration of children playing on a universally designed playground compared to children playing on an inclusive playground and designed inclusive playgrounds (Supplementary Table 1). No studies to date have evaluated outcomes of inclusive playgrounds from a Universal Design (UD) and play value perspective, as fundamental aspects of effective design (Brown et al. 2021; Moore, Lynch, and Boyle 2020; Parker and Al-Maiyah 2022).

Evidently, the design of public playgrounds has been implicated as a contributory factor in enabling inclusion (Brown et al. 2021; Fernelius and Christensen 2017; Lynch et al. 2020; Moore and Lynch 2015; Moore, Lynch, and Boyle 2020). Furthermore, addressing play and participation through inclusive playground design has emerged as deserving of attention (Lynch et al. 2020; Moore and Lynch 2015; Moore, Boyle, and Lynch 2022; Moore, Lynch, and Boyle 2020, 2022). While Universal Design (UD) is commonly cited across the literature, there remains evidence of inconsistent understanding and application of the term (Moore, Boyle, and Lynch 2022). For example, Bianchin and Heylighen (2018) identified that 'UD', 'inclusive design' or 'design for all', are used internationally, but vary depending on the continent or region. The new European standard EN 17210:2021 *Accessibility and usability of the built environment – Functional requirements* (NSAI Standards 2021), elaborated upon these three terms and identified that further terms to the above such as 'accessible design', 'barrier-free design' and 'transgenerational design' are often used interchangeably. However, from this plethora of terminology, UD has emerged as a design approach that appears to be linked most closely with inclusion (Lynch et al. 2020; Moore and Lynch 2015; Moore, Boyle, and Lynch 2022; Moore, Lynch, and Boyle 2020, 2022).

The UN Convention on the Rights of Persons with Disabilities (UNCRPD) defines UD as 'the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design' (UN 2006, 4). Indeed, the UNCRPD (UN 2006) endorses UD as the most efficient way of ensuring that everyone can access and use public services and facilities. Furthermore, General Comment No. 17 (GC17) (CRC 2013), an authoritative statement on Article 31, identified UD as the way forward in public play provision. Still, Moore, Lynch, and Boyle (2020) recently identified a lack of evidence as yet concerning the applicability of UD for playground design. In addition, researchers found that despite having seven principles and eight goals to enable its application, UD is poorly understood as a concept, and requires further clarity and specificity as it pertains to playground design and inclusion in outdoor play (Moore, Boyle, and Lynch 2022; Moore, Lynch, and Boyle 2022).

Despite these limitations to UD specifically, there is an abundance of documentation to support 'inclusive design' in its general sense in the form of guidelines. Design guidelines play an important role in translating the principles of an approach such as UD to guide the creation of inclusive solutions that meet the needs of children and families. They differ from published academic literature insofar as they are often more easily accessed by diverse stakeholders and aim to increase understanding of relevant design principles and their application. Numerous grey literature guidelines have been produced internationally for the design and provision of playgrounds for inclusion,

and come from several sources, including non-governmental and not-for-profit organisations, industrial organisations (e.g. commercial manufacturers of playground equipment) and from implications of formal and informal research studies (Casey 2017; Lynch, Moore, and Prellwitz 2018, 2019). Despite their proliferation, researchers have found that few formal guidelines clearly articulate what a universally designed playground is or should be (Burke 2013; Fernelius and Christensen 2017; Moore and Lynch 2015). Also, inconsistent design principles, as well as solutions, are resulting in a lack of clarity (Moore, Lynch, and Boyle 2020); thus, it is difficult to establish good practice for the design and provision of playgrounds for inclusion, as few efforts have been made to synergise the information (Olsen 2015).

While some effort has been made in recent years to examine the evidence for best practice for designing playgrounds for inclusion (Brown et al. 2021; Fernelius and Christensen 2017; Moore and Lynch 2015; Moore, Lynch, and Boyle 2020), and to assemble information from guideline documents (Kim, Kim, and Maeng 2018; Lynch et al. 2019), to date, there has not yet been a systematic analysis of grey literature guideline documents to synthesise the design approaches, design principles and design recommendations for the design of universally designed public playgrounds, that enhance play value for inclusion and participation. Thus, to move beyond the exclusionary practices and determine what designing public playgrounds for inclusion is, or should be, the purpose of this study was to explore international grey literature guidelines for the design of public playgrounds for inclusion, and examine the design approaches, design principles and design recommendations within these guidelines. Moreover, the review aimed to determine the applicability of UD and play value, to bring together an improved understanding and knowledgebase for those who plan, design and/or provide public playgrounds for inclusion.

## Methods

This paper describes scoping review search methods that were developed and applied to conduct a review of grey literature pertinent to guidelines for the design of public playgrounds for inclusion. The most common definition of grey literature (the 'Luxembourg definition') defines it as 'that which is produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers, i.e., where publishing is not the primary activity of the producing body' (Schöpfel et al. 2005). The Internet is often used as a platform for publishing grey literature by a wide range of organisations (Benzies et al. 2006) and tends to be widely accessible as subscriptions are not required, as may be the case with the peer-reviewed scholarly literature (Godin et al. 2015).

Although scoping reviews typically comprise a review of published and grey literature on a given topic (Arksey and O'Malley 2005; Levac, Colquhoun, and O'Brien 2010; Peterson et al. 2017), for this study, a scoping review of grey literature exclusively was selected for four main reasons. First, a scoping review of published peer-reviewed research literature on the design and provision of playgrounds for inclusion has already been conducted (Moore, Lynch, and Boyle 2020) and found no studies that reported on outcomes for the application of UD to enhance inclusion; second, the design and provision of public playgrounds for inclusion is therefore informed primarily by expert opinion and guidelines on good practice rather than being evidence-informed from formal peer-reviewed studies; third, these guidelines warrant investigation, as inconsistent design approaches, principles and solutions are resulting in a lack of clarity on what a public playground design for inclusion is or should be; and fourth, guidelines for designing playgrounds for inclusion are typically released by government and non-government organisations and not published in academic journals. Thus, a review of grey literature would provide a more complete review of all available evidence (Mahood, Van Eerd, and Irvin 2014).

Consequently, a scoping review of grey literature was conducted using the five-stage approach originally described by Arksey and O'Malley (2005) and later refined by the Joanna Briggs Institute (Peters et al. 2015) and other researchers (Levac, Colquhoun, and O'Brien 2010).

### Stage 1: Identifying the research question(s)

This scoping review focused on answering the following research questions: (1) what are the characteristics of the grey literature guidelines for designing public playgrounds for inclusion (e.g. year published, source organisation, by whom they were developed, intended audience, goal/objectives of guideline)? and (2) what are the design approaches, design principles and design recommendations articulated within the guidelines for designing public playgrounds for inclusion?

### Stage 2: Identifying relevant studies

To identify guideline documents for designing public playgrounds for inclusion, an electronic search of Google search engines was completed in November 2019 and updated in June 2020. Search terms included combinations of the following, in recognition of the various terms used to describe UD: (playground OR playspace OR 'play space') AND (guide* OR 'design guide*') AND (design* OR access* OR inclus* OR 'Universal Design'). The search generated 106 potentially eligible records.

### Stage 3: Study selection

As the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommends using a study flow diagram to describe the screening and study selection process

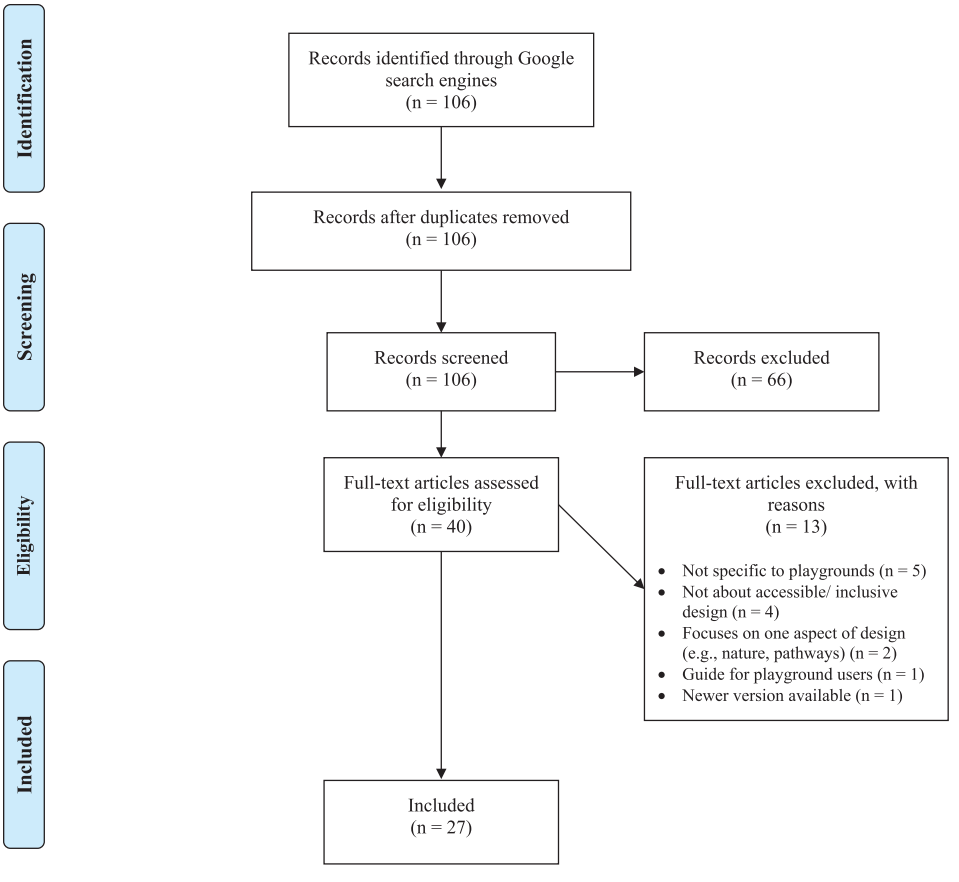



**Figure 1.** PRISMA diagram of study selection process (Moher et al. 2009).

(Moher et al. 2009), this process was applied to the grey literature search methods (Figure 1). The title, year of publication, source organisation and web links of guideline documents identified were entered into an Excel sheet. For a guideline document to be included, strict inclusion criteria needed to be met (Table 1).

Of the 106 screened records, twenty-seven guideline documents that focused on designing public playgrounds for inclusion, met the inclusion criteria (Figure 1).

### Stage 4: Charting the data

Following a full review of each included guideline document, data were extracted pertaining to guideline characteristics (source organisation, year published, by whom they were developed, intended audience, goal/objectives of guideline) and the design approaches, design principles and design recommendations within these guidelines. Only data that were relevant to the design of public playgrounds for inclusion were extracted (i.e. guidelines pertaining to specific play items were not extracted), consistent with the a priori objectives of the review.

### Stage 5: Collating, summarising and reporting the results

Using the data extraction chart, data were collated and summarised. Data analysis was conducted by the lead author of this scoping review and independently reviewed by the remaining authors. Data were analysed using a UD and play value framework.

## Results

### Evidence characteristics

Evidence characteristics were identified from the twenty-seven guideline documents that met the inclusion criteria, and data extracted pertaining to research question one. These are listed in Table 2 and, where referenced within this paper, highlighted with the relevant number.

Of these, twenty-four guideline documents were published between 2003 and 2020; a further three guideline documents did not list their date of publication (Table 2). Ten of the guideline documents originated from the United Kingdom (UK), six from the United States of America (USA), five from Australia, two from Canada and one each from Ireland, Denmark, China and India.

The guideline documents ranged from 7-pages to 156-pages, with the average number of pages being 51.6-pages, and originated from several sources, including non-profit organisations ($n = 13$), industrial organisations ($n = 6$), government organisations ($n = 4$), industrial-education cooperation ($n = 2$), government advisory organisation ($n = 1$) and from education (n = 1) (Table 2). All guideline documents provided guidance for designing public playgrounds for inclusion and the intended audiences for the guideline documents were those that plan, design and/or provide public playgrounds (design professionals, councils/municipalities and community groups).

Furthermore, as shown in Table 2, thirteen guideline documents referred explicitly to UD; however, only four of these utilised the seven principles of UD as their design principles (6, 11, 18 and

**Table 1.** Inclusion and exclusion criteria.

| Inclusion criteria | Exclusion criteria |
|---|---|
| Freely accessible guideline documents for designing public playgrounds for inclusion. | Inaccessible guideline documents (e.g. at a cost) for designing public playgrounds for inclusion. |
| Guideline documents that focus on designing public playgrounds for inclusion. | Documents that did not focus on designing public playgrounds for inclusion (e.g. focused on nature exclusively). |
| Guideline documents that translate to other contexts (e.g. general guidance). | Guideline documents for specific contexts that do not translate to other contexts (e.g. compliance with country specific standards/laws). |
| Available in English language. | Not available in English language. |

**Table 2.** Design approaches, principles and recommendations.

| | | | | | Design approach(es) | | | | Play value design recommendations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Author(s), Publication year and location | Title | Main agent | Page count | Accessible design | Inclusive design | UD | Design principles | Engaging people of all ages and abilities | Selecting play space equipment | Accessing play space equipment | Grouping play space equipment | Incorporating risk and challenge | Physical play | Sensory play | Social play | Cognitive/ Dramatic/ Imaginative play |
| 1 | Alison and Wheway 2004 UK | Can play, will play: Disabled children and access to outdoor playgrounds | Non-profit | | | | | organisation | 45 | ● | | | | ● | ● | ● | |
| 2 | DESSA 2007 Ireland | Play for all: Providing play facilities for disabled children | | 44 | ● | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 3 | Shackell et al. 2008 UK | Design for play: A guide to creating successful play spaces | | 156 | ● | ● | | *10 principles | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 4 | Touched by Olivia 2012 Australia | The principles for inclusive play | | 7 | | ● | | (1) Everyone can play<br>(2) A connection to community<br>(3) Access to nature<br>(4) Total experience<br>(5) Play independence: I can do it myself<br>(6) Friendship and social participation | ● | | | | | ● | ● | ● | ● |
| 5 | Play Wales 2016 UK | Developing and managing play spaces: A community toolkit | | 37 | ● | ● | | *10 principles | ● | ● | | | | ● | ● | ● | ● |
| 6 | Yuen 2016 China | Inclusive play space guide: Championing better and more | | 132 | ● | ● | ● | ** 7 UD principles | ● | ● | ● | ● | ● | ● | ● | ● | ● |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | Alison and Wheway 2004 UK | Can | play, will play: Disabled children and access to outdoor | | playgrounds | Non-profit | | | |
| | | inclusive spaces in Hong Kong | | | | | | | | | |
| 7 | Pooja Hiranandani, | | | | | | Krishnamoorthy, and Gopal 2016 India | | 7 | Pooja | |

Notes: *10 principles (Are bespoke; Are well located; Make use of natural elements; Provide a wide range of play experiences; Are accessible to both disabled and non-disabled children; Meet community needs; Allow children of different ages to play together; Build in opportunities to experience risk and challenge; Are sustainable and appropriately maintained; and Allow for change and evolution).
** 7 UD principles (Equitable use; Flexibility in use; Simple and intuitive use; Perceptible information; Tolerance for use error; Low physical effort; and Size and space for approach and use).

19). Thus, a degree of inconsistency and confusion was evident among the included guideline documents. Yet, the core concept of inclusion underpinned all twenty-seven guideline documents, irrespective of what design approach or design principles were adopted. Moreover, specific design recommendations relating to designing public playgrounds for inclusion were evident in all guideline documents. These will be discussed under the summary of main findings.

## Summary of main findings

Three themes were identified from the data extracted and pertain to research question two. The first theme describes the design approaches that were used to describe designing for inclusion. Theme two addresses the design principles articulated to describe the concept of designing for inclusion. The third theme highlights the design recommendations for designing public playgrounds for inclusion.

### Theme 1: Design approaches

Although all twenty-seven guideline documents provided guidance for designing public playgrounds for inclusion, UD was not always articulated as a design approach. As shown in Table 2, accessible design, inclusive design and UD were used to describe non-discriminatory planning and design processes.

Of the twenty-seven guideline documents, thirteen documents referred to UD as a design approach for inclusive public playground design (Table 2) and used UD interchangeably with accessible design and inclusive design; yet all thirteen documents defined what was meant by UD. Specifically, six documents drew upon definitions proposed by Ronald Mace (6, 18 and 22) and international Centres of Excellence in UD (9, 11 and 16). Moreover, two documents referred to rights-based documents when defining what was meant by UD; one guideline (8) drew upon GC17 (CRC 2013), while another guideline (19) referred to the UNCRPD (UN 2006). Furthermore, five documents did not necessarily cite their source, but defined UD differently as the design of: 'buildings, products, and environments that are usable and effective for everyone, not just people with disabilities, without the need for adaptation or specialised design' (13), 'products, environments, programmes, and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design' (15), 'environments, services and products that are useable and accessible for people of any age and ability' (21), 'an approach to designing products, services, and environments to be usable by as many people as possible regardless of their ability' (24) and 'environments that are usable by more people, to the greatest extent possible' (25).

Overall, while differences were apparent across the definitions, when discussed in relation to play environments, the aims of UD, were articulated as follows: (i) moving beyond minimum accessibility, to ensure equal emphasis is placed on maximising varied play opportunities and supporting social integration (11, 16, 19, 22 and 24); (ii) creating a space where everyone is welcomed (9, 15 and 25); (iii) providing the same or equivalent experiences and activities (these may have to be provided in different ways for different people) (9 and 15); and (iv) designing a space with accessible, inclusive routeing and infrastructure and access to relevant ground- and elevated-level activities (19).

Yet, for the remaining fourteen guideline documents that did not refer explicitly to the UD design approach, ten guideline documents utilised inclusive design in combination with accessible design (Table 2). Also, two documents used inclusive design exclusively; like UD, inclusive design was defined as a space that 'offers and encourages play experiences for people of all abilities … ' (4), and 'beginning from a perspective of 'strengths,' … create [a] play space that is designed with everyone in mind and that challenges and supports children with a wide range of abilities' (14). In this way, inclusive design mirrored UD, in that it was about providing for all. Moreover, two further documents used accessible design exclusively, with a greater focus on children with disabilities; accessible design was defined as 'the criteria by which accessibility should be judged therefore is

whether the disabled child was able to play at the playground, rather than whether they were able to access a particular item of equipment, or complete a particular activity …' (1)

and 'encouraging disabled and able-bodied children to play together' (26).

To summarise, most guideline documents ($n = 23$) utilised a combination of design approaches, or indeed, used the terms interchangeably for designing public playgrounds for inclusion. While UD was identified as a design approach with specific meanings and aims, when used, it was always used in combination with other approaches. It is not clear why this was the case; however, as established in the literature review, UD, inclusive design and accessible design are often used interchangeably. Nevertheless, given that UD was defined as a specific design approach with specific aims, inclusive design held similar meanings to UD, whereas accessible design differed because it was about designing for disability. In any case, it could be argued that while single design approaches were adopted in some instances, a combination of approaches appears to be the most favoured approach for designing public playgrounds for inclusion among the included guideline documents. Indeed, apart from two documents focusing on accessible design, there was an overall recognition among the guideline documents of the need to move beyond minimum accessibility, and thus, a combination of approaches was adopted in most instances.

### *Theme 2: Design principles*

The principles and/or goals of UD were not always articulated as design principles for designing public playgrounds for inclusion among the twenty-seven guideline documents. However, given the establishment of UD as the design approach recommended by the GC17 (CRC 2013) and the UNCRPD (UN 2006), and the evidence of it being the most advanced in terms of principles and goals, the seven principles of UD were used as an analytical tool to map the design principles. As shown in Table 2, the number of design principles, listed in the guideline documents, ranged from nil to ten principles, with the average number being 4.4 principles.

As noted earlier, thirteen guideline documents referred explicitly to UD. However, only seven guideline documents referred to the commonly accepted seven principles of UD; four of these guideline documents utilised the seven principles of UD as their design principles (6, 11, 18 and 19), while three guideline documents tailored the principles of UD for playgrounds (22, 24 and 25) (Table 2). For the remaining six guideline documents that referred explicitly to UD, one document identified seven principles (9), one guideline document listed three principles (16), one guideline document named three essential factors (21) and three documents did not list design principles (8, 13 and 15) (Table 2).

For the remaining fourteen guideline documents that did not refer explicitly to UD but instead referred to accessible design and/or inclusive design, numerous design principles were apparent. Specifically, three guideline documents listed ten design principles (3, 5 and 26), one guideline document identified seven design principles (7), two guideline documents listed six design principles (4, 10), one guideline document utilised five design principles (20), one guideline document named three design principles (23) and six guideline documents that referred to accessible design and/or inclusive design did not list any design principles (1, 2, 12, 14, 17 and 27) (Table 2).

To summarise, a combined eighteen of the twenty-seven guideline documents articulated design principles for designing public playgrounds for inclusion. Thirteen guideline documents referred explicitly to UD; however, only seven guideline documents referred to the commonly accepted UD principles (Connell et al. 1997). Still, only four of these guideline documents utilised the seven principles of UD as their design principles (6, 11, 18 and 19), while the remaining three documents employed them in different ways to make them more specific to playgrounds (22, 24 and 25). A further eleven guideline documents articulated their own design principles suggesting that UD principles either require further tailoring to make them more specific to playgrounds or are not deemed applicable. Yet, as evident above, the principles vary significantly across the guideline

documents, which further adds to the confusion when attempting to determine what an inclusive playground is or should be.

Still, play, play value and children's participation in the physical and social environments for play were significant. Moreover, when the seven principles of UD were applied as an analytical tool to map the design principles that did not use the seven UD principles, but instead either tailored the seven UD principles, or articulated their own design principles, the three most common UD principles evident were equitable use, flexibility in use and tolerance for error. Moreover, regardless of what design principles were adopted, twenty-two guideline documents endorsed the need for co-design when designing public playgrounds for inclusion. Co-design varied from engaging and involving children (1, 2 and 5), adults (e.g. parents) (14 and 19), children and adults (3, 4, 6, 7, 13 and 20), children, adults and the community (e.g. disability organisations; residents) (9, 11, 15, 16, 18, 21 and 22), as well as the community (12, 23, 26 and 27).

### *Theme 3: Design recommendations*

Among the twenty-seven guideline documents, numerous design recommendations for designing public playgrounds (play spaces) for inclusion were apparent. Design recommendations were categorised into recommendations as they pertained to: (1) play value, (2) location, layout and accessibility and (3) support features. While the length of the paper precludes a full discussion of each of the design recommendations (e.g. the design process and including users), attention will be drawn to the main messages.

*Play value.* Play value is used to describe the value of an environment, object or piece of equipment for play. For play value, design recommendations pertained to the provision of inclusive play spaces and play items that were inclusive of persons of all backgrounds, ages and abilities to participate in varied types of play. Play value recommendations were categorised into nine issues, outlined below.

For **engaging people of all ages and abilities**, twenty-five documents provided recommendations (Table 2). Indeed, the need to provide meaningful opportunities for inclusive, intergenerational play was recommended. Specific recommendations included the need to: provide play equipment to allow family groups to play together; select play activities so that people of all ages can engage in play; avoid segregating individuals by ability by ensuring that the most fun activities are also the most accessible; and include adult-centred play spaces where seniors can socialise through shared activities (e.g. exercise equipment, etc.). While there was acknowledgement of the need to provide meaningful opportunities for inclusive, intergenerational play, twenty documents were primarily oriented towards play for children (1, 2, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24, 25 26 and 27).

For **selecting play space equipment**, twenty-four documents provided recommendations (Table 2). Specifically, there was recognition among the documents that having a one hundred per cent accessible play space is not possible; however, the overall aim is to ensure that all children have access to the social experience of play and equality of play experience. Even so, specific recommendations included the need to: select equipment that complies with country specific standards; ensure some provision for people with differing abilities (e.g. equipment with UD features); select 'non-prescriptive' equipment that can be used flexibly by children of different ages and interests; use colour carefully to avoid over stimulation or confusion; and maintain equipment overtime to reduce the inherent risks.

For **accessing play space equipment**, twenty documents provided recommendations (Table 2). Recommendations included the need to: ensure access to high-interest, fun areas of the play space; ensure clear ground space so that a child who is using a wheelchair can access the play equipment and features by sitting at/under them; place equipment so that it can be reached by children at different sitting and standing heights and abilities; and provide play equipment that accommodates variations in gross and fine motor control.

For **grouping play space equipment**, fourteen documents provided recommendations (Table 2). Specifically, there was recognition that good play spaces avoid segregating children based on age or ability and are laid out so that equipment and features can be used by a wide range of children and allow for different patterns of usage. Specific recommendations included the need to: consider play equipment fall zones, movement zones, areas to 'wait your turn' and space for multiple users when grouping equipment; locate similar types of equipment in the same area; and incorporate equipment or features with graduated levels of challenge, that is, options for children to try different challenge levels.

For **incorporating challenge and risk**, twenty-one documents provided recommendations, particularly as it related to play challenge in the playground (Table 2). Recommendations included the need to: include a range of stimulating and imaginative activities in the play space with several overlapping scales of difficulty; and balance risk and benefits in a strategic way, using a policy framework (detailing the approach to risk and safety), to help resist unjustified negligence claims.

For play types then, recommendations were largely categorised into affordances for four play types: physical, sensory, social and cognitive/dramatic/imaginative play. For **physical play**, twenty-four documents provided recommendations (Table 2). Physical play affordances included features, equipment or spaces that afforded the following actions: spinning; sliding; rocking; swinging; climbing; crawling and strengthening; balancing; jumping and bouncing; and walking, running and rolling. Moreover, tunnels and cableways/ziplines were recommended. Also, the provision of accessible play items that provide for varied play preferences and play styles, as well as graduated challenge was recommended.

For **sensory play**, twenty-three documents provided recommendations (Table 2). Sensory play affordances included features, equipment or spaces that afforded the following sensory experiences: tactile/touch (smooth, soft, hard, rough, grainy and uneven); auditory/sound; visual experiences/sight;as well as smell and taste. Also, natural elements (water, earth, fire and wind), natural features (e.g. trees, willow structures and plants that create loose parts), planting (non-thorny and non-toxic) and cosy/quiet areas, were recommended. Moreover, the need to carefully consider the location of sensory stimuli to avoid creating a chaotic sensory environment of haphazard stimuli as well as ensure that sensory stimuli were accessible to all and afford play value was recommended.

Also, for **social play**, twenty-five documents provided recommendations to foster social play opportunities (Table 2). These included the need to include features, equipment or spaces that: encourage cooperative play (e.g. equipment that requires reciprocal interaction to operate it); and encourage interaction with others while playing (e.g. spaces to congregate).

Finally, for **cognitive/dramatic/imaginative play**, twenty-three documents provided recommendations to foster cognitive/dramatic/imaginative play opportunities (Table 2). These included the need to: include a mixture of dramatic and realistic play equipment and features (e.g. stage/platform, playhouse and play items that resemble other items); utilise play spaces under/on the play structure; incorporate loose parts (e.g. construction materials); and ensure that cognitive/dramatic/imaginative play opportunities are accessible.

*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: location; parking and other ways to arrive; entryway and orientation; surfacing; pathways; wayfinding; orientation in and around the space; perimeter boundary; and supervision and surveillance. While the length of the paper precludes a full discussion, the design recommendations for location, layout and accessibility as they relate to each of these nine issues can be found in Supplementary Materials.

*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: seating; tables/picnic

tables; spaces to gather and socialise; shade and sheltered areas; toilets/changing facilities; litter bins; drinking fountains; lighting; storage facilities; service/assistance animals; signage; web page/social media. While the length of the paper precludes a full discussion, the design recommendations for support features as they relate to each of these twelve issues can be found in Supplementary Materials.

## Discussion

The purpose of this study was to explore international grey literature guidelines for designing public playgrounds for inclusion. Moreover, this review aimed to determine the applicability of UD and play value in designing public playgrounds for inclusion. While some effort has been made in recent years to examine the evidence for best practice for designing public playgrounds for inclusion (Brown et al. 2021; Fernelius and Christensen 2017; Moore and Lynch 2015; Moore, Lynch, and Boyle 2020), and to synergise information from guideline documents (Kim, Kim, and Maeng 2018; Lynch et al. 2019), for the first time, this systematic analysis of grey literature guideline documents provides a broad understanding of how design approaches, design principles and design recommendations for designing public playgrounds for inclusion are conceptualised and discussed in guidance documents in many international contexts. Indeed, findings from this review show that grey literature guideline documents are an important source of knowledge for designing for inclusion, and in the absence of evidence for implementing UD, potentially provide a vision for inclusive playground design (Moore, Lynch, and Boyle 2022).

Despite differences, the core concept of inclusion underpinned all twenty-seven guideline documents in this review. Findings from this review highlighted the importance of autonomy of inclusion, which deconstructs assumptions on 'providing for all'. Certainly, there was acknowledgement that no one size fits all and public playground users are not a homogenous group; inclusion, however requires that provision be made for different ages, abilities, play preferences and comfort preferences, for example. Nevertheless, while there was acknowledgement of the need to provide meaningful opportunities for inclusive, intergenerational play among most guideline documents, they were primarily oriented towards the play of children. Nevertheless, given that achieving inclusion by providing for different abilities is a defining feature of UD, we must carefully consider how it can underpin the design of public playgrounds, echoing findings from a recent review of the academic literature (Moore, Lynch, and Boyle 2020). This would contribute to discussions on changing social expectations of the concept of who can 'play' and where, given the value of public playgrounds in terms of providing shared community spaces.

In this review of guideline documents, multiple design approaches and numerous design principles were evident, suggesting an inconsistency and confusion between approaches, principles and application. Indeed, the analysis revealed that design approaches were often named without context/source/citation. While UD and inclusive design were the most common approaches articulated among the reviewed guideline documents, two used accessible design exclusively as a design approach. Despite the assertion that accessible design is synonymous with UD, it has recently been asserted that accessibility factors alone are inadequate for addressing play participation in inclusive playgrounds (Moore, Lynch, and Boyle 2020, 2022; Moore, Boyle, and Lynch 2022). As noted in the findings, design recommendations identified the need to consider accessibility, play value, progressive levels of challenge and adopt a balanced approach to risk. These extend beyond accessibility and aim toward the provision of public playgrounds that offer inclusive and varied play experiences and facilities. Therefore, conflating accessible design with UD risks overlooking key inclusion measures such as play value, and a collective approach to its eventual use. Indeed, the concept of play value is now identified as central to public playground design among international researchers (e.g. Parker and Al-Maiyah 2022; Woolley and Lowe 2013).

It has been concluded elsewhere that the application of UD is problematic when considering the need to design for play (Casey 2017; Lynch, Moore, and Prellwitz 2018; Moore, Lynch, and Boyle

2020). Despite the challenges, UD is endorsed by GC17 (CRC 2013) and the UNCRPD (UN 2006), and is also promoted by international researchers for providing conceptual guidance for designing playgrounds that are inclusive (Burke 2013; Casey 2017; Moore, Lynch, and Boyle 2020, 2022; Moore, Boyle, and Lynch 2022; Prellwitz and Skär 2007, 2016; Stanton-Chapman et al. 2020; Woolley 2012). Consequently, to fully realise the design of public playgrounds for inclusion, UD may need to be tailored for play (UD for play [UDP]) (Moore, Boyle, and Lynch 2022) in the same way it has been tailored to ensure equity of teaching and learning in inclusive education (UD for Instruction/UDI) (Burgstahler 2009). A similar approach could be adopted to consolidate the importance and future application of UD for Play (UDP) – this proposal suggests that UD could/should be integrated with play value in such a way that it can be applied to the overall design of inclusive public playgrounds as well as of specific playground components, terrain and facilities.

### *Methodological considerations*

Despite efforts to conduct this scoping review of grey literature systematically and rigorously, there are some limitations. To maintain the focus of this scoping review, several criteria were put in place that excluded potentially relevant studies. Specifically, the use of Google search engines as the primary source for locating grey literature, available free of charge, may have omitted a greater diversity of evidence. Also, guidelines selected for inclusion focus on public playgrounds that are intended for community use, and do not specifically consider school playgrounds; this may have overlooked potentially relevant evidence, as school playgrounds are becoming more available for public use, outside of school hours, in international contexts. Although these guidelines originated in four continents (North America, Australasia, Europe and Asia), no specific cultural or spiritual differences were identified, which needs further exploration in future studies. Finally, this scoping review of grey literature was limited to guideline documents published in the English language; therefore, evidence published in other languages was omitted.

Importantly, this scoping review excluded guideline documents for specific contexts that do not translate to other contexts (e.g. each fit within specific national country-specific contexts in relation to standards and laws). While the included guideline documents applied to designing public playgrounds for inclusion in general, it must be acknowledged that country specific standards/laws are mandatory, and therefore, guideline documents need to be used in combination with the relevant country specific standards/laws to avoid potentially dangerous/illegal practices. Nevertheless, if country specific standards/laws do not mention UD then there might be a perception that there is no obligation to attempt or consider UD for public playground design. However, given the establishment of UD as the design approach recommended by the GC17 (CRC 2013) and the UNCRPD (UN 2006), this scoping review revealed that guideline documents play an important role in offering guidance for designing public playgrounds for inclusion. Thus, the overlap between what is mandatory (country specific standards/laws) and what is optional (guidelines) is worth exploring in future research.

## Conclusion

The review of grey literature evidence reveals some important findings that would not have been apparent without a comprehensive analysis of grey literature. The synthesis of evidence from this review brings together an improved understanding for those that plan, design and provide public playgrounds for inclusion. Although UD is recognised to have the potential to support the design of public playgrounds, inconsistent design approaches, principles and recommendations, were communicated among the included guideline documents. Still, the core concept of inclusion underpinned all guideline documents, and a tailored application of UD dominated. Consequently, to fully realise the design of public playgrounds for inclusion, UD may need to be tailored for play (UD for play [UDP]) (Moore, Boyle, and Lynch 2022); however, further research is required.

Therefore, future research needs to establish best practice guideline documents for designing public playgrounds for inclusion as well as explore the perspectives of 'users' and 'creators' (i.e. 'end users' and those with technical expertise) of public playgrounds, to overcome the inequalities faced by diverse public playground patrons and strengthen socio-spatial inclusion. While involving users is not yet common practice in built environment design (Heylighen, Van der Linden, and Van Steenwinkel 2017), this review highlighted that the success of public playground design is dependent on honest and respectful co-design and co-creation with creators, from project inception to outcome, otherwise, design can/does still occur with limited contextual understanding of the lived experience.

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This article does not contain any human or animal participants.

## ORCID

*Alice Moore* http://orcid.org/0000-0001-5204-2657
*Bryan Boyle* http://orcid.org/0000-0002-9630-7415
*Helen Lynch* http://orcid.org/0000-0002-3534-9144

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