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Applying universal design to playgrounds: expert perspectives

Ines Wenger[a,b,c,d], Christina Schulze[c], Helen Lynch[b] and Maria Prellwitz[a]

[a]Department of Health, Education and Technology, Luleå University of Technology, Luleå, Sweden; [b]Department of Occupational Science & Occupational Therapy, University College Cork, Cork, Ireland; [c]School of Health Sciences, Zurich University of Applied Sciences, Winterthur, Switzerland; [d]Laboratoire de recherche santé-social, University of Applied Sciences and Arts Western Switzerland, Lausanne, Switzerland

ABSTRACT

Playgrounds are essential for providing for children's right to play, yet often contain barriers that affect all children, including those with disabilities. To address these challenges, human rights and standards documents advocate for inclusive playgrounds using a Universal Design (UD) approach. However, expertise on applying UD to playgrounds remains scarce. Therefore, the current study aimed to identify experts' experiences and strategies for applying UD in playgrounds. Six UD experts were interviewed using a go-along method at four playgrounds located in Dublin, Ireland. Experts demonstrated a shared understanding of UD, emphasising strategies like adapting environments to children's diverse needs, fostering teamwork, and creating a positive social atmosphere. Natural elements played a central role, benefiting both children and the community. Importantly, participants did not aim to apply UD to each playground component but to the whole playground environment. In this way, play challenges and social inclusion for diverse users could be maximised.

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Introduction

The right to play is a universal right of every child (United Nations, 1989), but is often constrained by inadequate play spaces in terms of quantity and quality (Committee on the Rights of the Child, 2013). Playgrounds are outdoor spaces designed to facilitate children's play, that typically contain specific equipment for play (Woolley & Lowe, 2013). Access to playgrounds is influenced by physical factors such as traffic, location, proximity, and within playgrounds by the usability of equipment for children of different ages and abilities (Gemmell et al., 2023; Moore & Lynch, 2015), as well as social factors including perceived safety, community attitudes, and knowledge of social rules (Sterman et al., 2019; Wenger, Prellwitz, et al., 2023).

General Comment (GC) No. 17[1] (CRC, 2013, p. 9) highlights the importance of 'accessible and inclusive environments' for all children, especially those with disabilities, promoting the concept

CONTACT Ines Wenger ines.wenger@hetsl.ch.
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of inclusive playgrounds. Such inclusive playgrounds address physical accessibility and usability, and foster social inclusion by aiming to enhance social interactions and provide diverse play opportunities that cater to children's different preferences and play style (Casey & Harbottle, 2018; Joint Children's Play Policy Forum and UK Play Safety Forum, 2022). The concept of play value, which reflects the play opportunities afforded by a playground that enables children to engage in play in a variety of ways, is integral to inclusive playground design (Woolley & Lowe, 2013; Yuen, 2016).

To address the need for inclusive play environments, GC No. 17 proposes the application of Universal Design (UD) (CRC, 2013). UD describes an approach of designing 'products, environments, programmes and services' for the broadest range of people 'without the need for adaptation or specialized design' and the overarching aim of social inclusion (United Nations, 2006, p. 4). Seven principles of UD[2] were developed to specify the application of UD and to provide a kind of a guideline for its implementation, with each principle having four sub-points (Story, 2011). However, the principles have been critiqued to lacking clarity and evidence, and for having shortcomings in relation to the social dimension of UD (Steinfeld et al., 2012). To address these issues, the eight goals of UD[3] were introduced to clarify outcomes, enhance evaluation, and incorporate social aspects (Steinfeld et al., 2012).

Yet despite its endorsement in standards that are intended to support the design of products, goods, and services, like EN 17161:2019 (European Standard, 2019), and the built environment, like EN 17210:2021 (European Standards, 2021), based on the principles of UD, implementing UD in playgrounds continues to face challenges. One challenge concerns the inconsistent understanding of the concept of UD. For example, in a scoping review of UD and playgrounds, Moore et al. (2023) identified prevailing ambiguity about the meaning of UD, where it was often limited to ideas of accessibility rather than encompassing broader inclusive design. In another study similar confusion was evident alongside varying interpretations of inclusion and designing for inclusion, ranging from focusing exclusively on people with disabilities to creating spaces for people of all ages and abilities or fostering a sense of belonging (Wenger, Prellwitz, et al., 2023). Similar, at the implementation level, challenges existed such as a lack of clarity on how to apply UD in playground design (Moore, Lynch, et al., 2022b). Furthermore, few guidelines directly or adaptively apply the seven principles of UD to playgrounds (Lynch et al., 2018). Finally, while some resources and guidelines exist, there is limited evidence on the effectiveness of using a UD approach (Moore, Boyle, et al., 2022).

To address these challenges, several studies highlight the need for educational materials, good practice guides, and a national or regional specialist department to support playground planners and designers in applying UD (Moore, Lynch, et al., 2022a). Achieving this requires policies (Wenger, Prellwitz, et al., 2023) and national guidelines on inclusive playgrounds (Lynch et al., 2018, 2020). To strengthen guidelines, Lynch et al. (2018) initially proposed the need to combine the seven principles with play value and in the evolution of this work, Moore, Boyle et al. (2022) developed a UD for Play framework, based on UD for Learning, to enhance its application in playground design. UD for Learning aims to accommodate different learning styles through diverse forms of engagement, representation, action and expression (*Universal Design for Learning / CAST*, 2025). Similarly, as a new and emerging concept, UD for Play applies the principles of UD to the design of public play environments, emphasising co-design with a wide range of users and experts and focusing on issues of accessibility, play opportunities and quality of stay (Moore, 2022).

Thus, it seems that challenges such as conceptual ambiguity, lack of knowledge, inadequate resources, and negative societal attitudes hinder UD implementation and the provision of inclusive playgrounds. Addressing the gap between UD concepts and practical application, this study addresses the following research question: What are experts' experiences and strategies for applying UD in playground design?

Materials and methods

Design

The qualitative study collected data via interviews with experts (Bogner et al., 2018) using a go-along method (Kusenbach, 2003) in a naturalistic setting. Expert interviews draw on specialised expertise, often in the interviewee's professional domain, making them an effective method to gain expert insights (Bogner et al., 2018). Expert interviews are often supplemented with other qualitative methods to contextualise information and ensure triangulation (Bogner et al., 2018). As knowledge about UD and its application in the built environment is closely linked to the tangible physical elements affecting invisible non-tangible aspects (e.g. social inclusion, societal attitudes), the go-along method was chosen to complement the expert interviews. The go-along method is an interview technique, in which the interview is conducted on the move or mobile, e.g. on a walk (Kusenbach, 2003). In this way, the go-along method adds the value of being in the physical environment of the playgrounds and is particularly suited to eliciting knowledge and stimulating discussion about aspects that are not visible in a desk-based interview (Jørgensen, 2016; Kusenbach, 2003). Documenting the interplay between participants and the environment, photos were taken of discussed elements, supplementing verbal data (Finlay & Bowman, 2017).

Study context

Four community playgrounds embedded in parks across Dublin's province of Leinster were selected. Inclusion criteria required playgrounds to demonstrate UD principles and remain accessible to the public. Two parks were urban, and two were suburban, each featuring a mix of built equipment and natural elements catering to diverse abilities. The playgrounds, averaging 5,650 m^2, were selected by the assistance of a centre of excellence for UD located in Dublin and with expertise in UD (serving as the study's gatekeeper). The gatekeeper identified these sites as exemplary models of UD in practice. The use of UD for play infrastructure is promoted both in the Dublin City Development Plan 2022 – 2028 (Dublin City Counsil, 2022) as well as the Dublin City Play Strategy 'Pollinating Play!' 2021 – 2025 (2021). The playgrounds were designed to maximise inclusion for children with diverse disabilities, for example including play components for sensory and movement experiences (for examples see Table A1).

Participants

Participants were recruited using purposive sampling to ensure their expertise in UD and playground design (Solarino & Aguinis, 2021). The gatekeeper initially contacted three experts, who then referred three additional participants, whose contact details were forwarded with permission to the first author. The expert status of the participants was defined in terms of their experience with UD and play, which included both practical and theoretical UD knowledge (Bogner et al., 2018; Hoffman et al., 1995) as users and involvement in playground provision for children with diverse needs.

Similar to Rivera et al. (2021) the first author contacted these participants via email and sent information about the study, the informed consent form and a link to a survey for the collection of demographic information, including the opportunity to discuss any questions about the study with a member of the research team. Six participants participated in the study (see Table 1).

Data collection

Procedure

The go-along expert interview was pilot tested first by the first author on urban community playgrounds in Switzerland. From the tests it became clear that the interviewer should take the

Table 1. Characteristics of playgrounds and participants.

Sites	Park A		Park B		Park C	Park D
Location	South Dublin		South Dublin		Dublin City	Dublin City
Size of playground (m^2)	12'000 m^2		5000 m^2		4000 m^2	1600 m^2
Participants						
Name	John	Mary	Luke	Catherine	Sarah	Michael
Age (years)	48	52	17	N/A*	46	44
Profession	Landscape architect	Disability Liaison, Access and Equality Officer	Student in compulsory education	N/A*	Architect and landscape architect	Landscape architect
Work experience (years)	15-20	> 20	N/A*	N/A*	15-20	> 20
Experience with UD (years)	10-15	> 20	15-20	N/A*	15-20	10-15
Received education in UD (yes/no)	no	no	no	no	no	no

Note. Participants' names are pseudonyms. Average age of participants was 41 years ($SD = 12.5$). N/A: not available, indicating that participants did not provide information.

photos, as the pilot participants were so involved in the go-along expert interview that they tended to forget to take them. Before the go-along expert interviews began, participants were introduced into the study procedure to familiarise them with the go-along expert interview method.

Data were collected during four visits in one week in February 2023 on different playgrounds selected by the gatekeeper and took place either in the mornings or in the afternoons. Participants either engaged alone or in groups of two in the expert interviews, which were conducted using the go-along method in the form of a walk through the playgrounds. The go-along expert interview covered topics like UD principles, natural elements, and playground design processes. Interview questions were open-ended or semi-structured. Each data collection event lasted one hour on average and was audio-recorded. Reflective practices, including post-interview discussions within the research team and journaling, supplemented data collection.

Data analysis

The go-along expert interviews were transcribed using a transcription service, then reviewed for accuracy and pseudonymized by the first author. The photos were used for elicitation so therefore were not part of the data analysis. Data were analysed using NVivo (Version 14) for qualitative content analysis (Graneheim & Lundman, 2004) which is a suitable method for analysing expert interviews (Döringer, 2021). First, meaning units were identified in the transcripts. Next, the meaning units were condensed to their essence, resulting in so-called condensed meaning units. Then, the condensed meaning units were coded. In a fourth and final step the codes were grouped and finally, three themes were identified from the code groups.

To enhance trustworthiness, triangulation was applied through regular co-author discussions (Graneheim et al., 2017). Furthermore, a form of 'member reflections' described by Tracy (2010, p. 844) was done once the preliminary findings were identified, to seek further participant feedback on the authors interpretation of the data (Birt et al., 2016; Motulsky, 2021; Tracy, 2010). Participants received an email with a summary of the identified themes (developed in accordance with Birt et al. (2016)), and were invited to provide feedback on how accurately the themes captured their perspectives. Their feedback was then incorporated in further analysis of the themes, providing further insights on some aspects. The authors considered the process of member reflections to be in line with the underlying beliefs of user involvement in UD.

Results

The analysis of the go-along expert interviews showed that the experts shared a common understanding of UD in relation to playgrounds. In summary, the experts understanding of UD seemed to be based on three core values, each of which seems to lead to a rewarding outcome. Experts agreed that when UD is applied, the outcome is that everyone is happier – the children, the parents, the grandparents, and the designers themselves.

The first core value was that UD should accommodate everyone and lead to the outcome that by applying UD, solutions are created that are more usable for a wide range of people. The second core value was that UD should bring people together, and as an outcome, create meeting points in the neighbourhood. The third core value was that UD should be informed by the lived experiences of people who use it, and as an outcome, contribute to an understanding of inclusion in the society.

The three core values are each described in more detail below as different themes, including the strategies identified for implementing them through design and how they relate to the principles or goals of UD. A list of these strategies and their mapping to the UD principles and goals, illustrated with examples, is provided in the online appendix in Table A1.

Design to accommodate everyone: 'Universal is universal.'

One core value identified from the go-along expert interviews was that UD should accommodate everyone, regardless of ability, ethnicity, language, gender or age and enabling equitable play experiences for every child. The experts explained that their idea of equitable play means providing play opportunities for every child in different ways, but not in the sense that every child can do everything. Experts awareness between the differences of accessibility and usability, and the diverse needs of children, including children with various disabilities was shown by experts explaining that they aimed to design for a range of different play experiences, including risky play, creative and imaginative play, sensory experiences through play, and places to hide or retreat. This core value was informed by expert's experiences of advocacy for the rights of children and people with disabilities as Luke and Catherine shared: 'It is only fair. Every child has the right to play, free play!'

One strategy in relation to this core value described by the experts, was to design the environment in a way that meets the diverse needs of children to enable participation in play and the experience of play opportunities. The examples given by the experts often combined opportunities for play with design by applying UD principles in design. Experts explained that this strategy could for example be to have gradual and multiple challenge and play opportunities for children with a variety of needs and ages. Examples of how this was implemented on playgrounds through applying the UD principles of equitable use and flexibility in use, included provision of inclusive playground equipment, such as inclusive trampolines or a variety of swings that afforded sensory experiences to children of different ages and abilities and could be used in a variety of body positions. Another example shows how the UD principles tolerance for error and size and space for approach and use were implemented by extending the area of the playground to an adjacent wood, which was made usable for children to explore and experience a sense of adventure by designing in paths and little play elements carved out of wood, and at the same time gave parents a feeling of safety. John explains: 'Before we put the path in the woodlands, a lot of parents would have said to their children: 'don't go in there!'. That's because maybe in urban areas, places like that are sort of synonymous with teenage drinking.' Furthermore, the experts also mentioned the provision of different places for children to hide for example in woods, dens, behind logs etc., as such places provided the children possibilities to be among themselves and to regulate their own behaviour or to be out of the direct sight of adults, but still within the area of the playground.

Experts also showed an understanding of providing for play that includes opportunities for children to be creative and shape the environment, either physically or through their imagination. Examples that provided for this experience and applied the UD principles of flexibility in use, were illustrated by the experts explaining how they included logs in design as they could be used in many different ways. John explains when pointing to a big log:

> This could be a climbing feature, and you will have various insects, and you can pull off little pieces of bark and there'll be insects and stuff. This type of loosing yourself in play and children like little tiny things like daisies or big things like sunflowers. Lots of children who just lose themselves in very… Their own little, little world.

Another example given were the use of boulders that were placed in a way that they could be used in various ways by people of different ages and provide play opportunities to create and shape the environment or for challenges as John explains:

> If I ask children what's this, someone say: 'Oh it's princess castle, it's troll under the bridge, it's den, it's a winner of the Olympics.' There's a million different things that a child will decide. Sometimes we come out here and they're jumping off the top. Sometimes the small children will play on it and then in the evening you see the teenager sitting there or you see the mum sitting there having a cup of tea.' So they sort of continue to evolve and there are no rules of how to use it.

Experts also shared examples of how they implemented UD principles of simple and intuitive use and perceptible information through the integration of natural materials in their design as it inherently included play opportunities and provided sensory experiences, such as plants, wood with carvings, the combination of water and sand and designing in puddles as some children 'love mud and the freedom to jump in and get muddy'. Another example was the installation of easy to read maps at the entrance of a playground outlying the different play areas, or a communication board with pictograms and images of playground equipment in the middle of a playground, which were found to be not only useful for the participation of children who are non-verbal but also for children who do not speak the local language (e.g. in a context/neighbourhood with growing communities of immigrants). Another suggestion by an expert who was a mother of a child using a wheelchair was to even improve the maps by adding symbols indicating the play experiences and usability of the playground equipment on the map and in the playground itself.

Examples of how UD principles of low physical effort and size and space for approach and use were implemented were evident in a sandpit that had a designed path to make the sandpit itself and different sand equipment accessible, such as a sand digger, a multiplayer sand unit, and water pipes and tables. The expert shared his experience that the path was not only used by children using mobility devices, but also made the playground more accessible for everyone (e.g. for parents on rainy days, or for caregivers using mobility devices themselves). Other examples related to the UD principle of equitable use concerned accessibility, such as installing gradient ramps, designing paths wide enough so that people can cross, and the use of accessible surface materials.

Yet the analysis of the go-along expert interviews also revealed different opinions in the interpretation of how to design the environment. This is shown in divergent opinions among the experts if a playground should contain special equipment for children with disabilities or not. Some experts believed that sometimes the provision of special equipment could be a way to enable play experiences for children with disabilities that they could not have otherwise. An example of this was the wheelchair swing, that often needs to be fenced off separately to the other swings for security reasons and ends up therefore being segregating. In contrast, some experts believed providing specific equipment for children with disabilities was humiliating and segregating. Instead, they suggested the use of inclusive equipment, that allows for many children to use it together and experience the sense of movement, also when seated in a wheelchair, such as a giant see saw.

In this theme all of the seven principles of UD were evident. The analysis showed that the playground designer experts rather applied the seven principles of UD as a whole to a playground, rather than applying all seven principles of UD to each piece of playground equipment. In addition, expert users did not agree with a UD approach to all play components and valued opportunities to experience play via specially adapted equipment such as a wheelchair swing.

Designing for being together: 'if we don't give people the chance to make friends, well, they're going to be very lonely and isolated.'

The second core value identified was that UD should bring people together and enable a social experience of being together. Sarah explained how she relates this value to playgrounds: 'If you've enabled children of different backgrounds, ages, abilities to play together, then I think you've achieved an inclusive and accessible playground' (Sarah).

One strategy that the experts described was not only to create play opportunities for children to be in the same space, but to create play opportunities that promote playing together and teamwork. One expert stated: 'teamwork is something we try and design in'. Experts explained how they tried to design for inclusion and children making connections with each other by designing play opportunities that request or naturally stimulate playing together. On the playground visits experts showed several examples of how they created such play opportunities. One example addressed the UD goals of body fit and comfort through inclusive playground equipment that not only allows access for children with different needs, but that also requires collaboration, such as a giant seesaw or a carousel. Experts emphasised that they had chosen equipment that didn't require strength to get going, so that everyone could do it. Another example showing the implementation of the UD goals of awareness, understanding and social integration was the combination of natural materials with playground equipment that encourage collaboration through other means than speaking as the following quote of John illustrates: 'And small children will join in games with other children where there may be no language in common. It could be a boy and a girl, and it could be different age groups and the imagination games take over.' On the playgrounds this was for example done through sound cushions, that could be played together or sand and water play features to create streams and dams. The experts also valued the provision of natural elements that could be used as loose parts, such as sticks, leaves, pebbles, which could be used as tools for manipulation, e.g. digging in the sand, and provided play opportunities.

Another strategy by the experts was described to create a welcoming atmosphere on the playground, which aligns with the UD goals of social integration and wellness. Experts shared their experiences how this way of designing had positive outcomes for children with challenges in social interactions, and for the overall length of stay of the adults accompanying the children on the playgrounds. In this context, the experts often cited examples of the integration of natural materials and landscape forms into the design, as these contribute on the one hand to a pleasant and relaxing atmosphere in the playground by providing sensory experiences and shade. On the other hand, natural materials and landscapes also provided places where children could participate in play by observing, for example from the top of a hill or a boulder, and aligning with the UD goal of personalisation. As another example the experts suggested to place inclusive playground equipment either in a central location where it could be surrounded by other children, or on a hill where it could be seen by other children playing to create a welcoming atmosphere. Experts also shared the example how they designed a playground layout that used natural boundaries, such as woods or hills, to define a play area and did not require fencing. The intention behind this example was also to create enough space for play, so there is no need for rules, which adds to a welcoming atmosphere and aligns with the UD goals of personalisation and wellness, as John explains: 'It's sort of we try and take those rules

away with lots of space. There's a lot more tolerance of error.' Because there is space, running is allowed, and the highest point of a playground has no prescribed use (for example, it is not a slide that would be blocked by a child), children can just sit there and watch.

Designing for a welcoming atmosphere was addressed by considering the historical context of the site and to design the surroundings in a way that people have a sense of belonging and feel part of a community, which relates to the UD goal of cultural appropriateness and social integration. Michael explained his reasoning for the design of a park like this: 'the design ideas was that the park should bring them all together. And it did you know, it did. It did. Everyone, every community, everyone uses the park.' This example also illustrates the implementation of the UD principles of equitable use, flexibility in use and low physical effort, which includes the integration of amenities (e.g. toilets, changing places and parking), furniture for people of all ages and abilities (e.g. seats or benches with back and arm rests and space to the side for a pram or wheelchair, which can be used for different purposes such as sitting, changing a nappy or playing). In addition, access must be provided, which was illustrated through the implementation of the UD goal of awareness, with examples of measures that facilitate orientation, such as tactile paving or colour differentiation, and minimise hazards, such as gravel in front of benches to provide a quiet place to sit and rest in a park heavily used by skateboarders. Also measures such as informing about the playground through online media, e.g. in the internet, through podcasts or videos were suggested by participants. For everyone to be together and feel welcome in the playground, everyone needs to have physical access. Experts described an accessible network of paths connecting the main entrance to the playground to the different elements, that supported circulation and movement between the different areas and relates to the UD goal of understanding. Experts who use wheelchairs themselves also stressed the importance of ensuring universal access for parents or carers with a disability who accompany their children feel welcome in the playground. This includes making entrances and exits to playgrounds easy to open.

In this theme, all eight goals of UD were evident. With the goals of social integration and wellness being considered as overarching goals that guided the design and align with one of the identified core values that was the social experience of being together.

Design is informed by knowledge from different perspectives: 'it's really like because you live it you have this ability.'

The third core value was that UD needs to be informed by the lived experiences and needs of playground users to enable inclusive playground provision. From the experiences described by the experts, it was evident that their understanding was informed by their own experiences and from listening to the experiences of playground users. Luke who uses a wheelchair and was a playground user when he was younger illustrated his experiences like this: 'In my opinion you're not disabled, you gain a disability by having a disability, you have to do things in a different way. And you have to think how am I gonna get to this place. How am I gonna get across the road?' The benefits of a design process that is informed by the lived experiences of the users was illustrated by Michael on the example of a park that also includes a playground and was co-designed with diverse user groups resulting in becoming an 'iconic location for skateboarding in the city' and 'for the community the playground is very well-used'.

One strategy described by the experts was the process of co-design with the users. A common element across the different forms of co-design was that the consultation process also raised mutual awareness of people's diversity, as the examples of co-design described by the experts' involved users with a wide range of abilities and characteristics. One form of co-designing was described as extensive participatory consultation processes involving the local community and schools. This form for example included a series of workshops (either online or onsite) for

the joint development of plans for the re-design of a local park, including a playground, through sharing stories, discussing and drafting ideas together in intergenerational groups including people with and without disabilities. Another playground was inspired by a school fair project for which children crafted a range of thematic objects and presented it to the playground designer team. Also, participants described having extensive online discussions (with cameras on) with teachers to discuss their needs and the needs of the children attending a school, using child-friendly questionnaires and focus groups for consulting with children. Another form of co-designing was described by John as 'talking to lots, and lots of parents'. Experts described how they learned about the (play) needs of children with and without disabilities through engaging in conversations with their parents: 'And you get feedback from members of the community. So go and sit in the space and just small talk' (Sarah). Yet, another way of co-designing was described as testing playgrounds with users before its opening with the option to do adaptations after the construction, which led to innovative solutions to make the playground more usable. Experts also described how they used observations as a method to inform their design process, e.g. observing playground users on the places they have designed themselves, observing their own children playing or observing their relatives living with a disability in their everyday lives. Another example given by the experts was that they had been inspired by case studies from other playgrounds.

However, experts who have been involved as users in forms of co-designing playgrounds also highlighted that sometimes the initiative needs to come from the users. An example of that could be to actively contact the designer or to provide feedback for adaptations in a constructive way.

A strategy that addressed a continuous process of maintenance even after the playground was constructed, was described by experts as 'kind of staff training' or a 'maintenance schedule' to make sure the playground is maintained to keep it accessible for everyone. The experts also emphasised the importance of staff understanding why the playground and its equipment were built the way it was, believing that this understanding would make them more likely to maintain the playground in an accessible and inclusive way.

Another strategy that addressed environmental responsibility, biodiversity and circular economy was the use of natural materials and plants instead of plastic materials. Experts saw the benefit of this strategy because it provided opportunities for play, connects children with nature with a positive impact on their mental health, and increases safety. One of the examples given by the experts to illustrate this was that they preferred to use wood chips rather than rubber surfacing, because rubber surfacing has caused accidents when wet or frozen and emits an unpleasant smell above a temperature of 18 °C, which some children on the autism spectrum may find uncomfortable and may ultimately prevent them from using the playground. In addition, wood chips and other natural materials can often be sourced locally or as recycled elements, in line with circular economy principles. Another example was how experts wanted to help increase biodiversity by carefully choosing plants, using local plants, eatable berries, or planting hedges along the sides of the playgrounds.

In this theme strategies were described that related to the UD process of inclusive playground provision. Thereby, the importance of including playground users along the whole process was showed.

Discussion

The study aimed to advance the understanding and use of UD in inclusive playgrounds by identifying experts' strategies and experiences. The experts had long-standing experiences and conceptual clarity about UD which was based on three core values identified through the analysis: UD should accommodate everyone, bring people together, and be informed by the

lived experience of those who use the spaces and objects therein. For all three values, the shared outcome was that UD results in playspaces that are usable for a wide range of users, foster neighbourhood interactions, and promote social inclusion. Importantly, although the experts described how their design was guided by the principles of UD, findings suggest that primarily, UD was understood as a ***process of social inclusion***, aligning with contemporary definitions that focus on designing for diversity and inclusion (CEUD, 2020; Steinfeld et al., 2012).

Knowledge of children's play was key to implementing UD in playgrounds. As noted in other studies, designing playgrounds means designing for play value which requires an understanding of children's play needs (Woolley & Lowe, 2013). Children associate play value with experiences of challenge, a sense of belonging through creative engagement with the physical environment and social inclusion (Wenger, Lynch, et al., 2024). Experts' knowledge about children's play and characteristics of play value were evident in the findings of the study. Additionally, the need to embed co-design strategies were identified as an important way to continually develop creative solutions. Suggested strategies included collaboration with diverse users (e.g. children, older adults, and caregivers with disabilities) to incorporate the local, cultural, and historical context, intergenerational and inclusive design and to create a nice atmosphere and a feeling of belonging for everyone. Participatory co-design approaches have also been recognised in the literature as beneficial for creating intergenerational public spaces (Nelischer & Loukaitou-Sideris, 2023).

Furthermore, the findings of the present study revealed that knowledge about UD combined with knowledge about play needs to incorporate nature into playgrounds, which is an under-explored area in UD design. Especially in relation to create play value, social inclusion and a welcoming atmosphere for everyone, experts emphasised the importance of incorporating nature in the design. In this sense, according to the experts, the use of nature and natural materials seems to play a key role in linking play value, inclusion and UD. The expert-identified strategies showed that nature and natural elements aligned with UD principles of equitable and flexible use, tolerance for error and size and space for approach and use, support diverse play styles without imposing social constraints. Experts described how nature and natural elements also provide sensory experiences, are intuitive and can be used according to personal preferences, contributing to social inclusion and well-being. In addition, the use of plants and natural materials is a contribution to biodiversity and sustainability. This perspective introduces a new focus on nature's contribution to UD, which has been to our knowledge, rather absent so far (NSW Government, 2023; Watchorn et al., 2021). However, nature is well-documented for its positive impact on health, wellbeing, and play value (Gill, 2014; Woolley & Lowe, 2013). Children describe how nature provides them with a variety of opportunities for play and has a positive impact on their well-being (Adams & Savahl, 2017; Tillmann et al., 2019). Yet, how children perceive nature and its value for play should be further explored.

Findings also showed that designing every play component with inclusivity and play value in mind was not the goal. Instead, UD experts designed the overall playground to foster playing together or a place to gather. The consequence, that some play components were not usable for all children. Some play components were too small or arranged in a way that they were not usable by more than one child. The experts did not provide a reason why these choices were made and whether more efforts to provide accessible and usable play components was possible, or whether other possible forces were influencing decisions such as financial and maintenance considerations. This approach to playground design is common, yet playgrounds need to provide challenge and play opportunities on different levels for diverse users, size and ages of children. Children describe playgrounds that lack such challenge, as being boring and not being fun (Wenger, Lynch, et al., 2024). For this study, the playgrounds designed with UD in mind seemed to achieve the goal of providing a place to meet and play together which, as noted, is the expected outcome of UD. However, from the authors' perspective as occupational therapists, there was a missed opportunity to apply UD

to the design of individual play components to maximise inclusion and seek equity of experience, i.e. where every child can experience diverse play experiences in one setting. Future studies should investigate this aspect.

To conclude, studies report a limited understanding of UD in relation to playgrounds, often focusing on specific adaptations for people with disabilities (Moore, Lynch, et al., 2022b, 2022a; Wenger, Prellwitz, et al., 2023). While the findings of the present study indicate that the experts were knowledgeable about UD, the detailed application of UD principles to every playground component was not the approach used by the experts in the current study. This may suggest that UD is more useful as a process and framework for playground design as a whole, rather than being expected to apply to every playground component. It may also suggest that more advanced exploration of the application of UD knowledge to playground components is warranted before a whole playground approach is adopted as best practice.

Lessons learned: Recommendations for applying UD in inclusive playground design

The following recommendations translate expert strategies into actionable recommendations for playground planners, designers and provider. The structure of the recommendations is by key elements and their purpose or implementation identified from expert strategies and examples. Expert strategies, examples of implementation and how they relate to UD principles and goals are illustrated in Table A1.

- Provision of inclusive playground equipment
  Purpose: To provide for gradual and multiple challenges, enhance collaboration while playing.
  Implementation: To be placed in a central location or on a hill.
  Strategies: (a), (b)
- Inclusion of nature and natural materials
  Purpose: Offers possibilities to hide and retreat, various uses and play opportunities, sensory experiences, shade, pleasant and relaxing atmosphere, contributes to biodiversity.
  Implementation: in combination with playground equipment to encourage collaboration without words. As natural boundaries to define the playgroud area and provide enough space for play. Can be sourced locally or from recycled materials.
  Strategies: (a), (b), (c), (f)
- Ensure accessibility and usability
  Purpose: provides information, facilitates orientation and minimise hazards.
  Implementation: Provision of easy-to-read maps and communication boards, accessible paths and surfaces, a route net allowing for easy circulation and movement linking the different play areas in the playground integration of amenities (e.g. toilets, changing places, parking spaces).
  Strategies: (a), (c)
- Consider the historical context of a site to create a sense of belonging
  Strategy: (c)
- Co-design with users
  Implementation: participatory consultation processes including workshops, discussions, child-friendly questionnaires and focus groups, talking to and observation of playground users, user tests with potential adaptations afterwards, inspiration from case studies.
  Strategies: (d)
- Regular maintenance of the playground

Implementation: staff training to maintain playground in an accessible way and ensure play value, ensure regular maintenance through a maintenance schedule.
Strategy: (e)

These recommendations differ from existing guidelines in that they are based on the application of UD to playgrounds, for which there are currently few recommendations (Moore, Boyle, et al., 2022).

Limitations and future research

This study's small, purposive sample, limited to Ireland, restricts generalisability as the experts' specific UD knowledge may have excluded broader perspectives. Future research should explore how UD as a process and framework is incorporated into the design of play spaces in different contexts and explore UD applications from the perspectives of diverse users, including children, carers, community members, and design professionals. Despite limitations, combining expert interviews with the go-along method proved valuable, facilitating field-based discussions and insights.

A further limitation of the study could relate to the circumstances that the study was designed and carried out by a group of authors who are not design professionals. This might have affected the interpretation of the data and consequently the findings. However, the authors are experts in children's play and thus believe that their contribution could be relevant for the application of UD in playgrounds, as it could offer a perspective centred on play.

Notes

1. A General comment clarifies the content of a right and outlines potential violations of those rights and offer advice to states parties on how best to comply with their obligations under the human rights treaty. General Comment No. 17, initated by the CRC (International Play Association, 2013) seeks to enhance the understanding of the importance of article 31 for children's well-being and development.
2. P1. Equitable use; P2. Flexibility in use; P3. Simple and intuitive use; P4. Perceptible information; P5. Tolerance for error; P6. Low physical effort; P7. Size and space for approach and use (Connell et al., 1997).
3. G1. Body fit; G2. Comfort; G3. Awareness; G4. Understanding; G5. Wellness; G6. Social integration; G7. Personalization; G8. Cultural appropriateness (Steinfeld et al., 2012).

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Research ethics and consent

Both the Ethical Review Authority of Sweden and the Social Research Ethics Committee at University College Cork in Ireland approved the study and Sweden assigned the number 2021-04545. Participants gave written consent for the study, including audio-recording the go-along expert interview, publishing interview quotes and anonymously analysing the go-along expert interviews.

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Notes on contributors

Ines Wenger is a research collaborator at the University of Applied Sciences and Arts Western Switzerland (HETSL | HES-SO). She has obtained her PhD Degree in Occupational Therapy and Occupational Science from Luleå University of Technology in Sweden and University College Cork in Ireland.
Her research interests focus on the participation and inclusion of children with diverse needs in everyday life. In particular, she is interested in their participation and inclusion in public spaces and decision-making processes. Thereby, she has a keen interest in the use of participatory research methods. For her doctoral project, which was developed within the P4PLAY Marie Skłodowska-Curie Innovative Training Network, she investigated play and inclusion on inclusive playgrounds from the perspectives of playground users and providers.

Christina Schulze is a professor, researcher, and therapist in occupational therapy and a manager of a therapeutic centre with a professional background in occupational therapy.

Dr. Helen Lynch, P4play and University College Cork, Ireland, is a play researcher and advocate, and a qualified occupational therapist, specialising in working with children with disabilities, families and communities. She has been engaged for many years in a research programme concerning inclusive childhood play environments, and the rights of children to play, in particular play for children with disabilities. She has co-authored over 55 papers, 12 chapters and presented at many conferences internationally and has led several grants valued over €2M from Ireland and Europe, including the Irish Heritage Council, the Irish Research Council, the National Disability Authority, Ireland, and Horizon2020. She is a member of the steering committee for Cork Child Friendly Cities, and currently chair of the International Play Association, Ireland branch.

UCC Research Profiles: Helen Lynch www.p4play.eu.

Maria Prellwitz is an Associate Professor in Occupational Therapy at the Department of Health, Education and Technology at Lulea University of Technology, Sweden. Dr. Prellwitz's background around accessibility issues in the physical environment underpins her teaching and research, and her particular area of interest are the outdoor environment and children's play. Her research focuses on the use of Universal Design to support accessibility and to capture what matters to the children by listening to their voices.

ORCID

Ines Wenger http://orcid.org/0000-0002-4776-2964
Christina Schulze http://orcid.org/0000-0002-5662-5347
Helen Lynch http://orcid.org/0000-0002-3534-9144
Maria Prellwitz http://orcid.org/0000-0001-7812-321X

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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