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Title page

Can universal design support outdoor play, social participation, and inclusion in public playgrounds? A scoping review

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Ethical Approval

Ethical approval was not required for this study as it drew upon previously published material and does not contain any human or animal participants.

Title

Can universal design support outdoor play, social participation, and inclusion in public playgrounds? A scoping review

Running head

UD and public playgrounds: A scoping review

Article Category

Research Paper

Abstract

Purpose: To synthesize evidence regarding the physical design features and non-physical aspects of public playgrounds that facilitate/hinder outdoor play, social participation, and inclusion; identify design recommendations; and explore the current discourses and concepts around designing for outdoor play, social participation, and inclusion in public playgrounds in the context of Universal Design (UD).

Methods: Published studies addressing public playgrounds, inclusion, and design, were identified via a systematic search of eleven databases from health, science, education, and humanities.

Results: Fifteen documents met the inclusion criteria. Three main themes were identified concerning physical design features and non-physical aspects of public playgrounds that facilitate/hinder outdoor play, social participation, and inclusion, with associated design recommendations. Although UD is recognized to have the potential to support the design of public playgrounds, no studies examined UD solutions for playgrounds or tested them for effectiveness.

Conclusion: We cannot yet determine whether UD can support outdoor play, social participation, and inclusion in public playgrounds. Research to date has mostly focused on understanding users' perspectives; future research should continue to be informed by diverse users' perspectives to address gaps in knowledge concerning children's voice from migrants, lower socioeconomic communities, and intergenerational users with disabilities alongside researching design solutions for play.

Main text

Introduction

Play is recognized as essential to the social, emotional, cognitive, and physical wellbeing of children [1-3]. Different academic disciplines provide multiple understandings of what play is, what it can do for both individual children and society, and conversely, what play deprivation can mean for children, families, and society [4]. For this paper, play occupation is used to differentiate it from play skills or play activities, which are frequently the focus of other disciplinary perspectives on play [5-8]. Play occupation refers to play that is characteristically active, freely chosen, process rather than outcome-oriented and intrinsically motivating [9]; otherwise referred to as play for the sake of play [8].

Within play research, outdoor play has become increasingly important as a source of wellbeing [5,10]. Outdoor play has been associated with increased physical activity, indicating that outdoor play is characteristically less sedentary and more physical than play indoors [11-13]. Outdoor play has been further associated with opportunities for children to develop independence, self-determination, and physical skills [14]. Moreover, researchers have

identified a myriad of social, emotional, cognitive, and physical benefits for children engaging in outdoor play that is less supervised, less structured, more adventurous and includes elements of challenge and risk [15-20]. However, participation in outdoor play is under threat in many industrialized countries in particular because of restricted access to gardens and green areas, concerns about road safety and stranger danger, restricted independent mobility, heightened emphasis on academic learning and increased scheduling of adult organized activities and sedentary screen-based behavior [1,11,21-29]. Reductions in play opportunities have been documented internationally with researchers coining terms such as "play deprivation" [23], "nature deficit disorder" [25], and "poverty of experience" [24].

To address these mounting concerns, particularly regarding the need to balance children's safety with wellbeing [30,31], attention has been directed toward the design of built environments in terms of how they contribute to people's health, social participation, and attainment of human rights [32]. Although children's play takes place in many environments outside such as homes, local neighborhoods, schools, public spaces, and locations found by children to suit their play needs [33], public playgrounds, the focus of this paper, are considered to have a crucial role in portraying a public message that children are welcome to play in a particular locality [33]. Public playgrounds are typically located in a neighborhood or at a location where playground users are expected to drive or take public transportation to utilize the play space [34]; they are generally adult-planned and managed outdoor play spaces, broadly accessible to the public, and typically include equipment that is purpose-designed and built for children [35]. However, public playgrounds are typically designed to facilitate communities and provide meaningful opportunities for social interaction between children and parents of different social and ethnic characteristics and are potentially significant in enabling inclusion [36-39]. Moreover, public playgrounds are regarded as essential settings for children to play, experience and interact with their social and physical environment, test their abilities, and

develop physical, social, and motor skills [11,40-45]. Therefore, participating fully in public playgrounds has potential for wide-reaching effects that extend beyond these spaces and beyond childhood [46].

However, researchers have been proposing for some time that the physical and non-physical environments of playgrounds can inadvertently perpetuate marginalization and exclusion because of the way in which policy is developed and operationalized, or indeed absent in relation to play provision [44,47], which can result in barriers such as, inadequate access, inadequate play options and play value, and limited opportunities for social interaction [35,38,43,44,46,48-55]. And while decreased opportunities apply to many groups of children [10], it is potentially amplified for children with disabilities because of additional factors including attitudinal, physical, and social barriers resulting in reduced opportunities to benefit from participating in play compared with other children [56,57]. Thus, many children are not afforded opportunities to benefit from participating in outdoor play due to tensions between children and adult-planned and managed play environments [58]. Nonetheless, having opportunities to play and access the physical environments for play is a human right of all children [59]. As such, the notion of providing inclusive public playgrounds is gaining momentum to address the barriers that both children and their families experience [58] and reframe playground design as "the architecture of social participation" [32,44].

For some time, researchers have proposed varied concepts and methods to address non-discriminatory planning and design for playgrounds, including for example accessibility, usability, inclusive design, barrier-free design, and design for all [4,35,43,44,50,54,55,60-64]. However, lately, it is proposed that UD which is underpinned by seven principles [65] and eight goals [32], is the way forward for providing conceptual guidance for solving the problem of designing playgrounds that are inclusive for all [4,11,33,35,43,44,53,60]. As initially perceived, UD was focused on "the design of products and environments to be usable by all

people, to the greatest extent possible, without the need for adaptation or specialized design" [66,p.1]. In recent years, UD has "acquired global significance and become orthodoxy of what is presented as the very best of design practice" [67,p.873]. This is emphasized in General Comment No. 17 (GC17) on the right to play [10] and by the inclusion of UD in the Convention on the Rights of Persons with Disabilities (UNCRPD) [68] as a means to overcome inequities of access to the built environment [69]. Significantly, the UNCRPD articulated that "disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others" [68,Article1], shifting traditional views of disability from the level of individual responsibility to the interactional [70]. UD was, therefore articulated as an approach which has the potential to enable people by dismantling disabling barriers and creating the right environmental conditions for social inclusion across all human abilities [70]. UD is increasingly being applied to policy relating to the design of built environments internationally, to reduce discrimination and enhance social participation [71], and applied to playground design, with the need to ensure targeted consideration for those groups who are at particular risk of play deprivation. According to GC17 [10], these groups include children with disabilities, girls, children living in poverty, children in institutions, children from indigenous and minority communities as well as children in situations of conflict, humanitarian and natural disasters [10].

Although UD in the built environment is commonly referenced, there is a general lack of knowledge about UD as a design approach to date [72], and research regarding its efficacy remains emergent [69]. O Shea and colleagues [73] observed that "UD is not easily investigated by traditional scientific methods of analysis and validation, there are no clear criteria for what constitutes a universally designed built environment, and there is little consensus on how UD principles should be applied or evaluated" [69,p.2]. Furthermore, Lid identified that

understanding UD concerns requires an understanding of barriers from individual perspectives [74]. Individual perspectives are developed as user-based knowledge from a first-person perspective, embodied knowledge [74]. Thus, understanding the barriers for diverse groups is fundamental before determining what design approaches best support outdoor play, social participation, and inclusion in public playgrounds.

While there has been some effort to examine the evidence for best practice for inclusive playground design [75] and to determine evidence for accessibility and usability of playground environments for children [43], to date, there has not been a systematic analysis of peer-reviewed studies to synthesize evidence on public playground design that facilitate/ hinder outdoor play, social participation, and inclusion. Moreover, the current discourse around designing for social participation and inclusion in public playgrounds has not been explored in relation to the applicability of UD. Consequently, it is challenging to build a comprehensive model for applying UD to playgrounds due to the current lack of evidence to inform best practice in inclusive playground design and provision [11]. Thus, the purpose of the present study was to conduct a scoping review of peer-reviewed published literature informed by a UD perspective to (a) synthesize evidence regarding the physical and non-physical aspects of public playgrounds that facilitate/hinder outdoor play, social participation, and inclusion, (b) identify design recommendations and (c) explore the current discourses and concepts around designing for outdoor play, social participation, and inclusion in public playgrounds in the context of UD.

Methods

This scoping review followed Arksey and O' Malley's [76] methodological framework for good practice in conducting scoping studies, and further methodological intricacies as recommended by the Joanna Briggs Institute [77] and other researchers [78]. Scoping reviews

seek to map the extent, range and nature of a body of literature that has not been reviewed extensively or exhibits a large, complex, or heterogeneous nature not amenable to a more detailed systematic review [76,77,79]. The scoping review framework combined five stages, which will be described concerning this study. Of note, a UD lens was adopted to map the extent, range, and nature of published peer-reviewed literature relevant to public playground design.

Stage 1: Identifying the research question(s)

The questions this scoping aimed to address were: (1) What are the physical design considerations for public playgrounds that facilitate/ hinder outdoor play, social participation, and inclusion? (2) What are the non-physical design considerations for public playgrounds that facilitate/ hinder outdoor play, social participation, and inclusion? and (3) What is known about designing inclusive playgrounds, and what recommendations/ design approaches underpin the current discourses around designing for outdoor play, social participation, and inclusion in public playgrounds from a UD perspective? The findings presented later in the paper correspond to each of the three questions; theme one corresponds with question one, theme two relates to question two, and theme three endeavors to answer question three.

Stage 2: Identifying relevant studies

To obtain the most relevant results, the first author consulted an expert librarian to validate the search strategy and database choices before conducting electronic searches in November 2019 – see table 1 for the final list of primary and secondary search terms. The primary search terms included a breakdown of how public playgrounds are described in the literature. While this study adopted a UD lens, the secondary search terms included other related concepts (as noted earlier) that are currently used to describe non-discriminatory planning and design processes

internationally, including barrier-free design, building for everyone, accessible design, and architectural access. Terms more closely associated with UD are also included, for example, inclusive design [80] and design for all [32]. Despite some semantic differences and different place of origin, these approaches share a similar aim to UD in terms of considering people's diversity to the greatest extent possible [72].

A systematic search of peer-reviewed studies was conducted using eleven databases from health, science, education, and humanities to ensure the inclusion of diverse perspectives: Academic Search Complete, CINAHL, Education, ERIC, MEDLINE, PsycINFO, SocINDEX, SPORTDiscus, Scopus, Web of Science and PubMed. The primary search terms were first searched independently and then combined with the secondary search terms using the Boolean AND operator. Duplicates were removed from the search results, yielding 117 studies. Based on guidance by the Joanna Briggs Institute [77], the first author then manually searched reference lists of relevant studies for any additional resources, yielding a further forty-one studies. Figure 1 illustrates the number of publications in each year of the review period. Figure 2 shows the search yield and screening process.

Stage 3: Study selection

All citations were uploaded to EndNote X9 (2019) reference management software for the screening and selection process. A. M., H. L., and B. B., independently screened titles, and abstracts. The reviewers met on many occasions to discuss uncertainties related to study selection; as such, development of the inclusion/ exclusion criteria was iterative as familiarity increased with the literature. Studies were selected using the inclusion and exclusion criteria detailed in Table 2.

No date limits were set to ensure that all research conducted on the topic was captured. Following the initial screening and full-text review, a combined eighty-seven studies were

excluded based on the following criteria: not concentrated on public community playground design 'for inclusion' (n = 41), not focused on playgrounds intended for community use (n = 19), not peer-reviewed (n = 9), not original data collection (n = 8), field reports (n = 6), full text not available (n = 3) and focused on the technical aspects of design that do not translate to international contexts (n = 1).

A. M. and H. L. independently read the full texts of studies corresponding with the inclusion criteria. The additional validation process was then conducted, where all included studies, and 20% of the excluded studies were randomly selected and reviewed by a third reviewer (B. B.). Consensus was reached through discussions. A total of fifteen peer-reviewed studies met the inclusion criteria. The study selection process from study identification to final inclusion is represented in Figure 2.

Stage 4: Charting the data

The first author created and reviewed the data extraction chart multiple times in the data extraction process to ensure that all relevant data to answer the research questions were extracted from the included studies. As suggested by Levac et al. [78], the extraction process was iterative; the authors frequently met to discuss goodness-of-fit of the data extraction chart with the content of studies included and adapted the extracted data form accordingly. As a test of consistency, one other author (H.L.) independently reviewed two of the included documents and extracted data according to the data extraction chart. Following this, the individual extractions were examined and compared. All three authors agreed that the data extracted by each reviewer were consistent with each other and the data extraction chart allowed for all relevant data to answer the research questions to be extracted.

Stage 5: Collating, summarizing, and reporting the results

Using the data extraction chart, data were collated and summarised. Numerical summaries described the data quantitatively, and thematic analysis guided by Braun and Clarke's [82] six-step approach to thematic analysis, provided a complementary qualitative description of the findings. Data analysis was conducted by a single author of this scoping review (A.M.) and independently reviewed by the remaining authors (H.L. and B.B.). All information from the data extraction was summarized in table form (Table 6).

Results

Evidence characteristics

Fifteen studies from eleven first-named authors met the inclusion criteria for this review. Publication dates of the studies spanned from 1999 to 2019, with twelve published in the last 10 years. Most studies in this review originated from Europe (n = 8, 53%) or America (n = 4, 27%), with the remaining evidence arising from Canada, Australia, and New Zealand (Table 3). While built environment disciplines, such as architecture and planning were present within this literature [42,75,83], the most significant contribution was made by health disciplines and humanitarian scholars [38,43,44,50-52,60,61,84,85]. Education scholars also contributed [54,55].

A combination of methodologies, and mixed methods approaches were evident across the fifteen studies (Table 4). However, a common approach across the included studies was to employ qualitative methods to examine users' perspectives and identify current conditions that, by design, include and/or exclude children in public playgrounds, or review the built environments. A total of 1270 participants were involved in these fifteen studies, yet of these only 26 were children who used the playgrounds. As shown in Table 5, the reports of parents and caregivers of children aged from birth to fifteen years with disabilities were sought in seven

of the studies [42,51,52,54,55,61,85]. A further four studies included the reports of municipality representatives, members of the Ludi 'Play for Children with Disabilities' COST Action network, not-for-profit organization representatives and caregivers with disabilities [44,50,61,85]. Only three studies included the perspectives of child participants with and without disabilities [52,60,61] and one sibling [52]. None of these children represented other groups of children at risk of play deprivation (e.g. migrant children, children from lower socioeconomic communities). A further 433 existing parks and playgrounds were evaluated across four of the studies [38,42,83,84]. Furthermore, two studies included a review of the literature [43,75], while one study included a review of policies and guidelines also [44].

Summary of main findings

Three themes were identified from the data extracted through thematic analysis (see Table 6). The first two themes relate to research questions one and two and describe design considerations for public playgrounds that facilitate/ hinder outdoor play, social participation, and inclusion. Design considerations are divided into: (1) physical design features and (2) non-physical aspects. The third theme addresses research question three and outlines the physical and non-physical design recommendations identified in the included studies, that arose as an outcome of the users and providers perspectives, to maximize inclusion in playground design. The design recommendations were informed by varied concepts in designing for inclusion; for this paper, the seven principles of UD were used as an analytical tool to map the recommendations with further emphasis on specific design approaches adopted and the applicability of UD.

Theme 1: *Physical design features of public playgrounds that facilitate/ hinder outdoor play, social participation, and inclusion*

The physical design features of public playgrounds can facilitate/ hinder outdoor play, social participation, and inclusion, especially for children with disabilities. Physical design features were primarily reported with reference to facilitators and barriers.

Facilitators

Facilitators to outdoor play, social participation, and inclusion were categorized into two main issues: physical access to the playground environment, and then once there, accessing and using the playground components. Five studies determined physical design features of public playgrounds that facilitate outdoor play, social participation, and inclusion, particularly for children with disabilities [44,75,83-85] (Table 6). These included: the location of the playground (e.g. within walking distance) [83,85], accessibility features that facilitate equitable access (e.g. accessible pathways leading to all elements around and within the playground) [44,75,83,84], the inclusion of support items (e.g. accessible car park spaces) [83,84], and safety features (e.g. fencing) [44,84]. More specifically, seven studies explored physical design features more particular to the designated play space and playground components that provided more diverse play experiences for all children [43,44,60,75,83-85] (Table 6). These included: a circular playground design [75], inclusive play items (e.g. full-body support swings) [83-85], play items with a recognizable design (e.g. house), play items that provide for stimulation of all of the senses, and the inclusion of loose parts [43,44,60,75,84].

Usability was also closely related to the play value of the physical environment. For example, specific spaces in the playground such as multi-niche settings [75], observation points, comfortable places, space to interact socially and meet up with friends and green

spaces were noted to be of benefit for all children [44,75,83]. One study advocated for spaces that accommodate simple repetitive play for children that desire it [44]. Finally, a design that is simple and easy to understand, requires low physical effort, accommodates different play preferences and styles (cognitive, sensory, motor, social), and provide for appropriate challenge and risk [44,75] were regarded as inclusive.

Barriers

In contrast, when design for accessibility, usability, and play value was poor, barriers to play were identified. All fifteen studies reported on physical design features of public playgrounds that presented barriers for outdoor play, social participation, and inclusion, particularly for children with disabilities [38,42-44,50-52,54,55,60,61,75,83-85] (Table 6). Significantly, fourteen studies identified the absence of many accessibility features that resulted in exclusion [38,42-44,50-52,54,60,61,75,83-85]. These included: a lack of nearby accessible car parking [38,43,84], inaccessible entrances (e.g. presence of stairs) [50,51,61,83], inaccessible ground surfaces (e.g. sand) [38,43,51,60,83], surfacing that slows children down [54], inaccessible routes [38,84], narrow path widths [84], irregular path surfaces [50,84], high curbs [84], borders in the form of half-buried logs [50], steep gradients [50], absence of adequate lighting [84], lack of pathways leading to play items [44], enclosures with narrow openings [50], and lack of alternative options to access elevated play items [44,51]. Other elements that impacted accessibility were not defined but identified as getting to the playground being too hard [85]. Additional barriers included a lack of safety (e.g. fencing, shade, color contrast) [38,42-44,51,52,54,55,60,84], and the availability and accessibility of playgrounds being determined by socioeconomic status and place of residence [43,84].

Barriers to usability and the consequential poverty of play experiences was also identified in twelve studies that identified considerable design barriers, particularly for children

with disabilities [38,43,44,50,51,54,55,60,61,83-85] (Table 6). These included: a lack of routes to access elevated play items [38,43,50,61,84], play items not designed for children with disabilities (e.g. swings not capable of fully supporting the user) [44,50,84], lack of usable play items (e.g. too small, too high, too complicated) [44,61,83,85], and the absence of specific spaces that support social or physical inclusion (e.g. less stimulating area) [84,85]. Also, the absence of simple play items (e.g. moveable toys) [51,60], play items that provides for stimulation of all of the senses [84], play items with recognizable design, and inadequate activities that hold the children's interests [54,55,60], were noted as barriers. Finally, one study identified the removal of play items from playgrounds without consulting children as a significant barrier [60].

Although accessible/ inclusive play equipment did exist in some playgrounds within these studies, eight studies identified a lack of effectiveness of these design solutions [43,44,51,52,54,55,83,85] (Table 6). Specifically, the location of accessible/ inclusive play equipment in isolation from other play equipment were regarded as contributing to a segregated/ stigmatizing design [44,51,55,83]. Where a ramp existed to access elevated play items, no play opportunities at the top of the ramp, resulted in limited usability and playability [52,54,85]. Also, ground-level, and accessible play equipment were regarded as lacking in play value and deemed unenjoyable [43,54,55,85]. Finally, inclusive playgrounds were criticized for their age-appropriateness and considered ineffective for children less than five years of age [54,55], and playgrounds in general were reported as not being able to meet the needs of younger and older children in one setting [43]. So, although accessibility and usability features had been considered in some playground designs, the actual outcome (i.e. play value) was not included as an essential design consideration.

Because of the physical design features of public playgrounds that presented considerable barriers, children with disabilities primarily, were precluded access to the

playground space or parts of the structure. Specifically, nine studies identified that adult assistance was required to play which resulted in limited social opportunities [43,44,50-52,55,60,61,83] (Table 6). Subsequently, children with disabilities had reduced opportunities to make friends and be independent [51], which was further attributed to the acquirement of secondary disabilities [50,52,61]. Moreover, for children requiring adult assistance, they were found to feel embarrassed [51] and fearful of being teased/ bullied by peers [55,60]. As a result, as children with disabilities got older, they avoided visiting and using playgrounds [61]. Thus, social barriers were an outcome of the physical design barriers which shows that the physical environment underpins issues concerning social participation in playgrounds.

Theme 2: _Non-physical aspects of public playgrounds that facilitate/ hinder outdoor play, social participation, and inclusion_

In addition to the physical design features of public playgrounds, the non-physical aspects can also facilitate/ hinder outdoor play, social participation, and inclusion, most notably for children with disabilities. Non-physical aspects included attitudes, knowledge, and training, and were primarily reported also as facilitators and barriers.

Facilitators

Family and child attitudes were identified as a facilitating factor for pursuing visiting public playgrounds. Specifically, five studies found that families and children alike valued playgrounds [42,52,55,60,85] (Table 6). One study found that all children described playgrounds as a place everyone knew very well and would miss if it did not exist [60], while a further study identified that families valued playgrounds for specific reasons (child's enjoyment, imagination, being a part of the social/ family experience) [52]. The remaining studies found that families pursued visiting playgrounds for their child with disabilities

[42,55,85]. Families/ parents were noted to play an active role overall; they encouraged their children to play with other children [42], and actively planned for and supported their children's outdoor play participation [85].

Outside of the immediate family, attitudes of extended networks and communities were also identified across two studies as facilitating children's outdoor play participation [75,85] (Table 6). One study identified that community support in terms of inclusion and acceptance was particularly crucial for children with disabilities and their caregivers in public playgrounds [85]. Moreover, the remaining study, identified several factors that facilitate children's outdoor play participation (e.g. staff experience and training) [75] (Table 6).

Positive attitudes towards designing for inclusion were also evident among playground providers. One study recognized the positive work that playground planners/ designers/ providers were already doing to support outdoor play, social participation, and inclusion as a point of discussion out of the interview data [85]. Specifically, playground designers/ planners/ providers were engaged in educational campaigns around disability awareness and stigma reduction, consulted with communities about preferences and needs and worked to integrate social interaction into a playground to support feelings of acceptance [85]. Furthermore, one study noted that playground planners/ designers/ providers were aware of their limitations in the area of inclusive playground provision and wished for more knowledge of design for consideration of children with restricted mobility [50] from multiple stakeholders including users/experts [42,50-52,54,55,61], advocacy organizations [55], special education professionals [54,55], and rehabilitation professionals (e.g. occupational therapists) [51,52,54,61].

Barriers

Nonetheless, negative attitudes were also a common challenge among these studies. These included issues relating to the attitudes of other caregivers toward disability-related issues [55], social stigma [85], and perceptions of not being accepted, which were identified as barriers for children with disabilities and their caregivers. Furthermore, attitudinal barriers among fundholders and policymakers meant that provision for children with disabilities was either not prioritized or not considered because of perceived additional cost [43,50,55,61,85].

Alongside attitudinal barriers, there was also evidence in seven studies of insufficient knowledge of design for inclusion of children with disabilities among those that plan/ design/ provide public playgrounds [38,42,43,50,51,61,85] (Table 6). Insufficient knowledge was primarily attributed to external factors such as the lack of policy and legislation (e.g. national policies that address children's play) [43,44,84], resulting in the provision of public playgrounds that comply with the minimum accessibility standards [54,55,85]. Moreover, two studies reported that poor enforcement of international and national policies acted as a significant barrier [54,55], while one study recognized the limitations of civil rights policies [55]. A further study identified that the interpretation and implementation of safety standards led to limiting play in nature and the provision of sterile and uninteresting environments [85]. Lastly, poorly administered systems of management [43,50,61] in municipalities meant that children's play was an interdepartmental responsibility [44] resulting in disjointed play provision.

Theme 3: *Designing for outdoor play, social participation, and inclusion in public playgrounds: concepts utilized, and recommendations identified*

The third theme addresses the question: what is known about designing inclusive playgrounds. Most studies identified physical and non-physical design recommendations that arose as an

outcome of the users and providers perspectives to maximize inclusion in playground design and were informed by varied concepts in designing for inclusion. The seven principles of UD were used as an analytical tool to map the recommendations with further emphasis on specific design approaches adopted and the applicability of UD.

Recommendations for physical design features

Ten studies identified design recommendations concerning the physical accessibility aspects of public playgrounds, appropriate to meet the needs of sections of the population (primarily children with disabilities) [38,42,44,51,52,61,75,83-85] (Table 6). General design features that encourage families to stay and play were evident in recommendations: for example, access to shade, toilet provision with large changing tables, picnic tables, safety features (e.g. fencing), and the installation of appropriate lighting to encourage evening use [38,51,52,83-85] (Table 6).

However, recommendations for the physical design features are closely aligned to some of the seven UD principles to playground design. For equitable use (principle 1) design recommendations included the inclusion of accessible car parking spaces, accessible entry points, regular and accessible pathways leading to all elements around and within the playground, and accessible surfacing (e.g. rubber tiles) [38,42,44,51,52,61,75,83,84]. For perceptible information (principle 4), design recommendations included the inclusion of signage that addresses different learning styles [83]. For size and space for approach and use (principle 7) design recommendations included the inclusion of enough space for maneuvering between and on pieces of equipment, equal amounts of elevated and ground-level items, ramps or transfer systems to access elevated items, and singular usable methods of accessing play items [44,52,61,75,83].

Flexibility in use (principle 2) was also evident. Specifically, nine studies determined design recommendations concerning the physical design features more particular to the designated play space and playground components, appropriate to meet the needs of sections of the population (primarily children with disabilities) [42,44,51,54,55,61,75,83,84] (Table 6). Design recommendations included the inclusion of: a circular playground design that links complementary activities for children with autism [75], and accessible play items (full-body support swings, side-by-side slides, equipment that enables children to maintain neutral body posture, support features on play equipment such as supporting rails) [42,44,61,83,84]. Also, specific spaces in the playground such as multi-niche settings (equipment/ activities that require more than one child to operate or play) [75], observation points or "jump in" points, comfortable places, space to interact socially and meet up with friends, and green spaces were noted to be of benefit for all children [44,75,83]. For all children then, additional play items were also identified as contributing to more diverse play experiences and contributed to simple and intuitive use (principle 3); these included sensory play items (e.g. telescopes, structures with mirrors, musical equipment, talking tubes, sand, sensory garden) [54,55,84], loose parts (e.g. various props, playhouses and tables, sporting equipment) [75], play items with recognizable design (e.g. house, car, boat, animal), and simple equipment (e.g. moveable toys or playhouses) [51,60,75].

In addition to spaces and play items, the need to provide age-appropriate play items was determined across three studies [54,55,84] (Table 6). These recommendations related to flexibility in use (principle 2) as well as low physical effort (principle 6). Design recommendations included the provision of separate areas for different age groups as well as age-appropriate play items drawing on the recommendations of national bodies [86] in the USA [54,55] (Table 6). Furthermore, the need to provide for risk and challenge was also identified across three studies [44,75,85] (Table 6). Design recommendations included the inclusion of

play items that offer appropriate levels of challenge and risk for children of all abilities [44,75], play items that support social interaction and challenge across developmental levels (e.g. construction, water, or sand play) [85], and the provision of risk-rich play spaces that offer opportunities for adventure and excitement with consideration for tolerance and error (principle 5) [44]. A further consideration was made for designing for individual play preferences and styles [44]. Finally, four studies recommended the need to design opportunities to interact socially with peers [42,51,54,60] by incorporating play items with a recognizable design and play items that would support private conversations (e.g. playhouses) [60].

Recommendations for the non-physical aspects

In addition to the design recommendations concerning physical aspects of public playgrounds, five studies identified design recommendations for the non-physical aspects of playgrounds, appropriate to meet the needs of sections of the population (primarily children with disabilities), relating to attitudes, knowledge, and training [38,42,43,55,84].

To redress barriers pertaining to limited knowledge and negative attitudes towards inclusion among those that plan/ design/ provide playgrounds, four studies identified a need for the establishment of legislation, policies, and standards [38,43,55,84]. Three studies were prescriptive on what these should look like: to determine what an accessible playground is or should be [43], a commitment to providing inclusive playgrounds [38], and ensuring that minimum standards are enforced [84]. The remaining study noted that legislation at national and local levels are fundamental in facilitating social change to improve playgrounds for children aged 2 to 5 years [55]. Despite much of the recommendations focusing on the establishment of legislation, policies and standards, a further study noted that existing legislation should be carefully implemented [42]. Finally, it was proposed that the sales

representative's profit to be made from the sale of playground equipment should be eliminated or limited [54].

Additional recommendations included: local governments should be supported through scientific/ academic studies and financially [42], and the government should support familial and community agency to advocate for their own needs [85]. Specifically, four studies identified key people thought to be important stakeholders in the planning and design of playgrounds that support outdoor play, social participation, and inclusion [43,51,84,85] (Table 6). One study determined that society should be responsible for ensuring change occurs, not just parents of children with disabilities [51], while three further studies referred to the involvement of users/experts in playground design [43,84,85] (Table 6). Moreover, four studies proposed that occupational therapists can play a crucial role in playground design due to their knowledge on play needs, combined with usability and accessibility of play environments [43,51,52,60] (Table 6). Also, one study identified that future research should seek to understand local government organizational structures and determine the decision-makers concerning children's services [85].

Furthermore, training needs were identified for those that plan/ design/ provide public playgrounds to acquire knowledge on design for consideration of children with disabilities [38,42,54,61] (Table 6). Specific training identified included: UD and playground accessibility [38] as well as child development and special education professional development courses [54]. One study further proposed that training should be provided to caretakers, playground staff, and teachers on how to effectively integrate children with and without disabilities [75].

From an attitudinal perspective, local authorities were identified as needing to play an essential role in increasing awareness about disability-related issues and increasing acceptance among residents and society [83]. Moreover, addressing barriers in the wider community were identified across two studies [42,55] and included awareness rising and changing attitudes of

the children without disabilities towards children with disabilities [42], as well as the need for parents to educate their children on accepting children with disabilities [55].

Additionally, to redress barriers concerning attitudes towards children with disabilities and their caregivers, three studies identified the need for interventions in the social environment. One study identified the need for effective interventions to increase the social interactions between children with and without disabilities to be developed and implemented in playgrounds [42]. Two further studies were more specific on what the interventions should/ could consist of (e.g. incorporating programs, such as peer buddies/ trained playworkers, and the involvement of community organizations such as YMCA), appropriate to meet the needs of sections of the population (i.e. children with disabilities) to develop friendships [54,55]. In addition to identifying interventions for children with disabilities primarily, these were extended to adult caregivers and families more broadly (e.g. provision of a peer support network) [55].

Specific design approaches and the applicability of UD

Ten studies reported specific design approaches thought to support outdoor play, social participation, and inclusion in public playgrounds [43,44,51,52,54,55,60,75,83,85] (Table 6). Of these, the most used concept across the studies was UD. Seven studies advocated for the design of playgrounds that comply with the principles of UD [43,44,51,52,54,55,60]; however, six of these seven studies did not identify how UD could be applied to playground design [43,51,52,54,55,60]. Instead, four studies focused on aims/goals of UD; the overriding consensus was to facilitate social participation and inclusion [43,51,52,60]. In comparison, the remaining two studies conceptualized UD as going beyond what is minimally required by law [54,55]. Nonetheless, one study discussed the potential application of the seven principles of UD to playgrounds alongside play value principles; the study concluded that play value

principles needed to be seen on par with UD principles and facilitate the avoidance of separate or stigmatizing design [44]. A further study did refer to specific UD principles (e.g. low physical effort); however, its application in playgrounds was not necessarily developed [55]. Although UD is recognized to have the potential to support the design of public playgrounds, none of these studies specifically focused on how UD is applied in public playgrounds or the evidence for using UD in public playgrounds to support outdoor play, social participation, and inclusion.

Accessibility and usability were the next most used concepts across five studies [38,42,51,52,84] (Table 6). Specifically, four studies referred to designing for accessibility and usability [38,51,52,84]. Two studies focused only on accessibility [38,51]. One study conceptualized accessibility as gaining physical access to the playground, noting that attention should be given to accessibility early in the playground design process [38]. The other study focused on the provision of a fully accessible playground, noting that part accessibility results in embarrassment [51]. The remaining two studies focused on accessibility and usability in tandem [52,84]. One study identified accessible and usable playgrounds as spaces that bring children together in a way that promotes social inclusion through increasing other children's, and society's in general, awareness of disability-related issues [52]. The other study described accessible and usable playgrounds as catering for all people across the lifespan [84]. A further two studies focused on the outcomes of inclusive playground design by identifying that playgrounds should meet the needs of all children, enable and enhance social participation, noting that this can be achieved by developing inclusive approaches in designing playgrounds [42,44].

The concept of inclusive design was discussed in two studies, who referred specifically to inclusive design as a synonymous concept with UD [75,83]. One study noted that designs that comply with inclusive design criteria (referring to the 7 principles of UD) should consider

all children [83]. The remaining study found ten evidence-based practices of inclusive playground design from their review of the literature [75]; however, reference to specific principles of UD was not evident [75]. Although not referring specifically to UD or any specific inclusive design concept, one further study talked about designing for inclusion as an issue of going beyond what is minimally required by law [85].

To summarize, most studies identified physical and non-physical design recommendations as an outcome of the users and providers perspectives to inform the provision of outdoor play for social participation, and inclusion in public playgrounds. Although UD is recognized to have the potential to support the design of public playgrounds, the discourse around UD as a concept or guiding framework in the included studies is driven more by description and discussion rather than empirical approaches. Specifically, no studies examined UD solutions for playgrounds or tested them for effectiveness. Instead, UD was evident in the discourses around inclusion and design challenges rather than empirical approaches.

Discussion

The aim of this scoping review was to investigate what is known from published, peer-reviewed studies about inclusive public playgrounds, underpinned by a commitment to understanding the concept of UD as proposed UNCRPD [68] and GC17 [10]. This review has identified and synthesized all available peer-reviewed evidence on public playgrounds in relation to physical design features and non-physical design aspects that facilitate or hinder outdoor play, social participation and inclusion; it provides a broad understanding of how UD, and related concepts, have been conceptualized and discussed in studies of inclusion in public playgrounds in many contexts around the world.

While this study initially aimed to determine what is known about applying a UD approach to support outdoor play, social participation, and inclusion in community playgrounds, the findings showed that we cannot yet determine whether it is an effective design approach as the evidence is currently very sparse. Instead, the review illustrates that research to date has mostly focused on understanding users' perspectives, primarily from adult informants and relating to children with disabilities, with less emphasis on evidence-based practices for inclusive playground design. While this is an important contribution, it also has limits. Notably, most studies relied on the accounts of adult caregivers as a proxy for exploring children's (particularly those with disabilities) perspectives on public playgrounds. Yet, good practice, according to the GC17 [10], is to include children as informants in designing for play. Furthermore, Wenger et al. [64] have recently identified that differences may exist in the way children with and without disabilities experience play activities and how these experiences are often perceived from an adult's perspective in the context of playgrounds. Therefore, multiple studies with diverse children are needed to build knowledge of a user's perspective.

This review identified that to date, no studies have included a focus on the breadth of diverse populations of children at risk of play deprivation (such as migrant children, children from lower socioeconomic communities), implying that inclusion in public playgrounds appears to be considered an issue for children with disabilities primarily. In this way, disability is configured to be an individual problem and continues to limit the potential for UD to enable play equity in public playgrounds. However, having a right to something (play, in this case) also entails "the right not to be marginalized in decision making" [99,p.676]. While the emerging knowledgebase is primarily from a user's perspective which provides insights into user-based knowledge, which is essential to enhance UD concepts and application [74], more research is needed to expand such user-based knowledge to include the broader range of diverse

groups of children who are identified to be most at risk of play deprivation and ensure this first-person, embodied knowledge continues to build.

However, involving users/experts in general, and disability experience in particular, is not a common practice yet in built environment design [72]. Nevertheless, in recent years, effort has been directed towards the evaluation of playground design from child perspectives. In the Netherlands, for example, "Speeltuinbende" (translated as "the Playground Gang"), consists of a collective of children and adults that test the accessibility and inclusivity of playgrounds [47]. While such initiatives are paving the way forward in terms of including children's perspectives, further efforts are required to include playground users (including children with and without disabilities) in not only the evaluation but also the design of public playgrounds. This study identified multiple stakeholders thought to play an essential role in planning and designing public playgrounds; their participation could be facilitated by using methods from participatory design or co-design commonly used in other design disciplines such as product design [72]. Also, multicultural perspectives, that reflect sociocultural disability-based understandings are necessary to enable UD to reach its full potential as a medium for social justice [11,69].

This review highlights evidence that children, particularly children with disabilities, are often excluded from public playgrounds because of the physical design features and non-physical aspects of playground design. Obstacles in the physical environment were primarily attributed to the concept of accessibility, which were potentially amplified for the children with disabilities and their families in these studies, as they were precluded access to the playground space or parts of the structure, meaning that they required adult assistance to play resulting in limited social opportunities [43,44,50-52,55,60,61,83]. Thus, social barriers were associated with physical design barriers which shows that the physical environment underpins issues concerning social participation in playgrounds. This finding is supported by a previous finding

whereby the physical environment was recognized as a lynchpin for inclusion and social participation in playgrounds [43].

Barriers for playground users were attributed to physical design features of playground design particularly related to accessibility issues. Accessibility has traditionally focused on compliance with official guidelines [100]; indeed, for built environment professionals, the primary source of information into how people interact with and experience the designed environment are building codes or accessibility legislation [72]. Although accessibility standards derive from human consideration, they often translate accessibility into facts (or indicators and averages) [72] and offer little insight as to why a particular building feature is problematic, leading to the inaccurate application [101]. Indeed, the findings uncovered that accessibility pertained to the elimination of barriers in the physical environment, to address disability issues especially for wheelchair users. However, such a focus overlooks other diverse user groups that have a comparable need for inclusion and result in solutions that fall short of the ambition to provide equity of play experience and social participation as envisioned by proponents of UD.

Certainly, evidence from this review confirm that accessibility factors are inadequate for addressing play participation concerning playgrounds. In recognition of this limitation, Lid argues that UD needs to consider the human experience as one shaped by a relationship between individual and environmental factors and should draw on the situated knowledge of individuals in terms of exploring how people experience the accessibility and usability of design solutions [102]. Unlike accessibility, usability does not focus on compliance with official guidelines; instead, usability is about being able to access and use the environment on equal terms with others, and thus gets closer to the end goal of inclusion [100]. Nonetheless, and as previously noted in the findings, the terms accessibility and usability are often being

used in tandem; however, the two words represent different constructs [100]. Thus, clearer delineation from, or indeed the relationship between, related concepts is needed.

More recently Watchorn et al. [69] contributed further by asserting that if UD is intended to increase social inclusion and wellness, it cannot be limited to personal and environment determinants but instead needs to be more inclusive of the occupations people participate in (i.e. play in playgrounds in this case). Consequently, Grangaard and Gottlieb [103] argue that built environment design needs to shift away from the "black box" of prescriptive requirements that is based on fixated perceptions of users and instead focus on performance-based regulation. In this way, they argue for the contribution from users/experts in identifying solutions and altering or tailoring accessibility regulations rather than merely applying them [103]. In the context of public playgrounds, users/experts have a vital role to play in the design process [72], as they can appreciate qualities designers may not be attuned to [104].

Barriers for playground users were attributed to non-physical aspects of playground design also, namely a lack of knowledge among playground designers/ planners/ providers that impacted their ability to design/ plan/ provide community playgrounds that support outdoor play, social participation, and inclusion. Alongside a lack of/ weak enforcement of policy and legislation [54,55,85], playground designers/ planners/ providers were noted to have insufficient knowledge of design for consideration of children with disabilities [38,42,43,50,51,61,85]. This mirrors findings from a municipality in Ireland that found that a lack of knowledge and expertise limited the capacity of providers to establish an evidence-informed approach to inclusive playground provision [11,53]. Among other barriers, funding was also identified as a barrier; providing for children with disabilities or adapting pre-existing playgrounds was primarily seen as an added cost [44,50,55,61,85]. However, more recently, the notion of 'added cost' has been debunked in other studies in the international context.

Specifically, researchers have determined that designing for inclusion (that is, designing for all) in comparison to specialized design (designing for some) does not necessarily incur an additional cost, or at least not a substantial cost [11].

However, playgrounds were identified as essential and valued environments for outdoor play, social participation and inclusion among the children, parents, caregivers, educationalists [42,52,55,85], and playground designers/ planners/ providers in these studies [85]. As an outcome to their studies, researchers were able to identify several enabling design features and factors in the physical and social environments that provided solutions beyond basic accessibility. This scoping review found that physical accessibility is only a basic consideration and designing for inclusion requires three things: 1) design for physical accessibility, 2) design for usability/playability, and 3) design for inclusivity by incorporating design elements in the physical environment that target the social environment, as previously discussed in the findings. Moreover, findings determined that there is a need to provide age-appropriate play opportunities as well as design for risk and challenge. This finding is supported by other international researchers that promote risk-rich [17,44,105] and age-appropriate play options [106,107].

UD was identified as the most common concept utilized across these fifteen studies. UD was recognized to have the potential to support the design of playgrounds that support outdoor play, social participation, and inclusion in seven studies [43,44,51,52,54,55,60], while all fifteen included studies focused on inclusion. However, the discourse around UD in the included studies is driven more by description and discussion rather than empirical approaches. Specifically, no studies examined UD solutions for playgrounds or tested them for effectiveness. Instead, UD was evident in the discourses around inclusion and design challenges rather than empirical approaches. Yet, by utilizing the seven principles of UD as an analytical tool to map the recommendations, it was evident from an analysis of

recommendations that the seven principles of UD were represented in the design solutions being proposed. In this way, it was possible to determine that UD is recognised to have the potential to support the design of public playgrounds; however, it must be noted that there are limitations inherent in labelling recommendations that are not born as UD, nor do the interpretations presented here necessarily reflect the original intent. Nevertheless, what is apparent is that UD is not commonly applied, and thus, new innovations and future iterations of UD as it pertains to playground design is presently lacking because of a lack of maturity in the field. Overall, findings from this study confirms that there is a clear acknowledgement for the potential of UD; however, an articulation of how the application of UD ensures inclusion in play and public playgrounds is yet to be realized.

The challenges in applying the UD principles practically in the context of play has been noted [13,42,55]. Indeed, Theresa Casey, a consultant on children's play and playground design, reviewed principles three and six and identified that "the principles of low physical effort and simple and intuitive use may be deemed to confound the desire for play features requiring progressive levels of physical exertion or offering intrigue and surprise" [55,p.371]. In this way, Casey highlights the need to provide for challenge in children's play, but also identifies the challenges inherent in designing a specific solution than can challenge everyone and thus support their progression. Such a critique offers an interesting and general theme about the interpretation of UD; is UD a single design solution that everybody can use or is UD a plethora of design solutions that enables everybody to choose a solution that fits. Findings from this study would suggest that the latter holds true in the context of play and playgrounds as no one size fits all. Instead, public playground provision requires tailored design solutions that are informed by multiple UD perspectives that meet community needs and wants. Ensuring an inclusive universality in such design efforts requires the incorporation of participatory or co-design approaches that position communities at the heart of the design process.

Yet, the application of UD for playgrounds has been identified as particularly problematic when considering the need to design for play [13,42,55], a subjective experience that defies universality. Even so, attempts have been made to translate and tailor the principles of UD for playgrounds from occupational therapy and occupational science perspectives [42,96], integrating knowledge about play and the environmental affordances rather than architectural design or landscape perspectives. However, there is a clear need to examine UD and consider how the principles of UD can be tailored to include play as a central concern as it relates to playgrounds [13]. Key to this process is expertise in play and how the environment supports and enhances free play, which is the goal of playgrounds. Thus, further research will require a focus on multi- and trans-disciplinary collaboration [11], including, for example, landscape architects, municipality professionals and rehabilitation professionals.

While this scoping review was conducted systematically and rigorously, there are several acknowledged limitations. To maintain the focus of this scoping review, several criteria were put in place that excluded potentially relevant studies. First, the selection of peer-reviewed literature as the primary source of the review means its conclusions are drawn from a single genre and may have missed perspectives that challenge the evidence presented here. Second, an assumption was made that school and preschool playgrounds were for private use only unless stated otherwise; this assumption may have overlooked a greater diversity of public playgrounds. Third, double coding was used, but this was led by one author [A.M] because of resource limitations, which limits the reliability of findings. Fourth, the scoping review was limited to articles published in the English language; therefore, evidence published in other languages may have been missed. Fifth, the use of electronic databases to search for evidence may have overlooked a greater diversity of evidence as UD (and related terms) are not commonly found in the subject headings and taxonomies on which they are based [69]. Finally, the low number of studies and heterogeneity in study design is also an acknowledged limitation.

Despite these acknowledged limitations, the body of knowledge presented in this article provides a broad understanding of how UD, and related concepts, are conceptualized for public playgrounds in many contexts around the world. In particular, the review illustrates that research to date has mostly focused on understanding users' perspectives with less emphasis on evidence-based practices for inclusive playground design. While this study aimed to determine whether UD can support outdoor play, social participation, and inclusion in community playgrounds, we cannot yet determine whether it is an effective design approach as the evidence is currently very sparse. Directions to foster inclusive public playground design in the future will warrant enlarging the discourse on UD as it applies explicitly to playgrounds. Meanwhile, the UNCRPD [68] and GC17 [10] currently place UD practice at the forefront of the political and social agenda of addressing play equity and will continue to ensure that there is a growing awareness of, and demand for playground environments that promote participation and for professionals who are well prepared to take up these challenges.

References

1. Ginsburg KR. The importance of play in promoting healthy child development and maintaining strong parent-child bonds. Paediatrics. 2007;119(1):182-191.

2. Milteer RM, Ginsburg KR. The importance of play in promoting healthy child development and maintaining strong parent-child bond: focus on children in poverty. Pediatrics. 2012;129(1):204-213.

3. Bento G, Dias G. The importance of outdoor play for young children's healthy development. Porto Biomed J. 2017;2(5):157-160.

4. Woolley H. Now being social: The barrier of designing outdoor play spaces for disabled children. Child Soc. 2013;27(6):448-458.

5. Moore A, Lynch H. Understanding a child's conceptualisation of well-being through an exploration of happiness: the centrality of play, people and place. J Occup Sci. 2018;25(1):124-141.

6. Moore A, Lynch H. Play and play occupation: a survey of paediatric occupational therapy practice in Ireland. Irish J Occup Ther. 2018;46(1):59-72.

7. Lynch H, Prellwitz M, Schulze C, et al. The state of play in children's occupational therapy: a comparison between Ireland, Sweden and Switzerland. Br J Occup Ther. 2018;81(1):42-50.

8. Lynch H, Moore A. Play as an occupation in occupational therapy. Br J Occup Ther. 2016;79(9):519-520.

9. Bundy A. Play and playfulness: what to look for. In: Parham LD, Fazio LS, editors. Play in occupational therapy for children. St Louis (MO): Mosby. 1997; p. 52-66.

10. UN Committee on the Rights of the Child. General comment No. 17 (2013) on the right of the child to rest, leisure, play, recreational activities, cultural life and the arts; 2013 [cited 2019 Jan 15]. Available from: https://www.refworld.org/docid/51ef9bcc4.html

11. Lynch H, Moore A, Edwards C, et al. Advancing play participation for all: the challenge of addressing play diversity and inclusion in community parks and playgrounds. Br J Occup Ther. 2020;83(2):107-117.

12. Burdette HL, Whitaker RC, Daniels SR. Parental report of outdoor playtime as a measure of physical activity in preschool-aged children. Arch Pediatr Adolesc Med. 2004;158(4):353-357.

13. Ferreira I, Van Der Horst K, Wendel-Vos W, et al. Environmental correlates of physical activity in youth? a review and update. Obes Rev. 2007;8(2):129-154.

14. Stephenson A. Physical risk-taking: dangerous or endangered? Early Years (Stoke-on-Trent). 2003;23 (1):35-43.

15. Alexander SA, Frohlich KL, Fusco C. Playing for health? revisiting health promotion to examine the emerging public health position on children's play. *Health* Promot Int. 2012;29(1):155-164.

16. Gill T. No fear: growing up in a risk averse society. London: Calouste Gulbenkian Foundation; 2007.

17. Sandseter EBH. Characteristics of risky play. J Adventure Educ Outdoor Learn. 2009;9(1):3-21.

18. Sandseter EBH, Kennair LEO. Children's risky play from an evolutionary perspective: the anti-phobic effects of thrilling experiences. Evol Psychol. 2011;9(2): 257-284.

19. Brussoni M, Gibbons R, Gray C, et al. What is the relationship between risky outdoor play and health in children? a systematic review. Int J Environ Res Public Health. 2015;12(6):6423-6454.

20. Herrington S, Nicholls J. Outdoor play spaces in Canada: the safety dance of standards as policy. Crit Soc Policy. 2007;27(1):128-138.

21. Kilkelly U, Lynch H, Moore A, et al. Children and the outdoors: contact with the outdoors and natural heritage among children aged 5 to 12: current trends, benefits, barriers and research requirements [Internet]. Dublin: Heritage Council; 2016 [cited 2019 May 13]. 60 p. Available from: https://www.heritagecouncil.ie/content/files/children_%20outdoors_commissioned_report_26mb.pdf

22. Saunders TJ, Chaput J-P, Tremblay MS. Sedentary behaviour as an emerging risk factor for cardiometabolic diseases in children and youth. Can J Diabetes. 2014;38(1):53-61.

23. Bundy AC, Naughton G, Tranter P, et al. The Sydney playground project: popping the bubblewrap-unleashing the power of play: a cluster randomized controlled trial of a primary school playground-based intervention aiming to increase children's physical activity and social skills. BMC Public Health. 2011;11(1):1-9.

24. Welsh Government. Wales – a play friendly country. Cardiff: Welsh Government; 2014 Jul [cited 2019 May 15]. 40 p. Available from: https://gov.wales/sites/default/files/publications/2019-07/wales-a-play-friendly-country.pdf

25. Louv R. Last child in the woods: saving our children from nature-deficit disorder. London: Atlantic; 2009.

26. Kalish M, Banco L, Burke G, et al. Outdoor play: a survey of parent's perceptions of their child's safety. J Trauma Acute Care Surg. 2010;69(4) Suppl:S218-222.

27. Remmers T, Broeren SM, Renders CM, et al. A longitudinal study of children's outside play using family environment and perceived physical environment as predictors. Int J Behav Nutr Phys Act. 2014;11(1):76.

28. Schoeppe S, Duncan MJ, Badland HM, et al. Associations between children's independent mobility and physical activity. BMC Public Health. 2014;14(1):91.

29. Han CS, Mâsse LC, Wilson A, et al. State of play: methodologies for investigating children's outdoor play and independent mobility. Child Youth Environ. 2018;28(2):194-231.

30. Cilliers EJ, Cornelius S. The creation of rural child-friendly spaces: a spatial planning perspective. Appl Res Qual Life. 2019;14(4):925-939.

31. Howard A. What constitutes child friendly communities and how are they built? [Internet]. Australia: Australian Research Alliance for Children & Youth; 2006 June [cited 2019 May 29]. 57 p. Available from: https://www.aracy.org.au/publications-resources/command/download_file/id/165/filename/What_constitutes_child_friendly_communities_and_how_are_they_built.pdf

32. Steinfeld E, Maisel J. Universal design: creating inclusive environments. New Jersey (NJ): Wiley; 2012.

33. Casey T. Outdoor play and learning in the landscape of children's rights. In: Waller T, Arlemalm-Hagser E, Sandseter EBH, et al., editors. The SAGE handbook of outdoor play and learning. London: SAGE. 2017. p. 362-377.

34. Daniels DM, Johnson EL. The impact of community-built playgrounds on the community. J Trauma Acute Care Surg. 2009;67(1) Suppl:S16-19.

35. Burke J. Just for the fun of it: making playgrounds accessible to all children. World Leis J. 2013;55(1):83-95.

36. Bennet SA, Yiannakoulias N, Williams AM, et al. Playground accessibility and neighbourhood social interaction among parents. Soc Indic Res. 2012;108(2):199-213.

37. Moore RC, Cosco NG. Using behavior mapping to investigate healthy outdoor environments for children and families. In: Ward TC, Bell S, editors. Innovative approaches to research excellence in landscape and health. London: Taylor & Francis; 2010. p. 36–67.

38.	Olsen HM, Dieser RB. "I am hoping you can point me in the right direction regarding playground accessibility": a case study of a community which lacked social policy toward playground accessibility. World Leis J. 2012;54(3):269-279.

39.	Siu KWM, Wong YL, Lam MS. Inclusive play in urban cities: a pilot study of the inclusive playgrounds in Hong Kong. Procedia Eng. 2017;198:169-175.

40.	Nabors L, Willoughby J, Leff S, et al. Promoting inclusion for young children with special needs on playgrounds. J Dev Phys Disabil. 2001;13(2):179-190.

41.	Rigby P, Gaik S. Stability of playfulness across environmental settings: a pilot study. Phys Occup Ther Pediatr. 2007;27(1):27-43.

42.	Talay L, Akpinar N, Belkayali N. Barriers to playground use for children with disabilities: a case from Ankara, Turkey. Afr J Agric Res. 2010;5(9):848-855.

43.	Moore A, Lynch H. Accessibility and usability of playground environments for children under 12: a scoping review. Scand J Occup Ther. 2015;22(5):331-344.

44.	Lynch H, Moore A, Prellwitz M. From policy to play provision: universal design and the challenges of inclusive play. Child Youth Environ. 2018;28(2):12-34.

45.	Reimers AK, Schoeppe S, Demetriou Y, et al. Physical activity and outdoor play of children in public playgrounds - do gender and social environment matter? Int J Environ Res Public Health. 2018;15(7):1356.

46.	Yantzi NM, Young NL, McKeever P. The suitability of school playgrounds for physically disabled children. Child Geogr. 2010;8(1):65-78.

47.	Van Melik R, Althuizen N. Inclusive play policies: disabled children and their access to dutch playgrounds. Tijdschr Econ Soc Geogr. 2020 [cited 2020 Sep 8]; [14 p.]. DOI: 10.1111/tesg.12457

48.	Jeanes R, Magee J. 'Can we play on the swings and roundabouts?': creating inclusive play spaces for disabled young people and their families. Leisure (Waterloo). 2012;31(2):193-210.

49.	Prellwitz M, Tamm M. How children with restricted mobility perceive their school environment. Scand J Occup Ther. 2000;7(4):165-173.

50.	Prellwitz M, Tamm M, Lindqvist R. Are playgrounds in Norrland (Northern Sweden) accessible to children with restricted mobility? Scand J Disabil Res. 2001;3(1):56-68.

51.	Prellwitz M, Skär L. Are playgrounds a case of occupational injustice? experiences of parents of children with disabilities. Child Youth Environ. 2016;26(2):28-42.

52.	Ripat J, Becker P. Playground usability: what do playground users say? Occup Ther Int. 2012;19(3):144-153.

53.	Lynch H, Moore A, Edwards C, et al. Community parks and playgrounds: intergenerational participation through universal design [Internet]. Dublin: National Disability Authority; 2018 Dec [cited 2019 May 13]. 213 p. Available from: http://nda.ie/Publications/Others/Research-Promotion-Scheme/Community-Parks-and-Playgrounds-Intergenerational-Participation-through-Universal-Design1.pdf

54.	Stanton-Chapman TL, Schmidt EL. Special education professionals' perceptions toward accessible playgrounds. Res Pract Persons Severe Disabl. 2016;41(2):90-100.

55.	Stanton-Chapman TL, Schmidt EL. Caregiver perceptions of inclusive playgrounds targeting toddlers and preschoolers with disabilities: has recent international and national policy improved overall satisfaction? J Res Spec Educ Needs. 2017;17(4):237-246.

56.	Anaby D, Law M, Coster W, et al. The mediating role of the environment in explaining participation of children and youth with and without disabilities across home, school, and community. Arch Phys Med Rehabil. 2014;95(5):908-917.

57. Schreuer N, Sachs D, Rosenblum S. Participation in leisure activities: differences between children with and without physical disabilities. Res Dev Disabil. 2014;35(1):223-233.

58. Stafford L. Journeys to play: planning considerations to engender inclusive playspaces. Landsc Res. 2017;42(1):33-46.

59. United Nations. Convention on the rights of the child; 1989 [cited 2019 Jan 15]. Available from: https://www.ohchr.org/Documents/ProfessionalInterest/crc.pdf

60. Prellwitz M, Skär L. Usability of playgrounds for children with different abilities. Occup Ther Int. 2007;14(3):144-55.

61. Prellwitz M, Tamm M. Attitudes of key persons to accessibility problems in playgrounds for children with restricted mobility: a study in a medium-sized municipality in northern Sweden. Scand J Occup Ther. 1999;6(4):166-173.

62. Stanton-Chapman TL, Schmidt EL. Creating an inclusive playground for children of all abilities: west fork playground in Cincinnati, Ohio. Child Youth Environ.2017;27(3):124-137.

63. Stanton-Chapman TL, Schmidt EL. In search of equivalent social participation: what do caregivers of children with disabilities desire regarding inclusive recreational facilities and playgrounds? J Int Spec Needs Educ. 2019;22(2):66-76.

64. Wenger I, Schulze C, Lundström U, et al. Children's perceptions of playing on inclusive playgrounds: a qualitative study. Scand J Occup Ther. 2020 [cited 2020 Sep 9]; [11 p.]. DOI: 10.1080/11038128.2020.1810768

65. Connell B, Jones M, Mace R, et al. The principles of universal design. NC State University, The Center for Universal Design; 1997 [cited 2019 Oct 1]. Available from: https://projects. ncsu.edu/design/cud/about_ud/udprinciplestext.htm

66. Mace R. Universal design. Barrier-free environments for everyone. Los Angeles (CA): Designers West; 1985.

67. Imrie R. Universalism, universal design and equitable access to the built environment. Disabil Rehabil. 2012;34(10):873–882.

68. United Nations. The convention on the rights of persons with disabilities and optional protocol; 2007 [cited 2019 Jan 15]. Available from: https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html

69. Watchorn V, Hitch D, Grant C, et al. An integrated literature review of the current discourse around universal design in the built environment: is occupation the missing link? Disabil Rehabil. 2019:1-12.

70. Lid IM, Solvang PK. (Dis)ability and the experience of accessibility in the urban environment. Alter. 2016;10(2):181-194.

71. Watchorn V, Grant C, Tucker R, et al. Evaluating universal design in built environments – a scoping project. In: Craddock G, Doran C, McNutt L, et al., editors. Transforming our world through design, diversity and education. Proceedings of Universal Design and Higher Education in Transformation Congress; 2018 Oct 30 – Nov 2; Dublin. Amsterdam: IOS Press; 2018. p. 689-695.

72. Heylighen A, Van der Linden V, Van Steenwinkel I. Ten questions concerning inclusive design of the built environment. Build Environ. 2017;114:507–517.

73. O'Shea EC, Pavia S, Dyer M, et al. Measuring the design of empathetic buildings: a review of universal design evaluation methods. Disabil Rehabil: Assist Technol. 2016;11(1):13–21.

74. Lid IM. Universal design and disability: an interdisciplinary perspective. Disabil Rehabil. 2014;36(16):1344-1349.

75. Fernelius CL, Christensen KM. Systematic review of evidence-based practices for inclusive playground design. Child Youth Environ. 2017;27(3):78-102.

76. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005;8(1):19-32.

77. Peters MD, Godfrey CM, Khalil H, et al. Guidance for conducting systematic scoping reviews. Int J Evid Based Healthc. 2015;13(3):141-146.

78. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. Implement Sci. 2010;5(1):69.

79. Pham MT, Rajić A, Greig JD, et al. A scoping review of scoping reviews: advancing the approach and enhancing the consistency. Res Synth Methods. 2014;5(4):371-385.

80. Imrie R, Hall P. Inclusive design: designing and developing accessible environments. London: Spon Press; 2001.

81. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann Intern Med. 2009;151:264-269.

82. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77-101.

83. Ayatac H, Pola I. No "obstacles" in playgrounds that are not only accessible but also inclusive. Iconarp Int J Archit Plann. 2016;4(2):1-14.

84. Perry MA, Devan H, Fitzgerald H, et al. Accessibility and usability of parks and playgrounds. Disabil Health J. 2018;11(2):221-229.

85. Sterman JJ, Naughton GA, Bundy AC, et al. Planning for outdoor play: government and family decision-making. Scand J Occup Ther. 2019;26(7):484-495.

86. U.S. Consumer Product Safety Commission. Public Playground Safety Handbook. Bethesda (MD): CPSC; 2015.

87. Spencer AM. Accessibility and your playground: a profile of facilities taking action. Parks & Recreation. 2003;38:40-49.

88. Ståhl A, Carlsson G, Hovbrandt P, et al. "Let's go for a walk!": identification and prioritisation of accessibility and safety measures involving elderly people in a residential area. Eur J Ageing. 2008;5(3):265-273.

89. Nilsson I, Townsend E. Occupational Justice: bridging theory and practice. Scand J Occup Ther. 2010;17(1):57-63.

90. Cosbey J, Johnston SS, Dunn ML, et al. Playground behaviors of children with and without sensory processing disorders. OTJR (Thorofare N J). 2012;32(2):39-47.

91. Woolley H, Lowe A. Exploring the relationship between design approach and play value of outdoor play spaces. Landsc Res. 2013;38(1):53-74.

92. Fjørtoft I. The natural environment as a playground for children: the impact of outdoor play activities in pre-primary school children. Early Child Educ J. 2001;29(2):111-117.

93. O'Brien J, Smith J. Childhood transformed? risk perceptions and the decline of free play. Br J Occup Ther. 2002;65(3):123-128.

94. Wyver S, Tranter P, Naughton G, et al. Ten ways to restrict children's freedom to play: the problem of surplus safety. Contemp Issues Early Child. 2010;11:263-277.

95. Yuill N, Strieth S, Roake C, et al. Brief report: designing a playground for children with autistic spectrum disorders – effects on playful peer interactions. J Autism Dev Disord. 2007;37(6):1192-1196.

96. Herrington S, Lesmeister C. The design of landscapes at child-care centres: seven Cs. Landsc Res. 2006;31(1):63-82.

97. Shelley P. Everybody here? play and leisure for disabled children and young people: a contact a family survey of families' experiences in the UK [Internet]. London: Contact a Family; 2002 June [cited 2019 May 15]. 41 p. Available from: https://www.inclusivechoice.com/Everybody%20here%20-
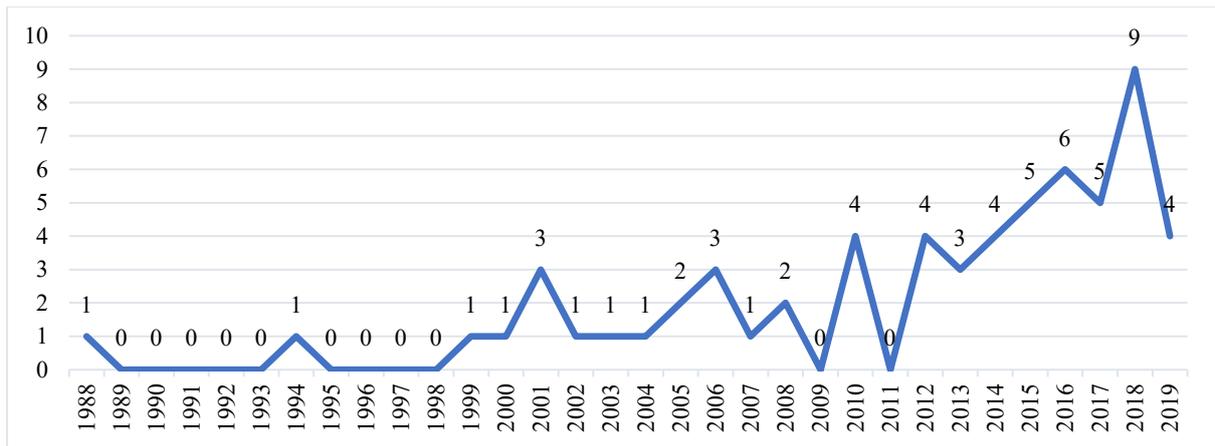
%20Play%20and%20leisure%20for%20disabled%20children%20and%20young%20p
eople.pdf

98. Terpstra JE, Tamura R. Effective social interaction strategies for inclusive settings. Early Child Educ J. 2008;35(5):405-411.

99. Attoh KA. What kind of right is the right to the city? Prog Hum Geogr. 2011;35(5):669-685.

100. Iwarsson S, Ståhl A. Accessibility, usability and universal design—positioning and definition of concepts describing person-environment relationships. Disabil Rehabil. 2003;25(2):57-66.

101. Manley S, de Graft-Johnson A, Lucking K. Disabled architects: unlocking the potential for practice [Internet]. Bristol: RIBA & Univ. of West England; 2011 Nov [cited 2020 Aug 29]. 156 p. Available from: https://uwe-repository.worktribe.com/output/958093/disabled-architects-unlocking-the-potential-for-practice

102. Lid IM. Developing the theoretical content in universal design. Scand J Disabil Res. 2013;15(3):203-215.

103. Grangaard S, Gottlieb SC. Opening the black box of accessibility regulation. In: Lill I, Witt E, editors. Proceedings of the 10th Nordic Conference on Construction Economics and Organization (Emerald Reach Proceedings Series, Vol. 2); 2019 May 7-8; Tallinn. Emerald Publishing Ltd; 2019. p. 365-370.

104. Cassim J, Dong H. Critical users in design innovation. In: Clarkson J, Keates S, Coleman, R, Lebbon C, editors. Inclusive design: design for the whole population. London: Springer; 2003. p. 532-553.

105. Brussoni M, Olsen LL, Pike I, et al. Risky play and children's safety: balancing priorities for optimal child development. Int J Environ Res Public Health. 2012;9(9):3134-3148.

106. Jones DB. Safe and fun playgrounds: a handbook. Am J Play. 2017;9:399-400.

107. Brennan A, Blanchard S, Scharn B, et al. The need for accessibility in playgrounds for children with disabilities. Am J Occup Ther. 2016;70(4):1-1.
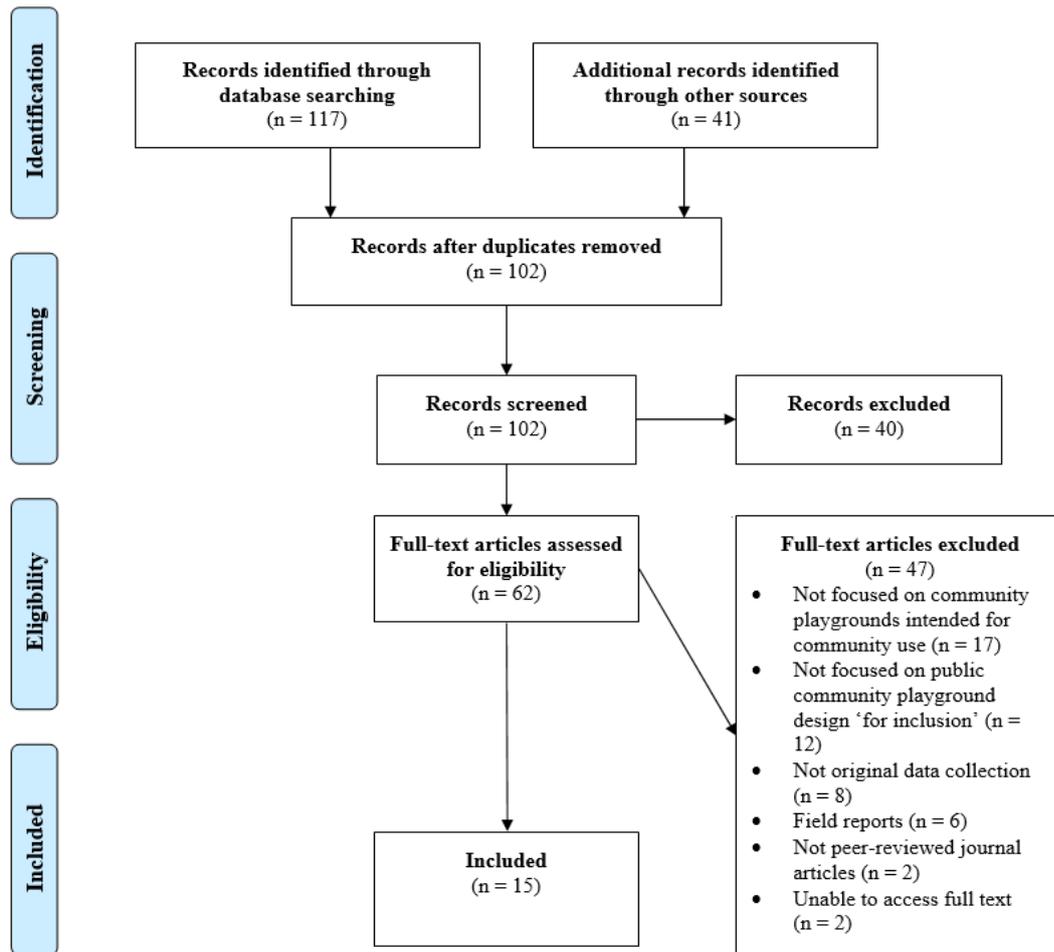
Figure Captions

Figure 1: Number of publications in the review period 1988 – November 2019 (n = 62)

Figure 2: PRISMA flow diagram [81] of study selection process

Figure 1: Number of publications in the review period 1988 – November 2019 (n = 62)

Figure 2: PRISMA flow diagram [52] of study selection process

Tables

Table 1: Primary and secondary search terms

Primary search terms		Secondary search terms
playground* OR "play space*" OR playspace* OR "outdoor play space*" OR "outdoor play environment*"	AND	universal* design* OR "barrier free design*" OR "design* for all" OR "building* for everyone" OR "access* design" OR "inclus* design*" OR "architect* access*"

Table 2: Scoping review study inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria

Included a focus on public playgrounds that are intended for community use.	Childcare/ pre-school/ school playgrounds not intended for community use. An assumption was made that such playgrounds were for private use only unless stated otherwise.
Included a focus on design methods which support inclusion in public playgrounds (see secondary search terms, Table 1). This could include the design of new /pre-existing playgrounds.	Included a focus on the technical aspects of design that do not translate to international contexts (for example, National Standards for safety).
Included a focus on design methods which support participation in public playgrounds as it relates to design for play (for example, Physical Activity as it relates to play).	Included a focus on participation for specific health related outcomes that do not relate to design for play (for example, physical activity for obesity/ BMI/ reducing sedentary behavior).
Included a focus on a review of literature AND/OR the perspective(s) of playground planners/ designers/ providers/ users in relation to accessibility/ usability/ inclusivity of public playgrounds.	Opinion pieces
Published in peer-reviewed journals	Not peer-reviewed journal articles (book chapters/ dissertations/ theses/ conference proceedings/ reports/ presentations/ posters/ magazine articles/ newspaper articles).
Written in English	Not written in English

Table 3: Geographical location of studies

Geographical location	Study reference no.	n (%)
Europe		
Sweden	[50,51,60,61]	4 (27)
Ireland	[43,44]	2 (13)
Turkey	[42,83]	2 (13)
United States of America (USA)	[38,54,55,75]	4 (27)
Canada	[52]	1 (7)
Australia	[85]	1 (7)
New Zealand	[84]	1 (7)

Table 4: Study designs

Data collection methods	Study reference no.	n (%)
Single method design		
Interview	[51,60,61]	3 (20)
Survey	[50,54,55]	3 (20)
Literature review	[43,75]	2 (13)
On-site observation	[38,83]	2 (13)
Mixed methods design		
Semi-structured interviews, document reviews and playground observations	[85]	1 (7)
Survey, policy review and a guideline review	[44]	1 (7)
On-site evaluation and classification of geographical deprivation	[84]	1 (7)
Interviews and expressive materials	[52]	1 (7)
Survey and evaluation of physical playgrounds using photos and a checklist	[42]	1 (7)

Table 5: Study populations (n = 1270)

Participants		Study reference no.	n (%)
Parents	Parents of children aged 12 and under with disabilities	[42]	667 (52.5)
	Parents of children aged 5 – 12 years with disabilities *(Visual impairment, multiple disabilities, intellectual disability, autism, mobility impairment, developmental delay, hearing loss, heart murmur)*	[51,52,61,85]	33 (2.6)
	Parents of children aged 14 – 15 years with disabilities *(Mobility impairment)*	[52]	3 (0.2)
Caregivers	Special education professionals (from birth to Grade 6) *(Autism, specific language impairment, developmental delay)*	[54]	303 (23.9)
	Caregivers of children aged 2 – 5 years with disabilities *(Specific language impairment, developmental delay, autism, orthopedic impairment, intellectual disability, other health impairment, behavior disorder, hearing impairment, learning disability)*	[55]	149 (11.7)
	Caregivers of children aged 7 – 11 years with disabilities *(Personal/ school/ educational assistant for children with mobility impairments)*	[52,61]	3 (0.2)
Children	Child participants aged 7 – 12 years with disabilities *(Mobility impairment, visual impairment, developmental disabilities)*	[52,60,61]	20 (1.6)
	Child participants aged 7 – 12 years without disabilities	[60]	5 (0.4)
	Child participants aged 14 – 15 years with disabilities *(Mobility impairment)*	[52]	1 (0.1)
Municipality reps.	Creators of playgrounds *(Landscape architect, Head of Parks Department, park technician, Head of Roads Department, Secretary for the Handicapped)*	[61]	5 (0.4)
	Municipality representatives	[50,85]	58 (4.6)
Other	Members of the Ludi 'Play for Children with Disabilities' COST Action network	[44]	18 (1.4)
	Not-for-profit organization representatives	[85]	2 (0.2)
	Caregiver with a disability	[52]	2 (0.2)
	Sibling of a child with a disability	[52]	1 (0.1)

Table 6: Summary of main findings

Reference and country	Year of publication	Physical design features and non-physical aspects of public playgrounds that facilitate outdoor play, social participation, and inclusion	Physical design features and non-physical aspects of public playgrounds that hinder outdoor play, social participation, and inclusion	Designing for outdoor play, social participation, and inclusion in public playgrounds
Ayataç & Pola [83], Turkey	2016	*Inclusive design features:* Convenient location, equitable access to the park (accessible pathways, ramps with optimal slope and width, stairs located where necessary), inclusive play equipment (e.g., swing for children with disabilities) within the play sections of the playground so children can play with peers (albeit limited), social amenities and green spaces. *For designers/ planners/ providers:* Authorities play an essential role in increasing awareness about disability-related issues and increasing acceptance among residents and society at large and need to pay attention to inclusive design criteria. *Research requirements:* Further research is required regarding children with disabilities opinions on and expectations from	*Barriers to users:* Lack of accessibility (ground surfaces such as sand, rubber and rammed earth, stairs at entrances) and lack of inclusive play equipment (inadequate dimensions and limited variety of items) precluded access to the playground space or parts of the structure resulting in limited/ unfair social opportunities (e.g. where inclusive play equipment exists, it is in isolation from the other equipment) and children requiring adult assistance to play.	Designs that comply with inclusive design criteria (7 principles of UD) should consider all children, including children with disabilities. Specifically, they should: • Be kept simple by eliminating unnecessary complexity and ensure the safety of users. • Ensure equitable access around and within the playground (including access to nearby amenities). • Include inclusive play options that are interesting and intensify the desire to play. • Include signage that addresses different learning styles. • Include equipment that enables children to maintain neutral body posture. • Provide enough space for children using assisting devices. • Include surface materials that are smooth to allow the use of wheelchairs. • Include paths with different characteristics and width so they can be used by children with different abilities.

playgrounds and the designs proposed should be grounded on the research performed.

Fernelius & Christensen [75], USA	2017	*Inclusive design features:* Circular playground design (ASD studies), equipment designed as commonly recognizable objects, inclusion of loose parts, accessibility features (wide entrances, accessible paths, accessible surfaces, enough space between pieces of equipment, ramps or transfer systems to access elevated items), specific areas (multi-niche settings where children are brought into close proximity, observation points where children can be alone and observe others' play before joining in, comfortable places such as large soft areas where children can move freely and feel safe) appropriate challenges and risk and sensory elements (sight, touch and sound). In addition to design, other factors include: the type of relationships children with disabilities have with both their peers and staff, the existence of playtimes, the individual routines of the children with disabilities, children's play and social behaviors, how a child with a disability is managed when moving to a new school, staff experience and training, providing lessons to help teach important	*Barriers to users:* Lack of accessibility (ground cover such as sand or gravel).	Public playgrounds should incorporate inclusive design principles that enable children of all abilities to play together. Specifically, this study found 10 evidence-based practices of playground design that support inclusive play for children with disabilities. These include: 1. Circular playground design that links complementary activities. 2. Playground equipment designed as common and recognizable objects. 3. Loose parts on the playground such as various props for imaginative play, playhouses and tables, sporting equipment, sand toys, musical instruments, and water play opportunities. 4. Accessible surfacing and enough space for maneuvering between and on pieces of equipment. 5. Equal amounts of elevated and ground level items for gathering in groups, and more ramps or transfer systems to access elevated items. 6. Multi-niche settings (equipment/ activities that require more than one child to operate or play). 7. Equipment that provides appropriate levels of challenge and risk for children of all abilities. 8. Observation points or "jump in" points.

	skills for playing, and children with disabilities having extra time outside or being brought out at the very beginning of the recess period so that they have a better chance of being included. Training should be provided to caretakers, playground staff, and teachers on how to effectively integrate children with and without disabilities.		9. Comfortable or "cozy" places, often created by enclosed areas or pieces of equipment. 10. Sensory stimulus activities and visual or tactile cues throughout playground.
Lynch et al. [44], Ireland	2018	*Inclusive design features for users:* Regular and accessible pathways leading to all elements in the playground, enough space to access and use play items, provision of alternative routes (such as a ramp) to access the highest point in the playground, provision of inclusive equipment (catering for different sizes and abilities such as swing seats, equipment with recognizable design), design that is simple and easy to understand and accommodates different play preferences and styles (cognitive, sensory, motor and social needs), spaces that accommodate simple repetitive play for children that desire it, appropriate challenges and risk, minimize hazards and maximized safety (contrasting colors, inclusion of boundaries such as fencing, landforms or low hedging), design for low physical effort, space to interact socially and meet up with friends. *Barriers to users:* Lack of accessibility (absence of pathways leading to play items, lack of alternatives to climbing to access the highest point in the playground), inaccessible play equipment (swings lacking alternative designs such as back and side supports, play equipment that was too small), design for high physical effort (users having to expend unnecessary effort to access or use the playground), segregated or stigmatizing design, complex design and lack of safety (absence of fencing), precluded access to the playground space or parts of the structure resulting in limited/ unfair social opportunities and children requiring adult assistance to play. *Barriers to designers/ planners/ providers:* children's play as an inter-departmental responsibility, funding, and few national		Taking on the challenge of applying UD in designing for play is an important endeavor to move forward in establishing good practice in inclusive playground provision. The general aim is to avoid design solutions specifically intended for use by people with disabilities to prevent the creation of separate or stigmatizing environments. Ideas of how the 7 principles of UD could be considered alongside play value principles to guide best practice include: 1. Equitable use: need to design for challenge and complexity that caters to people of different ages and abilities, resulting in equality of experience. 2. Flexibility in use: need to design for variety to satisfy people's individual play preferences and styles. 3. Simple and intuitive use: need to design stimulating play spaces that offer opportunities for adventure and excitement.

		policies exist in the European context that address children's play, the inclusion of children in designing for play, or the provision of inclusive play through UD.	4. Perceptible information: need to design play spaces that encourage users' natural curiosity.
			5. Tolerance for error: need to design risk-rich play spaces that afford users the opportunity to participate in challenging and risky behavior without being exposed to overly dangerous activities or risks.
		Research requirements: Further research is required from the user's perspective, as families of children with disabilities have rarely been involved in researching their preferences on this issue.	6. Low physical effort: need to design play spaces to provide for active play, while minimizing unnecessary fatigue.
			7. Size and space for approach and use: need to design play spaces that offer appropriate size and space to accommodate everyone and facilitate participation in the play space.
Moore & Lynch [43], Ireland	2015	*Inclusive design features for users:* Recognizable design features have been identified as more usable, and swings reported as the most usable play items in the playground environment.	• Universal design has the most potential for underpinning the design of publicly funded playgrounds due to its philosophical congruence with the principles of equity and inclusion [35].
		For designers/ planners/ providers: Legislation, policies and standards need to be established to determine what an accessible playground is or should be to enable children to access the social environment on equal terms with peers.	• The involvement of playground users in the designing and planning of playgrounds is an invaluable and under-utilized resource to maximize the inclusion of all children in the playground. In addition, occupational therapists are equipped with the skills and knowledge to advocate for children's occupational right to play and have a crucial role to play in the planning, design, and provision of playground environments.
		Barriers to users: Lack of accessibility (ground cover, inaccessible routes and lack of car parking areas close by), inaccessible elevated play items (lack of ramps and transfer systems), ground-level items lack diversity of experiences for children, age appropriateness of playground environments (inability to meet the needs of younger and older children in one setting), and lack of safety (shade, high traffic), precluded access to the playground space or parts of the structure resulting in limited/ unfair social opportunities and children requiring adult assistance to play. Other factors include: socioeconomic status and place of residence can determine the availability and accessibility of	

			playgrounds, children with disabilities having to attend special schools to access services can result in their exclusion from local playground environments due to lack of local friends. *Barriers to designers/ planners/ providers:* Lack of adequate policy and legislation, poorly administered systems of management, attitudinal barriers among fund holders and policymakers, insufficient knowledge of design for consideration of children with disabilities.	
Olsen & Dieser [38], USA	2012	*For designers/ planners/ providers:* Social policies need to be established with a commitment to provide inclusive outdoor playground spaces, responsibility of park and recreation staff to learn about competencies related to people with disabilities, such as UD and playground accessibility.	*Barriers to users:* Lack of accessibility (ground cover such as woodchips or sand, inaccessible routes, designated accessible parking) imbalance between the amount of elevated and ground-level play items, insufficient ramps and transfer systems to access elevated play items and lack of safety (shade) precluded access to the playground space or parts of the structure. *Barriers to designers/ planners/ providers:* Insufficient knowledge of design for consideration of children with disabilities.	• Attention should be given to accessibility early in the playground design process so that activities designed for accessibility provide easy access for and use by wheelchairs [87]. • Accessible structures or trees that protect participants from exposure to the sun are critical items for public playgrounds. Offering places of shade can prevent heat stress, heat stroke or heat exhaustion.

| Perry et al. 2018 [84], New Zealand | *Inclusive design features for users:* Inclusion of play items (full body support swings, side-by-side slides), support items (accessible car park spaces, accessible routes, seating near the play area, push button to open restroom doors), safety (fencing).

For designers/ planners/ providers: Legislation needs to be established so that minimum standards are enforced. | *Barriers to users:* Lack of accessibility (car parking spaces, inaccessible routes, high curbs, narrow path widths, irregular path surfaces, lighting), insufficient ramps and transfer systems to access elevated play items, lack of inclusive play equipment (swings capable of fully supporting the user, stimulation for all senses), no area for children and parents that was less stimulating and lack of safety (tactile markings on pathways, fencing, color contrast to demarcate different heights and fall zones) precluded access to the playground space or parts of the structure. Other factors such as a lack of inclusive support items (arm rests on seats, insufficient restroom availability and lacking inclusive features such as automatic doors, drinking fountain availability and capable of serving seated and standing users), socioeconomic status and place of residence can determine the availability and accessibility of playgrounds.

Barriers to designers/ planners/ providers: Lack of adequate legislation. | Parks need to be accessible and usable by all people across the lifespan, including persons with disabilities. Specific design recommendations include:

• Provision of support items (accessible car parking spaces), play items that provide for auditory, tactile, visual and olfactory stimulation (telescopes, structures with mirrors, high contrasting colors, lights, bells, chimes, talking tubes, sand, plants and flowers are particularly relevant to persons with disabilities as they require minimal physical ability to use and create a range of learning experiences), inclusive play items (full body support swings, side-by-side slides, safety (the installation of fencing should be considered following a risk assessment of hazards, considering all age groups, installation of appropriate lighting in multi-purpose areas [including playgrounds] would better encourage evening use for older children and adults).
• Involving persons with disabilities in the planning and design of parks and playgrounds has been shown to maximize participation and enjoyment in using such recreational environments [52,88]. |

Prellwitz & Skär [60], Sweden	2007	All children described playgrounds as a place everyone knew very well and would miss if it did not exist and valued playgrounds for social interaction with peers. They were also seen as an important place to have private conversations, meet friends, or make new friends as well as a space to seek challenges and risks. *Inclusive design features for users:* Swings were described as the most important and usable play equipment, play equipment with recognizable design (such as a house, car, boat, or an animal) promoted role-playing.	*Barriers to users:* For children with disabilities lack of accessibility (ground cover such as sand), play equipment too small (to maneuver around with assistive devices and use), playgrounds located too far from school buildings, lack of simple play equipment, lack of safety (color contrast to demarcate heights and fall zones) and fear of being teased by peers precluded access to the playground space or parts of the structure, adult assistance required to play for children with disabilities. For all children, factors such as limited play items with recognizable design that hold the children's interests for a longer period and changes in their playground (such as removal of play items) made the playground less usable.	• Playgrounds should incorporate UD principles so that children with different abilities can fully enjoy and participate in outdoor play activities. • Instead of concentrating only on playground equipment, measurements, and meeting accessibility standards, it is important to design opportunities for interaction. Incorporating play items with recognizable design not only promote fantasy and role-playing but might encourage more social interaction between children. The children expressed wishes for benches, houses and other equipment at the playground that would support private conversations. • Occupational therapists, with their knowledge of environmental barriers, understanding of disability and specific knowledge of activities, are in an ideal position to develop and maximize play activities on playgrounds and to increase their accessibility and usability.
Prellwitz & Skär [51], Sweden	2016	*For designers/ planners/ providers*: There is a need to include parents and children with disabilities as active consultants when formulating policies and laws for accessible playgrounds [4].	*Barriers to users:* Lack of accessibility (ground cover, narrow opening in fences, equipment requiring a lot of climbing), lack of simple play equipment (such as moveable toys or houses, does not require a lot of climbing), lack of safety (color contrast) and segregated design precluded access to the playground space or parts of the structure resulting in limited/ unfair social opportunities and children requiring	• Advocate for playgrounds built in accordance with UD concepts to promote participation and inclusion. • Provision of an accessible playground (part accessibility results in embarrassment, accessible entry points, design opportunities for interaction with peers), inclusion of simple equipment (such as moveable toys or playhouses for cooperative play, require less climbing), color contrast (for safety and independence).

		adult assistance to play. Additional factors such as disabilities inherent to the child resulted in accessibility barriers. Moreover, increased age and requiring adult assistance to play meant that children with disabilities felt embarrassed, had limited/ unfair opportunities, were denied opportunities to make friends and be independent, and subsequently avoided visiting playgrounds. *Barriers to designers/ planners/ providers*: Insufficient knowledge of design for consideration of children with disabilities	• Change is needed in the way playgrounds are built – society should be responsible for ensuring change occurs not just parents of children with disabilities. • Occupational therapy can contribute through the profession's knowledge of human functioning, disability, and the person-environment interaction by combining population and individualized approaches [89].
Prellwitz & Tamm [61], Sweden	1999	*For designers/ planners/ providers*: Some suggestions were offered that could bring about better knowledge of adaptation. These included: more training of design for consideration of children with restricted mobility and increasing competence by acquiring assistance from other professional groups (e.g. occupational therapists).	*Barriers to users:* Lack of accessibility (ground surfaces such as sand, narrow openings in fences, a ditch surrounding the playground) and inaccessible equipment (routes, height of swings, climbing frame and slide) precluded access to the playground space or parts of the structure resulting in limited/ unfair social opportunities and children requiring adult assistance to play. Moreover, increased age and requiring adult assistance to play meant that children with disabilities avoided visiting playgrounds.	• Change the ground surfacing by extending pathways so that children can get into the playground and get to the play equipment, accessible surfacing (tiles), support features on play equipment (such as supporting rails).

		Barriers to designers/ planners/ providers: Disorganization, insufficient knowledge of design for consideration of children with restricted mobility, costs of designing playgrounds for children with disabilities and attitudes (provision for children with disabilities either not prioritized or not considered because of a lack of awareness).	
Prellwitz et al. [50], Sweden	2001	*For designers/ planners/ providers*: Designers wished for more knowledge of design for consideration of children with restricted mobility. Institutional barriers can be overcome, but this requires that decision makers observe the views of those with limited mobility.	*Barriers to users:* Lack of accessibility (gate difficult to open, gate too narrow, ground surfaces such as sand or gravel, uneven ground, steep gradients, borders in the form of half-buried logs or enclosures with narrow openings) and lack of accessible/ inclusive play equipment (no ramps leading to the play equipment, equipment not designed for children with restricted mobility) precluded access to the playground space or parts of the structure resulting in children requiring adult assistance to play.

Barriers to designers/ planners/ providers: Disorganization, insufficient knowledge of design for consideration of children with restricted mobility, costs of designing or rebuilding playgrounds for children with disabilities and attitudes (provision for | |

			children with disabilities either not prioritized or not considered).	
Ripat & Becker [52], Canada	2012	Families valued playgrounds for child's enjoyment, imagination, and being a part of the social/family experience. *For designers/ planners/ providers:* Families, children and caregivers have valuable information to share about designing usable playground spaces. Moreover, occupational therapists can play a role in advocating for the development of usable playgrounds. *Research requirements:* Future research needs to examine whether and how usable spaces influence inclusion, play and social opportunities from a child-centered perspective.	*Barriers to users:* Lack of accessibility (ground surfaces such as sand, gravel, grass and boards/railway ties), lack of usability (where a ramp might exist there were no play opportunities at the top of the ramp), and lack of safety (shade) precluded access to the playground space or parts of the structure resulting in limited/ unfair social opportunities (e.g. segregation via dual methods of accessing items) and children requiring adult assistance to play.	• Specific features that promote access include accessible surfacing, ramps, pathways, singular usable methods of accessing play items, access to shade. • Inclusivity could be actualized in a playground by considering design-for-disability. Inclusivity was consistent with the principles of UD, specifically the principle of equitable use. • A usable place brings children together to play in a way that promotes social inclusion through increasing other children's, and society's in general, awareness of disability-related issues. • The development of usable spaces for children to play is within the scope of occupational therapists' work.
Stanton-Chapman & Schmidt [54], USA	2016	*For designers/ planners/ providers:* Invite families who have children with disabilities, special education teachers and related services providers (e.g., speech-language pathologists, occupational therapists, physical therapists), physicians, and policymakers to product development meetings. Eliminate or limit the sales representative's profit to be made from	*Barriers to users:* Lack of accessibility (surfacing that slows children down, ground cover such as woodchips, ramps), lack of usability (where a ramp might exist there were no play opportunities at the top of the ramp), uninteresting environment, lack equipment that challenges children, lack of equipment for younger children (< 5	Demand playground developers and playground equipment companies to go beyond what is minimally required by law (ADA) and focus instead on meeting the principles of UD so that every child is welcomed, and benefits physically, developmentally, and socially.

		the sale of playground equipment. Require playground equipment designers to take child development and special education professional development courses, so that they have the knowledge needed to create equipment that is sociable and playable for children of all abilities.	years), lack of activities the student likes and keeps them engaged for extended periods of time and lack of safety (inappropriate play equipment) precluded access to the playground space or parts of the structure resulting in limited/ unfair social opportunities (e.g. segregated design) and children requiring adult assistance to play. *Barriers to designers/ planners/ providers:* Poor enforcement of international and national policies at the community level, building play spaces that comply with the minimum accessibility.	Specific recommendations include: • Design for sociability (opportunities to interact socially with peers) and playability (opportunities to participate in play). • Need to focus on young children (<5 years) with disabilities when developing new playgrounds paying attention to developmental play and the type, scale, and layout of equipment. Include areas to crawl, low platforms with multiple access such as ramps and ladders, ramps with pieces attached for grasping, low tables for sand, water and manipulation of materials, tricycle paths with various textures, flexible spring rockers, sand areas with covers, and shorter slides [86]. • Incorporate activities that involve vestibular, proprioceptive, and tactile input. • Provide for the sensory needs of children (sandbox, musical equipment, architectural panels consisting of vibrant colors and pictures for visual needs or varying textures for tactile needs, and potent smelling plants for olfactory needs) [90]. • Incorporate programs, such as peer buddies/ trained playworkers on playground settings to help children with disabilities play.
Stanton-Chapman &	2017	Caregivers pursue social participation recreational activities (e.g. visiting the	*Barriers to users:* Lack of accessible equipment (ground level activities not as	Go beyond what is minimally required by law (ADA) when building playgrounds for

Schmidt [55], USA

playground) for their toddler or preschool child with disabilities.

For designers/ planners/ providers: Legislation at the national and local levels are fundamental in facilitating social change to improve playgrounds for children aged 2 – 5 years. Caregivers, advocacy organizations and special education professionals must serve as the 'voice' in public discourse to make change happen.

fun), lack of age-appropriate opportunities (not catering for <5 years), inclusive playgrounds built for older children despite signage stating that it is suitable for children aged 2+, uninteresting, lack of safety (falls from equipment, older children who are larger than toddlers and preschoolers), segregation, fear of teasing/ bullying, feeling frustrated or embarrassed (attitudes of other caregivers toward disability-related issues; need for parents to educate their children on accepting children with disabilities).

Barriers to designers/ planners/ providers: Limitations of civil rights policies, poor enforcement of international and national policies at the community level, building play spaces that comply with the minimum accessibility, limited funding, societal prejudices.

children of ages 2 – 5 years and include the principles of UD [65]. This means that all children are able to play together on the playground, they can play with the available equipment in a way that works best for them, the playground is safe for all children, and the playground requires low physical effort to access.

Specific recommendations include:

- Include an inclusive playground for young children (2 – 5 years) only (build a new area for younger kids or fence off an area).
- Include play equipment for children aged 2 – 5 years: areas to crawl, low platforms with multiple access such as ramps and ladders, ramps with pieces attached for grasping, low tables for sand, water and manipulation of materials, tricycle paths with various textures, flexible spring rockers, sand areas with covers, and shorter slides [86].
- Include play equipment for children aged 5 years and over: rope or chain climbers on an angle, climbing pieces, slides and sliding poles, and horizontal bars [86].
- Include sensorimotor opportunities (music equipment, sandboxes, sensory gardens).
- Include opportunities for children with disabilities to develop friendships (YMCA doing a team building activities to encourage [typical] children to play with children with disabilities).

			• Provide a peer support network for caregivers who have a child with a disability to enhance caregiver self-esteem and social functioning. • Need for parents to educate their children on accepting children with disabilities.
Sterman et al. 2019 [85], Australia	Parents actively planned for and supported their children's outdoor play participation, families valued parks and playgrounds that are well designed and everyone uses it (e.g., sand pits that accommodate wheelchairs), playgrounds within walking distance, community support (inclusion and acceptance). *For designers/ planners/ providers:* Valued playgrounds as community meeting spaces, educational campaigns around disability awareness and stigma reduction, consultation with communities about preferences and needs and integrating social interaction into a playground to support feelings of acceptance. Government should support familial and community agency to advocate for their own needs. *Research requirements:* Future research should seek to understand local government	*Barriers to users:* Lack of accessibility (getting there is too hard), lack of usability, absence of design elements to support social or physical inclusion, accessible playgrounds deemed unenjoyable or uninteresting, social stigma. *Barriers to designers/ planners/ providers:* Insufficient knowledge of design for consideration of children with disabilities (other than physical disability), building play spaces that comply with the minimum standards (safety and disability access), interpretation and implementation of safety standards (limiting nature play, sterile and uninteresting environment), budget (provision and adaptation of playgrounds), attitudes (provision for children with disabilities either not prioritized or not considered, Western view of disability), lacked sensitivity to the culturally and linguistically diverse nature of the	When communities are involved in design then they feel more ownership, and the resulting park is more likely to meet or exceed their expectations. Local governments must solicit family perspectives in ways that are meaningful to them and on engage in topics relevant to their lives. Health providers such as occupational therapists can play a key role in this process. Rather than only addressing physical access to a minimum requirement, government can support social inclusion in playgrounds in several ways. Specific recommendations include: • Spaces that are truly natural can increase creativity [91] and physical accessibility [92] and decrease maintenance costs. • Fences can provide barriers that ameliorate parental fears around children being injured by traffic, which is not restricted to children with disabilities [93,94].

	organizational structures, and determine the decision-makers in relation to children's services	community (challenges with community engagement).	• All children may need spaces within the playground to retreat to when overwhelmed [95]. • Materials and equipment that support social interaction and challenge across developmental levels (e.g. construction, pushing large items for cooperative play, water, or sand play) may support continued engagement [23,96] • To support a sense of community belonging with families, playgrounds should offer structural support such as family bathrooms with large changing tables, shade, and picnic tables [97].
Talay et al. 2010 [42], Turkey	Families pursue visiting playgrounds for their child with disabilities and encourage their children to play with other children. *For designers/ planners/ providers:* Legislation regarding physical environment should be carefully implemented. Local governments should be supported through scientific/ academic studies and financially. Local governments should be informed about disability-related issues as they pertain to playground design. There is a need to bring persons into contact that possess knowledge as well as users.	*Barriers to users:* Lack of accessibility, lack of safety, lack of municipal support, lack of inclusiveness, others' negative views of disability (communities lack of information, education, and awareness), perceptions of not being accepted, limited/ unfair social opportunities. *Barriers to designers/ planners/ providers:* Insufficient knowledge of design for consideration of children with disabilities.	Playgrounds should meet the needs of all children, enable, and enhance social participation. This can be done by developing inclusive approaches in designing the playgrounds. Specific recommendations include: • Design for social interaction and playability (accessible playground equipment). • Never target the creation of spaces designed specifically for children with disabilities but make suitable the existing spaces for common use. • Accessible paths should lead to the playground. Accessible surfacing such as rubber tiles rather than gravel or sand.

	• Effective interventions to increase the social interactions between children with and without disabilities must be developed and implemented in playgrounds [98].
	• Some physical and social barriers exist; determining these barriers will help to increase possibilities and afford children the right to play in an environment without such barriers.
	• Playground toys should be safe, durable, versatile and accommodate different ages, abilities, and interests [40]. Playground toys should encourage social interaction.
	• Awareness rising and changing attitudes of the children without disabilities towards children with disabilities.