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Title	Evaluating children's outdoor play: developing the Playground Play Value and Usability Audit tool
Authors	Morgenthale, Thomas
Publication date	2025
Original Citation	Morgenthale, T. 2025. Evaluating children's outdoor play: developing the Playground Play Value and Usability Audit tool. PhD Thesis, University College Cork.
Type of publication	Doctoral thesis
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Evaluating Children's Outdoor Play: Developing the Playground Play Value and Usability Audit Tool

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2025

Declaration

This is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork, Queen Margaret University Edinburgh or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork and Queen Margaret University Edinburgh concerning plagiarism and intellectual property.



_____

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Date of submission: 08.11.2024

Date of viva: 28.01.2025

Date of submission after minor revisions: 15.04.2025

Thesis Abstract

The overall objective of this thesis is to develop a new playground audit tool that supports an evaluation of playgrounds' play value for diverse users, particularly children with disabilities. This thesis, guided by theoretical frameworks of a transactional worldview and the theory of affordances, focuses on an examination of how the socio-spatial characteristics of playgrounds to support play as a fundamental starting point. Such a new playground audit tool needs to be evidence-informed, be grounded in a theoretical background supporting its development and interpretation, be guided by insights from children themselves, and its development needs to be documented transparently. To achieve this, three consecutive studies were conducted that advance knowledge about outdoor play occupations within public playgrounds.

Study 1 (Paper I) included a scoping review of interdisciplinary published research papers (*N* = 51; 1975 - 2022), which aimed to summarise the perspectives of children with and without disabilities about environmental qualities that enhance their play experiences in community playgrounds. Findings indicated that play experiences relate to physical and social environmental qualities. Children reported their multi-faceted play experiences, including the desire for fun, challenging, and intense motor and sensory play; the wish to self-direct their play; opportunities to play alone and with relatable social partners; and a desire for welcoming, safe, and aesthetically beautiful playgrounds. This review provided evidence that regardless of abilities, children are knowledgeable about how environments effectively enhance play value in playgrounds.

Study 2 (Paper II) was a secondary data analysis of a subset of the research papers (N = 45) identified in the scoping review. It aimed to investigate the transactions between the physical environment and children's outdoor play. This study used a structured content analysis to examine spaces, objects, and materials, and their functional characteristics in relation to play affordances. Underpinned by the theory of affordances, the *Environmental Taxonomy of Outdoor Play Space Features* (ETOPF) was formed. The ETOPF supports an evidence-informed identification of spatial features and their characteristics to explain the physical environment's shaping agency on outdoor play occupations.

Study 3 (Paper III) described procedures for developing and exploring the content validity of the *Playground Play Value and Usability Audit* (PVUA) tool. The PVUA tool's initial draft was populated from the findings from studies 1 and 2 (Papers

I and II). A modified Delphi method was used, incorporating semi-structured interviews and surveys to elicit perspectives from 22 international and interprofessional experts on outdoor play in playgrounds. Findings included the preliminary version of the PVUA tool and potential interpretations of its content. This preliminary version consists of 203 items divided across 28 content areas and two play value domains (Supporting Ecological Setting of Play Value and Immediate Environmental Dimension of Play Value).

The discussion of this thesis argues for the theory of affordances as an underlying theoretical framework for the PVUA tool and expands on the current understating of the theory. Furthermore, to fully capture play value, the central concept in this thesis seeks to operationalise, both an objective playground audit tool and a subjective method to capture children's lived experiences is proposed.

To conclude, this thesis presents a space-oriented approach to playground evaluation using a transactional perspective and the theory of affordances. It introduces the preliminary version of the PVUA tool, developed with input from children and experts, to evaluate and improve existing playgrounds in expansion and retrofitting procedures. Following these three studies, as explored in these papers, the tool is now ready for field testing to further validate its potential in supporting environmental improvements in public playgrounds for high play value and usability.

Keywords: affordances, audit tool, human rights, outdoor play, physical environment, playground, play occupation, play value, occupational science, occupational therapy, usability, validity

Acknowledgement

This PhD journey has been a transformative experience, and I am deeply grateful to everyone who has supported and guided me along the way.

First, I would like to express my sincere gratitude to my supervisors, **Professor Dr Christina Schulze, Dr Helen Lynch, and Dr Duncan Pentland.** Your expertise, guidance, and encouragement have been invaluable throughout this process. Thank you for your time, patience, and unwavering belief in my work, even when I doubted myself. Your mentorship has shaped not only this research but also my growth as a scholar. Thank you for your respectful and patient support, for making this PhD about learning, and for celebrating both the significant and the small achievements.

I would also like to acknowledge my advisors, **Assistant Professor Dr Janet Loebach** and **Professor Dr Anders Kottrop**, for their insightful feedback and thoughtful advice. Your perspectives have enriched my work, and I am grateful for your guidance and support throughout this journey.

To my **P4PLAY project colleagues**—ESRs, supervisors, project partners, and project managers—it has been an incredible honour to research and learn with such a talented group. I genuinely appreciate your camaraderie, inspiration, and shared purpose. The many discussions, along with moments of frustration, felt significantly more manageable with your support.

I extend my gratitude to the **European Union** for funding my PhD. I also appreciate the invaluable resources and support from **University College Cork** in Ireland, **Queen Margaret University** Edinburgh, Scotland, and **Zurich University of Applied Sciences** in Winterthur, which have been crucial for my research. Throughout my studies, I have been fortunate to meet, engage with, and learn from many individuals across different institutions.

To my **friends**, thank you for your patience and understanding, especially when I disappeared into my work for long stretches. Your encouragement, laughter, and reminders to take breaks kept me going, and I am so grateful for your presence in my life.

To my wonderful **family**—Mama, Papa, Karin, Stefan, Marina, Evan, Leia, Oma, Becky, Mike, Cheryl, Bob, and beyond—your love and support have been my foundation throughout this journey. I am so grateful for your genuine interest in my work and for cheering me on with every step. Thank you for encouraging me to follow my passions and reminding me of the bigger picture!

Finally, to my partner, **Cole**, how much your love, and steady support have meant to me. Thank you for being my rock, for celebrating every small victory, and for keeping me grounded on this journey. Your constant strength has been invaluable, and I could not have done this without you by my side. This achievement is as much yours as it is mine.

Funding

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 861257.

PhD Programme Information

This thesis is part of P4PLAY, an EU funded thematic joint PhD programme that addresses four areas of play: People, Place, Policy and Practice (P4PLAY). P4PLAY focuses on the occupation of play, play deprivation, and the impact of physical, socio-cultural, and policy environments on play provision, aiming to address barriers and offer solutions to improve play provision in diverse community settings, benefitting children, families, and communities. The P4PLAY Marie Skłodowska-Curie Innovative Training Network is a European Joint Doctorate programme in Occupational Science for Occupational Therapists that requires coursework of 60 ECTS in occupational science and play occupation as well as secondments with community practice partners. P4PLAY was designed as an exemplary PhD programme in Occupational Science based on best practice guidelines from Erasmus Mundus and Marie Sklodowska Curie.

This thesis was completed as part of the requirements for awarding of a PhD in Occupational Science from two universities as a joint award from University College Cork and Queen Margaret University Edinburgh, Scotland. The Zurich University of Applied Sciences, Winterthur in Switzerland was the lead institution and employer during the studies.



P 4 PLAY

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List of Abbreviations

Abbreviations	Explanation
AERA	American Educational Research Association
ALLEA	All European Academies
PSAT	Brief Play Space Audit Tool
CRC	Committee on the Rights of the Child
CPPF	Children's Play Policy Forum
ETOPF	Environmental Taxonomy of Outdoor Play Space Features
F-PGRS	Frost's Playground Rating System
GC17	General Comment No. 17
IPA	International Play Association
OSERC	Occupational Science Europe Research Committee
PARC's tool	Evaluation tool for assessing the accessibility and usability of community parks and playgrounds
PPET	Play Park Evaluation Tool
PRISMA-ScR	Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews
PSAT	Brief Play Space Audit Tool
PSQAT	Play Space Quality Assessment Tool
PTK	Playability Tool Kit
PVUA	Playground Play Value and Usability Audit tool
REDCap	Research Electronic Data Capture
SSO:USA	Society for the Study of Occupation:USA
TOPO	Typology of Outdoor Play Types
UNICEF	United Nations Children's Fund originally known as the United Nations International Children's Emergency Fund
UNCRC	United Nation Convention of the Child
UKPSF	UK Play Safety Forum
ZHAW	Zurich University of Applied Science (German abbreviation)

Thesis Structure

This PhD thesis by publication follows structures according to both universities as this is required for a joint doctoral degree. The three publications associated with this PhD thesis are integrated within individual chapters. Two publications have been published, and one publication has been accepted and is awaiting publication. This thesis is outlined in ten chapters.

Chapter One introduces this thesis topic, beginning with a personal reflection in relation to play before starting this research journey. A child rights perspective on play for every child, including those with diverse abilities, foregrounds the relevance of this research. Chapter One also outlines this thesis' four guiding research questions and aims. This is followed by introducing the central concepts relevant to setting the scene, including outdoor play occupation, public playgrounds, play value, usability, and evaluation of playgrounds via environmental audit tools.

Chapter Two details theoretical frameworks, including the transactional worldview and the theory of affordances, that guided the thinking behind the research. Additionally, this chapter examines how current scholars use the concept of play value and its alignment with the theoretical frameworks, particularly with affordances. This chapter concludes with an initial definition of play value aimed to be operationalised.

Chapter Three reviews key literature and research that have informed the topic of outdoor play on playgrounds and auditing the physical environment of playgrounds. This chapter highlights the agency of the environment, particularly the physical environment and its impact on children’s outdoor play. It also justifies why evaluating the physical environment is one way to ensure all children’s right to play. This review explores existing audit tools and the available evidence on the potential benefits of such audit tools. None of the identified playground audit tools adequately capture the constructs of play value and usability; they fail to report how they were developed and what sources of evidence informed and shaped their test content. Chapter Three highlights the research gap of needing new solutions for evaluating a

playground's play value and usability in combination and the importance of transparency in what steps informed the development of the Playground Play Value and Usability Audit tool.

Chapter Four addresses the overall research design, methodology and methods used. This Chapter also details information on test content development in two stages: (A) Developing the Initial Audit Tool and (B) Evaluating the Test Content. A particular focus on how validity evidence in the early stages of developing the *Playground Play Value and Usability Audit tool* was considered is described and justified in this chapter. The three methodologies (scoping review, secondary data analysis and modified Delphi method) are described alongside utilised methods.

Chapter Five presents **Study 1 (Paper I):** Morgenthaler, T., Schulze, C., Pentland, D., & Lynch, H. (2023). Environmental qualities that enhance outdoor play in community playgrounds from the perspective of children with and without disabilities: A scoping review. *International Journal of Environmental Research and Public Health*, 20(3), 1763. https://doi.org/10.3390/ijerph20031763

Chapter Six presents **Study 2 (Paper II):** Morgenthaler, T., Lynch, H., Loebach, J., Pentland, D., & Schulze, C. (2024). Using the theory of affordance to understand environment-play transactions: Environmental taxonomy of outdoor play space features—A scoping review. *American Journal of Occupational Therapy*, 78 (4). https://doi.org/10.5014/ajot.2024.050606

Chapter Seven is an interlude chapter and details how the initial version of the Playground Play Value and Usability Audit tool is constructed from the evidence gathered in Studies 1 and 2 (Papers I and II) and as a preparation for Study 3 (Paper III). This chapter describes how items are generated and clustered into content areas, subdomains and domains. The chapter specifies the assignment of items to the underlying constructs of play value and usability that the PVUA tool aims to operationalise. Furthermore, it explains alignment in item format, response format and instructions.

Chapter Eight presents **Study 3 (Paper III)** is accepted and is awaiting publication after minor revision: Morgenthaler, T., Loebach, J., Lynch, H.,

Pentland, D., Kottorp, A., & Schulze, C. (accepted). Developing the Playground Play Value and Usability Audit Tool (PVUA): An Evaluation of Content Validity via an Expert Panel. *Children, Youth and Environments*.

Chapter Nine is a synthesis of the findings from all three studies. This chapter aims to answer the first research question introduced in Chapter One: *What environmental characteristics contribute to successful outdoor play on public playgrounds?* Environmental characteristics in three environmental dimensions (physical, social, and atmosphere) relevant to outdoor play in playgrounds are described and discussed. A transactional perspective supports and underpins how the environmental characteristics and dimensions relate to each other and evolve over time.

Chapter Ten focuses on the key findings and interpretations from this thesis. This chapter is divided into four parts. The first section answers the three remaining research questions introduced in Chapter One. Answers to research question two revisit theoretical key principles from the theory of affordances, discussing how these principles support the theoretical interpretation of the playground audit tool developed in this thesis by expanding on them. Answers to research question three clarify the central concept of play value into three dimensions. Two dimensions (*Immediate Environmental Dimension of Play Value* and *Supporting Ecological Setting of Play Value*) are aiming to be represented in the Playground Play Value and Usability Audit tool and one dimension (*Experiential Dimension of Play Value*) is proposed as needing child-centred methods that give insight into children's perspectives. Answers to question four discuss how focusing on the physical environment in an auditing process supports an avenue to understand the transactional perspective on outdoor play occupation from a *collective child perspective,* a proposed approach that acknowledges diverse user groups when playgrounds are evaluated. The second section describes the methodological considerations of this thesis and a critical reflection on the developed playground audit tool. The third section provides an overview of this thesis's scientific, practical, and educational impact to date, as well as a few

recommendations on how future work that could build upon the research. Chapter Ten ends with a concluding statement.

CHAPTER ONE — THE FOCUS OF THE THESIS

"Playing is an ongoing, indeterminate and emergent flow of imaginations, movements, materials (and/and/and…) in-between bodies that produce distinctive co-created moments of time and space that always contain within them the possibility for going elsewhere"
(Lester, 2020, p. 115).

1.1 Introduction to Chapter One

Originating in occupational science, the scope of this study includes the topics of outdoor play occupation on playgrounds, with a particular focus on how the environmental qualities of playgrounds could support children's preferences and wishes in outdoor play and how those environmental characteristics can be audited. This opening chapter introduces the study and provides the necessary context for the research topic. It begins with a personal reflection as the starting point for the study topic. Then, the rationale based on children's right to play is presented, explaining why the topic is essential and in need of further investigation. This is followed by a brief overview of the study's research questions and aims. The chapter ends with an introduction to the central concepts of *outdoor play*, *playground*, *play value*, *usability* and *auditing playgrounds*.

1.2 Personal Reflections on Outdoor Play and Playgrounds

I grew up rural, in a single-family household, in a family of five with working-class roots. I consider myself lucky to have had the freedom of not only having a relatively big garden but also woods in proximity, living on a not-so-frequented road and other family members in the similar age range living in the same neighbourhood. My memories are filled with unsupervised play in all kinds of spaces within the wider community where I grew up, but mostly in nature. Some of these memories are about collecting the stones from the neighbour's house and grinding them to fairy dust with my sister and cousin (even when the neighbour did not like that, we stole those stones). I remember climbing up the fence to get to the icicles hanging down from the roof to just later smash them on the floor and see them shatter everywhere. I remember

playing as elements-embodied characters inspired by Pokémon (I was always electricity, which is not an element, but we did not care). I have vivid memories of practising play-fight-routines and play-escape-routines just in case the "other" neighbouring children came and we needed to protect our self-constructed tree fort. This actually ended with a hospital visit and a fractured arm (though, looking back, the adventure was still worth it). Memorable was also our dedication to clearing the creek in the forest from the autumn leaves that plugged the water flow. Our mission was to have a nice flowing creek for the creatures in it. I also remember spending days in spring catching the tadpoles and nurturing them in the garden pond by our house. These are just some recollections of my play memories. They all underscored what play for me was: outdoors, usually in a natural setting, frequently shared with familiar companions, my siblings or cousins. My play was often about feeling excitement to explore and create something for us even when it was uncertain where it would lead us, and play was about sharing the moment.

Do I also have memories of playing on playgrounds? Looking at my childhood photo albums, I am very surprised that I found several pictures of me and my siblings playing on playgrounds—but I do not recall these memories (see Figure 1 for a collection). To the contrary, I was not able to find pictures from my play memories described above. Now I wonder why I do not have photos of such cherished play memories from my time spent outdoors and in nature. I grew up in the countryside, with proximal access to outdoor environments in nature. Children living in more urban environments might not have such opportunities, and playgrounds might be one of the environments made available for these children. With this thought in mind, I was intrigued to discover how playground environments could support cherished play experiences for children.

Figure 1. Pictures of Me Playing on Playgrounds



Note. Photos taken by Ronald and Margret Morgenthaler 1995-1999

1.3 Personal Reflections on Utilising Play in Occupational Therapy Practice

My second reflection stems from my clinical practice as an occupational therapist. I am a trained occupational therapist with work experience of about seven years in the outpatient clinic and private practice with a specialisation of children aged one to ten years with diverse and often multiple disabilities. Naturally, being engaged in research about outdoor play for over four years, I

started to think about whether play and outdoor play were part of my clinical practice. I must admit that in my clinical practice, I never went on playgrounds with children. However, I know that some therapy goals were related to playground use in schoolyards. An indoor occupational therapy room in paediatric practices might resemble similar features that might be found on playgrounds, such as swinging or climbing opportunities or even materials like sand and water. However, enabling play was usually not the primary goal in therapy. Usually, children were referred for occupational therapy for other specific goals, such as supporting their writing skills or getting independently dressed. I believe play was more of the focus when colleagues and I planned group therapy sessions. Even when enabling play was not the primary aim of these sessions, play was still much more present. For some of these group sessions, we created a physical space by providing the objects and materials and allowed the children to explore and decide what they wanted to do. We therapists scaffolded some play, for example, when a child initiated something while the parents were instructed to sit on the side and observe. The goals were diverse for each child and family unit, such as understanding what the child could do or giving them space to explore.

Play was also more present in the annual forest group sessions we planned during summer. In these sessions, we went with a small group of children to a nearby forest and offered structured play opportunities alongside some opportunities to explore nature. What I observed in these two weeks was a transformation of several children who, in the beginning, were scared and did not want to touch anything or play and explore the wildlife and nature on their own. This shift was fascinating for me, especially as play within nature was so relevant for me in my childhood. I have to say most of these children lived in a city (Vienna, Austria), most of them also had a migration background, and all of them had disabilities. From dialogues with caregivers before our forest group sessions, I learned that they, as families, usually did not visit woodlands or nature areas. Some caregivers explained that they found these areas dangerous because of plants or wildlife, and some families did not have the resources or information to visit such natural areas. At this point, I did not

make the connection to playgrounds, but during my research, I learned that playgrounds of higher quality should provide opportunities to get in contact with the natural environment. I believe that is especially relevant for children living in cities and even more for children with a disability who have limited resources and opportunities to access nature elsewhere.

In essence, these clinical experiences underscore the critical role of the immediate social and physical environment in shaping children's play opportunities. Reflecting on this, one driving motivation behind this study was my desire to contribute to the body of knowledge on the environment and the occupation of play. Such knowledge could assist professionals, including occupational therapy practitioners and other professionals involved in evaluating environmental conditions using playground audit tools, in identifying barriers and developing solutions to promote outdoor play occupations.

1.4 A Child Rights-based Perspective of Play

To explore playground environments, it is essential to first understand what play is. In this thesis, play is approached as a fundamental right of the child. Play is a human right as recognised under Article 31 of the United Nations Convention on the Rights of the Child (UNCRC) (United Nations Committee on the Rights of the Child, 1989). Under the convention, play is defined as

> any behaviour, activity or process initiated, controlled and structured by children themselves; it takes place whenever and wherever opportunities arise… play itself is non-compulsory, driven by intrinsic motivation and undertaken for its own sake, rather than as a means to an end (UNCRC, 2013, pp. 5–6).

While all state parties who have adopted the UNCRC are obligated to safeguard every child’s right to play, this fundamental right is often overlooked, unknown and described as the least recognised right (International Play Association (IPA), 2010). In line with this, the Committee on the Rights of the Child (CRC) has expressed concerns regarding the inadequate recognition of Article 31 (UNCRC, 2013). For example, states have shown a lack of investment in appropriate play provision, a lack of protective play policies and

legalisation and disregard for children's participation in national planning strategies (UNCRC, 2013). Recently, studies have examined how much and to what extent the right to play is mentioned in state reports to the CRC and the concluding observations—the final reports from the CRC to the state parties after individual country-specific hearings (Bantulà Janot & Payà Rico, 2020; Payà Rico & Bantulà Janot, 2021). These reviews revealed that the right to play still has limited attention in either state reports or concluding observations (Bantulà Janot & Payà Rico, 2020; Payà Rico & Bantulà Janot, 2021).

The neglect to recognise Article 31 has led to the development of General Comment No. 17 (GC17), an additional document that aims to support state parties in how they will decipher and exercise their duty in realising Article 31—the right for play (UNCRC, 2013). In particular, the GC17 emphasises the significance of free and unstructured play by prioritising sufficient time and space for play rather than adhering to directed, structured and outcome-driven agendas (UNCRC, 2013). The importance of time and space for play is underscored by the role the environment has in safeguarding and ensuring the realisation of the GC17. For example, aspects of an optimum environment necessary for children's play are described (UNCRC, 2013). These include, among other aspects, freedom from stress, violence, exclusion, discrimination, hazards, pollution and traffic, availability of time and spaces free from adult control, as well as opportunities to access nature, create own imaginary worlds, and interact with peers, to highlight some of these aspects (UNCRC, 2013). The GC17 states that adults are important stakeholders who influence the creation of environments in which play takes place; however, play itself needs to be understood as an activity or process that is initiated and controlled by the children "and undertaken for its own sake, rather than as a means to an end" (UNCRC, 2013, pp. 5–6). This thesis places emphasis on these environmental aspects that contribute to the realisation of the right to play, with a thematic focus on spaces provided for outdoor play, such as public playgrounds.

The GC 17 identifies children with disabilities among other populations in need of particular attention in realising the right to play (UNCRC, 2013). The right to play for children with disabilities is supported not only by the GC17 but also by the United Nations Convention for the Rights of Persons with Disabilities under Article 30 (United Nations, 2007) and in a position statement from the IPA (2015). In the UNCRC (1989), several articles refer to children with disability, including article 23, which states children with disabilities "should enjoy a full and decent life, in conditions which ensure dignity, promote self-reliance and facilitate the child's active participation in the community" (p.7). Article 2 in the UNCRC outlines the principles of protection against discrimination, whereas children with disabilities are mentioned as one population that needs specific attention. Furthermore, article 12 in the UNCRC refers to the right to freely express their views and opinions in matters that affect them and the urge to adequately include all children's perspectives according to their abilities. Therefore, children with disabilities and their right to play and their right to be heard are safeguarded by several legally binding documents.

Regarding playground provision, GC17 identifies several additional barriers to play for children with disabilities, such as physical inaccessibility in environments and a lack of assistive devices, negative stereotypes and attitudes towards children with disabilities, as well as the risk of isolation at home because of limited opportunities for them in community settings (UNCRC, 2013). Despite identifying these barriers to play over ten years ago (UNCRC, 2013), these barriers still exist in many countries to date. For example, national reports from Germany, the United Kingdom (Wales and Scotland), and Ireland described a lack of playgrounds suitable for children with disabilities and recommended improvement to cater better to this population (Dallimore, 2023; FitzGibbon & Dodd, 2023; Moloney et al., 2021; Weber et al., 2023). Also, a survey across 18 European countries revealed a concerning absence of protective policies addressing play provision for children with disabilities (Lynch, Moore, & Prellwitz, 2018). The findings confirmed a significant gap in governmental responses to addressing play

through national legislation or policy, as it is instead subsumed under other government policies such as education or health (Lynch, Moore, & Prellwitz, 2018). Such a lack of policies specifically on play could lead to poor regulations concerning aspects of playground provision, including insufficient funding and reduced knowledge of adequate play provision (Lynch, Moore, & Prellwitz, 2018; Moore & Lynch, 2015).

Another need that the GC17 addresses is the necessity for systematic data collection and research that examines the condition of local environments, including playgrounds (UNCRC, 2013). A lack of suitable tools for understanding facilitators and barriers in the environment to fulfil the rights under Article 31 is reported (UNCRC, 2013). Such information is crucial to inform “planning processes and provide the basis for measuring progress in implementation” of Article 31 (UNCRC, 2013, p. 20) and could support the realisation of more inclusive playgrounds that are high in play value.

The ability to measure and collect data on community playgrounds and their quality is crucial for governments to demonstrate their commitment to providing play opportunities within their communities. For example, the Welsh Government in the United Kingdom implemented play policies a decade ago, which led to legal requirements for local authorises to report on measures taken to support play, known as ‘Play Sufficiency Duty’ (Play Wales, 2022). These reports include data on various aspects of playgrounds, such as provision for diverse needs, accessibility, and overall quality and serve as a critical indicator of how effectively these local authorities are fulfilling their obligation to support play in the community (Play Wales, 2022).

At this point, state reports to the CRC, along with the CRC’s concluding observations, only quantify the provision of playgrounds by stating the number of playgrounds in a country and community (Bantulà Janot & Payà Rico, 2020; Payà Rico & Bantulà Janot, 2021). These reports lack information on the more detailed level of the quality of playground provision (Bantulà Janot & Payà Rico, 2020; Payà Rico & Bantulà Janot, 2021), leading to a need for tools that can support the monitoring of high-quality playgrounds suitable for diverse user groups.

In conclusion, the international context of child rights recognises the importance of play. Unfortunately, the right to play is still not given sufficient attention in policy agendas both internationally and nationally. One way to rectify this oversight and promote the creation of inclusive and high-play-value playgrounds is to adopt evidence-based tools that empower playground providers to evaluate and improve existing playgrounds. However, to explore playground environments with such tools, a deeper understanding of what outdoor play occupation entails and how this translates into the environment is needed.

1.5 Overall Research Questions and Aims

The purpose of this study is to advance knowledge in outdoor play occupations within public playgrounds. This study hopes to develop evidence-informed and space-oriented approaches for socio-spatial inclusion in play provision and practice. In doing so, the overall objective of this thesis is to develop a new playground audit tool that supports an evaluation of playgrounds' play value for diverse users, in particular children with disabilities. Four initial and broad research questions are identified that guided this study.

Research Question One: What environmental characteristics contribute to successful outdoor play on public playgrounds?

This broad question aims to explore and describe the relationship between the environment and play occupation to examine environmental characteristics that contribute to play. In more detail, this question considers aspects of the built, natural and social environment known to influence what children want to play, what they want to experience on a playground, and how the environment could support and enhance their outdoor play.

Research Question Two: Can the relationship between the environment and play value be analysed from an affordance perspective to inform a playground audit tool?

This research question explores firstly how affordances have been used in providing environmental analysis, and secondly, whether an affordance

approach can be designed that supports an analysis of the relationship between children and their environment through environmental affordances. This involves identifying spaces, objects and materials and their environmental qualities in relation to children's outdoor play.

Research Question Three: How can a playground audit tool utilise an affordance analysis to describe play value?

This research question is concerned with identifying ways of describing the environmental characteristics of public playgrounds through the construct of play value. To achieve this, several aspects are required, including defining and operationalising the construct play value under the consideration of diverse user groups, constructing and developing an audit tool using both evidence literature and further exploration through an expert panel.

Research Question Four: What insights can be gained into the transactional perspective on occupations through the lens of the physical environment as an active agent in outdoor play?

This research question aims to explore the theoretical transactional perspective used in the thesis and examines the gap in knowledge about how the physical environment actively contributes to a transactional perspective on play occupation in occupational science. Specifically, by combining transactional perspectives on occupation with the theory of affordances, new insights into the importance of the physical environment and its relationship with play occupation can be gained. This is hoped to provide a foundation for acknowledging the physical environment in greater detail in occupational science in understanding the occupation of outdoor play.

1.6 The Thesis' Relevance to Occupational Science, Occupational Therapy and Interdisciplinary Audience

This thesis addresses a broad interdisciplinary audience interested in outdoor play, playgrounds and evaluating environments for play. However, this thesis is also approached from two related but distinguishable disciplines: occupational science and occupational therapy.

As an occupational scientist, it is important to understand children's outdoor play occupations from an occupational perspective, with an emphasis on how environments support, shape, and provide play occupations and how children subjectively relate to their environment. Focused on the core concept of occupation, occupational scientists adopt a perspective on the world that foregrounds doing as something essential to being human (Frank, 2022; Wilcock & Hocking, 2015; Yerxa, 1990). Occupations can be described as the essential fabric of life; they are what we do alone or with others, how we make use of time and space and how we experience meaning (Clark et al., 1991; Wilcock, 1993). Occupations encompass subjective and experiential aspects such as the social, cultural or personal meanings associated with an occupation (Hocking, 2009; Hocking & Jones, 2024; Zemke & Clark, 1996). Occupations also include more external observable aspects, such as who is engaged in an occupation and with whom, what are those activities, the spaces, objects and materials utilised which shape the occupations, and temporal aspects such as when and how long someone is engaged in occupations (Hocking, 2009; Hocking & Jones, 2024; Zemke & Clark, 1996). For children, one central occupation of childhood is outdoor play; therefore, it is relevant further to investigate this occupation through the lens of occupational science.

As an occupational therapist, applied solutions that support children's outdoor play occupations are of significant interest. In the personal reflections at the start of Chapter One, the lack of play and outdoor play occupation as a central aim in occupational therapy practice was recognised. This aligns with empirical findings from occupational therapy practitioners' perspectives in the United States and Europe (Kuhaneck et al., 2013; Lynch et al., 2017; Schlager-Jaschky, 2019). Despite occupational therapists' recognition of play occupation as a valued occupation in childhood (Kuhaneck & Spitzer, 2023; Lynch & Moore, 2016), at the moment, play occupation is overlooked and exploited in occupational therapy practice and is primarily used as a means to achieve other therapeutic goals (Brown & Lynch, 2023; Bundy, 1993; Lynch et al., 2017; Lynch & Moore, 2016; Moore & Lynch, 2018a). It seems that

occupational therapists have difficulties to fully live up to their beliefs about play occupations. Therefore, this thesis aims to provide new knowledge on outdoor play occupations and is hoped to be useful for practitioners. For example, occupational therapists reported on the lack of suitable and evidence-informed evaluation tools to understand and focus on play-enabling environments such as playgrounds (Kuhaneck et al., 2024; Kuhaneck et al., 2013; Lynch et al., 2017; Schlager-Jaschky, 2019). Tools designed to investigate environmental qualities for play value and usability could serve as a potential solution to endorse a shift for practitioners towards focusing more on play occupations and environments that support play occupations. Such tools are likely to be relevant not only for occupational therapy practitioners but also for an interdisciplinary audience. Furthermore, the knowledge generated in this thesis includes gaining an understanding of the subjective meanings derived from play occupations in playgrounds and how environments shape play occupations (Hocking, 2009; Pierce, 2014a). Such new knowledge is expected to be applicable to any discipline relevant to the study and practice of creating enabling environments for outdoor play.

1.7 Introducing the Main Concepts in this Thesis

Before describing the theoretical framework of this study (Chapter Two) it is helpful to set the scene by defining key concepts relevant to this thesis. These key concepts explored include *outdoor play occupation, playgrounds, play value, usability and auditing playgrounds*.

1.7.1 Play and Outdoor Play Occupation

From an occupational science and occupational therapy perspective play is recognised as a meaningful occupation in childhood (Kuhaneck et al., 2013; Lynch et al., 2017; Lynch & Moore, 2016). In this study, play occupation is defined as a

> subjective experience of joy and fun, that comes from engaging in freely chosen, intrinsically motivated, self-directed, meaningful occupations; play transactions take place between the child and the environment (including

> the virtual); play is about the process of engagement rather than the product (Lynch & Moore, 2016, p. 519).

This definition of play occupations fits within a child rights perspective and is aligned with the definition proposed by the GC17 earlier in this chapter. Both definitions propose that play does not focus on outcomes but rather embraces the here-and-now of childhood by valuing play for its own sake. In this definition from occupational science, the environment is explicitly mentioned and points to the importance of understanding play occupation in the transactional relationship between the child and the environment. This transactional perspective will be further explored in Chapter Two.

Outdoor play has unique experiential qualities that are different from playing indoors. This was found through an ethnography from Stephenson (2002), who observed children and interviewed teachers aiming to investigate how the outdoor and indoor environment shapes children's play experience. She discovered that children perceive outdoor play as being more open-ended, less structured through routines, and with less adult involvement. Furthermore, outdoor play allows behaviours that are not permitted indoors (for example, being louder and taking risks) and incorporates more changes and unpredictability (for example, through weather, seasons and wildlife). Stephenson (2002) described that children experience outdoor play more in terms of a process during playing (*'look at me'*) whereas playing inside tends to focus on the outcome (*'look what I have made'*). Therefore, compared to other forms of play, outdoor play is valued for a higher degree of freedom, being more unstructured and could be considered as more active (Tremblay et al., 2015). Research has found that outdoor play is children's most favourable and preferred play occupation when compared to other play, such as indoors (Little & Eager, 2010; Lynch, 2009; Miller & Kuhaneck, 2008; Moore & Lynch, 2018b; Nicholson et al., 2014). Outdoor play occupations take place in outdoor environments including but not limited to children's homes, communities and schools (Helleman et al., 2023; Martin et al., 2023). These outdoor environments can include open spaces such as backyards, streets, plazas, natural spaces, doorsteps, playgrounds, sports areas, and schoolyards, among others (Jansson et al., 2016; Lynch, 2009; Moore &

Lynch, 2018b; Nicholson et al., 2014; Pitsikali & Parnell, 2019). Outdoor play occupations can take on many different forms, reaching from occupations that are physically intensive, such as rough-and-tumble play or jumping and skipping ropes, but equally, outdoor play can be less intensive such as feeding fish in a pond, joking with a friend or lying in the sun (Burke & Stafford, 2023; Jansson et al., 2016; Loebach & Cox, 2020; Lynch & Moore, 2016). Furthermore, outdoor play can be more or less complex, which are both valued play occupations (Lynch & Moore, 2016). For example, playing cooking-a-meal or playing police and robbers with a group of children are examples of more complex play occupations in terms of the scenarios played out, the underlying rules involved, the diverse people included, the environmental qualities that shape the play and the associated multifaceted meanings. Simpler play occupations are also valued and might include feeling grass with the palms, pushing gravel to mounds or running through a puddle. Therefore, this study does not prioritise a certain form of outdoor play. Moreover, all forms of play will be equally acknowledged. Valuing all kinds of play aligns well with a child rights perspective and understanding play for its own sake.

1.7.2 Public Playgrounds

Public playgrounds are the main context of this thesis. Public playgrounds are defined as outdoor environments that have been specifically designed for children's outdoor play and are usually located in diverse community settings such as parks and schools generally open to the public (Burke, 2013; Woolley & Lowe, 2013). Definitions of playgrounds found in peer-reviewed literature commonly describe playgrounds by referring to the provision of play equipment, sometimes referring to traditional play equipment such as climbers, slides and swings (Brown et al., 2021) or purpose-designed play equipment (Burke, 2013; Pitsikali et al., 2020). Other definitions recognise, besides play equipment, other less equipment-focused features and structures such as pathways (Brown et al., 2021; Lee et al., 2022), topographical variation, diverse materials, loose parts and vegetation as essential features in playgrounds (Woolley & Lowe, 2013). In this thesis, all

these designed and non-designed features are considered to be part of public playgrounds.

1.7.3 The Concept of Play Value

Play value is a concept that tries to explain the relationship between the environment and play and how an environment supports outdoor play. In this thesis, play value was the central concept of interest, with the key aim being to find ways to describe and quantify it within a playground audit. Overall play value in this thesis was conceptualised as the diverse, multiple, and potential play affordances supported by diverse, varied and combined environmental features. This understanding of play value is a synthesis of how various sources in the literature described play value (Casey & Harbottle, 2018; Children's Play Policy Forum & UK Play Safety Forum, 2022; Frost, 1992, Frost, 2006; Lynch, Moore, Edwards, et al., 2018; Moore et al., 2023; Parker & Al-Maiyah, 2022; Playright, 2016; Wenger, Lynch, et al., 2024; Woolley & Lowe, 2013). While this definition of play value focuses on diversity and potential play affordances in a playground, this thesis also highlights the importance of considering children's experiential and subjective relationship with the environment in understanding the play value of playgrounds (Lynch, Moore, Edwards, et al., 2018; Wenger, Lynch, et al., 2024). Chapter Two will provide in-depth information on play value and identify how the concept was used in this thesis; in Chapter Ten, new advancements of the concept of play value driven by this thesis findings are discussed and justified.

1.7.4 The Concept of Usability

Usability is another concept of interest for operationalising. The concept of usability goes beyond accessibility. While accessibility is understood as getting to the playground or to the play equipment, usability prioritises play, and what children want to do on the playground (Moore et al., 2023). Usability, in this thesis, is defined as the environmental qualities that enable children with diverse abilities to play on playgrounds (Moore et al., 2023; Moore & Lynch, 2015; Prellwitz & Skär, 2007; Ripat & Becker, 2012). Accessibility, sometimes

referred to as barrier-free environments, would be understood by utilising design features following standard regulations for accessible physical environments (Iwarsson & Ståhl, 2003). In contrast usability is concerned with the equitable use of an environment for all children, coming closer to the overall goal of inclusion (Iwarsson & Ståhl, 2003) and play. Therefore, usability extends accessibility in terms of not just being able to enter a physical space but also having the possibility to use the space and objects in equal terms to others (Iwarsson & Ståhl, 2003).

In this thesis, environmental qualities that contribute to usability are closer to the overarching goal of creating playgrounds that enhance play value for diverse abilities (Iwarsson & Ståhl, 2003; Moore et al., 2023) and correspond with an understanding of play value which emphasises the need to consider diverse user groups such as children with disabilities (see Chapter Two). This means that the usability of a playground is part of the play value construct; however, by separating it as its own concept, it allowed closer attention to be paid to the population of children with diverse abilities.

1.7.5 Auditing Playgrounds

In this study, the constructs of play value and usability were operationalised through a playground audit tool; therefore, this paragraph introduces what a playground audit tool is. Playground audit tools can be defined as tests whose primary purpose is to collect data on the physical environment utilised in a systematic observation of the playground environment (Meng & Wang, 2022; Taylor et al., 2023) which relates to children's outdoor play (Oliver et al., 2014). Depending on an playground audit tool's intended purpose the aspects of the physical environment that are measured can vary significantly from audit tool to audit tool (Brownson et al., 2009; Nickelson et al., 2013). The range spans from a basic inventory-style counting of environmental features to a more detailed evaluation of their environmental characteristics such as surface type, quality of maintenance practices or environmental quality (Brownson et al., 2009; Oliver et al., 2014). While playground audit tools typically take the form of checklists that identify

and document key features and components in a physical environment when it is an audit tool for play value, such a tool needs to be informed by how environments are used for play and therefore needs more consideration than counting components.

Additionally, for audit tools the unit of analysis, meaning the scope of the physical setting or space under evaluation, can vary significantly, ranging from a broad focus of a city district or neighbourhood to more specific settings like a whole park or even smaller settings such as a single playground (Meng & Wang, 2022; Nickelson et al., 2013; Taylor et al., 2023). For this study, the aim is that the playground audit tool focuses on environmental qualities as a way to evaluate the play value and usability concepts. A review of evidence concerning playground audit tools will be more fully outlined in the Chapter Three.

1.8 Summary of Chapter One

This thesis has the potential to enhance understanding of playground environments and how these shape, influence, and cater to children's play occupations. Additionally, it attempts to construct a playground audit tool that can analyse the play value and usability of playgrounds. To achieve this, a comprehensive evidence base of children's outdoor play occupation and its association with environmental characteristics is required. In Chapter Two, the core theoretical frameworks that form the basis of this thesis are explained and how these are integrated into the research process.

CHAPTER TWO — THE THEORETICAL FRAMEWORK

"Understanding the meaning of occupation as a transactional process suggests a need to continue to explore the meaning of occupation from the perspective of lived experience, not as something that is individually derived but as something that is connected to the broader context of the world" (Reed & Hocking, 2013, p. 57).

2.1 Introduction to Chapter Two

Overall, this thesis aims to develop a new playground audit tool that supports an evaluation of playgrounds' play value for diverse users, in particular children with disabilities. In doing so this study hopes to develop evidence-informed and space-oriented approaches for socio-spatial inclusion in play provision and practice. As part of this thesis, it is important to learn about outdoor play occupation and the environment and environmental qualities which support and shape what children are doing. Furthermore, this study was interested in operationalising constructs of play value with consideration for users with diverse abilities. This chapter provides an overview of the theoretical frameworks which guided this study, including a transactional worldview and the theory of affordances. Furthermore, the concept of play value is explored and unpacked to identify its alignment with the theoretical perspective on affordances. This serves as the foundation to finding ways of describing and operationalising play value.

2.2 Transactional Worldview

This research study is guided by a transactional worldview inspired by the discipline of environmental psychology, which emphasises the environment's and person's interconnectedness (Altman & Rogoff, 1987). Such a perspective recognises the relationship between the environment and the child as an integrated unity (Altman & Rogoff, 1987). Consequently, this implies that the phenomena under investigation, such as outdoor play occupation, need to be understood and researched by the intertwined and mutually defining entities of children and the playground environment. A

transactional approach rejects viewing the child and the environment as separate, where the entities act upon one another in the sense of a cause-and-effect relationship (Altman & Rogoff, 1987; Werner et al., 1992). Such a cause-and-effect relationship can be described as an *interactive relationship* where the child and the environment are seen as both dualistic and relatively independent (Altman & Rogoff, 1987). Altman and Rogoff's research (1987) compares such interactive relationships to a game of billiards, where the balls represent separate but influencing entities with their own characteristics which act and react to each other over time. Theoretically interactional perspectives emphasis the independence of the environment and the child, whereas outdoor play could be understood as a predictive outcome or a dependent variable. In other words, research that adopts an interactional worldview would prioritise the prediction of behaviours (Altman & Rogoff, 1987).

In comparison, research that adopts a *transactional worldview* aims to explore, identify and describe patterns of the relationship among various entities such as children and their playground environment (Altman & Rogoff, 1987; Werner et al., 1992). Such a worldview seeks to understand how these entities fit together and work together rather than focusing on which entity causes an effect (Altman & Rogoff, 1987; Werner et al., 1992). Stated otherwise, a transactional perspective would explore the whole phenomenon, which includes understanding its entities, their relationships with each other, and how the entities work in combination (Werner et al., 2002). Which relational entities are explored depends on the nature of the specific research, and no transactional research would capture all potential relational entities (Werner et al., 1992). This PhD thesis investigates and describes the patterns of relationships between children and their playground environment, including aspects of the immediate environment and, to a lesser extent, aspects of a broader ecological environment. From a transactional perspective, it is assumed that both the children and the environment have agency in contributing to their intertwined relationship (Kyttä, 2003). For example, children have preferences regarding what to play or what they want to experience. These preferences may have already been influenced and shaped

by the environment, indicating the unity between the child and the environment. Children also have agency as they act within their environment by engaging with the environment and by changing and shaping their environment to fit their needs. The environment itself also holds agency, as it offers opportunities for children to play and shapes what children perceive to be possible. Combined the child and the environment have a shared agency by continuously emerging new opportunities depending on the evolving relationship between the child and the environment. This implies that the relationship is ongoing and continuously being reconfigured among one another, yet relational patterns which are more stable might be observable. This perspective of continuously changing but also stable relationships is better understood by the integral role of time within a transactional worldview (Altman & Rogoff, 1987; Werner et al., 2002).

In theory Werner et al. (2002) suggest that temporality is an essential aspect of any phenomenon and should not be considered as a separate aspect in a transactional worldview. Temporal aspects can be thought of as both being stable and constantly changing (Altman & Rogoff, 1987; Werner et al., 2002). For example, one could study patterns of relationships among entities such as environment-children-play transactions, and analyse how these patterns are changing and/or remaining relatively stable over time (Werner et al., 2002). The idea of change is an inherent aspect proposed as an ongoing configuration between relational entities rather than being an outcome influenced by its entities (Altman & Rogoff, 1987). Essentially, change represents and recognises the uniqueness of each event, while stable aspects are identified by common patterns of relationships that are more consistent and may or may not allow for more general statements to be made (Altman & Rogoff, 1987). Werner et al. (1992) further elaborate on such more stable aspects and argue that a transactional worldview seeks general rules to understand a phenomenon better while still acknowledging the uniqueness of each event. This argument of acknowledging both stability and recognising the uniqueness of each event supports this thesis purpose of developing an instrument to capture relationships between the environment and children supporting

outdoor play. Identifying and describing such stable relationships between children and their environmental transactions including what play is afforded by what environmental characteristics, offers an opportunity to incorporate them into a proposed playground audit tool. However, a transactional perspective acknowledges the ongoing reconfiguration between children and their environment, which means there is always the potential for change. Occupational science has also adopted a transactional perspective in the last decade. To align a transactional perspective on occupation with this thesis, it is helpful to explore how occupational science has understood and described environmental aspects.

2.3 Environment in Occupational Science: Moving from Dualistic to Transactional Perspectives on Occupation

The environment has always been recognised as relevant when researching occupations. From a conceptual standpoint, the environment in occupational science is broadly described "as having physical-spatial, ecological, sociocultural, historical, [political] and spiritual dimensions, and being a source of symbolic meaning, affordances, novelty, attractors, and resources" (Hocking, 2021, p. 223). Therefore, the scope of environmental aspects in relation to occupation reaches a spectrum from a more immediate physical and social environment, including the spaces and objects and the people and attitudes, to a more distal context that includes policies, legislations, institutions, culture, norms, history and economy (Hocking, 2021).

Hocking (2021) reviewed how the environment was conceptualised in occupational science and noted a shift in how occupational scientists have utilised and understood the environment over the last 30 years. Initially, the environment was conceptualised from a more dualistic perspective where a focus was given to the agency of the person who is acting on the environment and occupations occur in the environment (Yerxa, 1990, 1993). The focus was delineated by people's adaptiveness in responding to environmental demands and challenges through using their skills and abilities or by people's efforts to control their environment to achieve a person-environment fit (Jackson, 1996; Yerxa, 1993). A person adapting to environmental demands and

environmental challenges was seen as improving opportunities for occupations (Clark et al., 1991; Wilcock, 1993; Yerxa, 1993). This understanding of the environment gave more agency to the person as a "competent, participating master of their environment" (Yerxa, 1993, p. 3) who retrieves information from the environment (Wilcock, 1993; Yerxa, 1990). In brief, as Hocking (2021) summarised, "the environment was understood to be a source of occupational challenges and demands, including behavioural conventions and expectations, but not a determinant of human behaviour" (Hocking, 2021, p. 223). Such a perspective of the environment gives the impression of being more one-directional, where the person has more agency than the environment.

The more recent conceptualisation of the environment and its relationship with occupations has foregrounded a transactional perspective (Hocking, 2021), which has been suggested to advance understanding of occupation (Aldrich, 2008; Cutchin & Dickie, 2013a; Dickie et al., 2006). The transactional perspective on occupations is understood as processes that unfold over time in space where both the people and the environment are relational agents, contributing to the transaction (Hocking, 2000) and where both the people and the environment are transformed in this process (Hocking, 2021). The transactional perspective on occupation adopted by occupational scientists draws from the work of American philosopher John Dewey (Cutchin, 2004; Cutchin & Dickie, 2013a). Likewise, the transactional worldview proposed by Altman and Rogoff (1987) in environmental psychology and described above also builds on Dewey's work (Dewey & Bentley, 1949). Due to its shared origin, it can be stated that occupational scientists following a transactional perspective adopted a similar belief system as proposed by environmental psychologists. Both environmental psychology and occupational science acknowledge the importance of a transactional perspective in understanding the relationship between people and their environment. However, environmental psychology places greater emphasis on the physical environment itself (Altman & Rogoff, 1987), while occupational science focuses more on the occupations people engage in (Wilcock, 1993;

Yerxa, 1990). Overall, a transactional perspective on occupations has been proposed as useful to overcome the dualistic, individualised and decontextualised perspective of occupation, which has been identified as problematic in research and practices in occupational science and occupational therapy (Aldrich, 2008; Dickie et al., 2006; Gerlach et al., 2018). This transactional perspective supports an understanding of occupations that centres on the unity of the person and environment relationship and their functional coordination (Aldrich, 2008; Cutchin & Dickie, 2013b).

To summarise, the environment has always been an essential aspect of researching occupations. However, there has been a shift in the understanding of this relationship. Previously, there was a more interactive understanding where the person acted on the environment. More recently, a more transactional understanding foregrounds the relationship between the person and the environment as a unity. This new understanding recognises that the environment and context have agency and contribute to occupation. Whilst environmental psychologists and occupational scientists advocate for a transactional approach, few guidelines exist, as yet, on how to operationalise research that adopts a transactional perspective for the study of physical environments and occupations. Addressing this need requires introducing an additional theoretical perspective. For this study, the theory of affordances emerged as being a valuable approach in this regard.

2.4 The Theory of Affordances

The theory of affordances was introduced by James J. Gibson (1904-1979), a psychologist and founding father of a branch of ecological psychology. Affordances are described as possibilities for action that someone perceives and then may actualise in their environment (Gibson, 1979). Gibson defined affordances as follows:

> The affordances of the environment are what it offers the animal[1], what it provides or furnishes, either for good or ill. The verb to afford is found in the dictionary, but the noun affordance is not. I have made it up. I mean by it

[1] By animal, Gibson referred to any organism relevant to the study of perception, including humans and animals. Literature in ecological psychology sometimes refers to individuals, organisms, or animals.

> something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment (Gibson, 1979, p. 127).

In other words, the perceptual concept of affordances[2] provides a way of understanding the environment-person relationship as a transactional one where affordances are potentially available, may be perceived, and may be actualised by individuals (Kyttä, 2002). According to Gibson (1979) affordances refer mutually to both the environment and the individual, meaning that affordances point in both directions to the environment and the person. This environment-person mutuality is represented in Gibson's philosophical standpoint, where a dichotomy of subjectivity and objectivity is dismissed. In simpler terms, affordances are neither solely environmental (objective) nor personal (subjective); they are intertwined between the environment and the individual (Gibson, 1979). Therefore, the theory of affordances is a good fit for a transactional worldview (Altman & Rogoff, 1987).

Heft (1988) has further theorised on the theory of affordances and outlined affordances as "perceived qualities that emerge from person-environment relations" (p. 32). For example, Figure 2 depicts a tree with strong enough branches and stems and smooth enough bark that might afford children climbing, or the horizontal to diagonal curved stems might afford children to sit and lean on to relax. However, the perceivable action of climbing might change when rain wets the stem, making it too slippery to climb and uncomfortable to sit on.

[2] Gibson (1979) based the theory of affordances on empirical evidence about how individuals visually perceive their immediate physical environment and the continuous flow of visual information from it.

Figure 2. *Affordances of a Tree*



Note. Photo taken by Thomas Morgenthaler 2022, Mature Tree Blarney Castle Park, Cork

Affordances are also ever-present and do not necessarily need an individual who is perceiving and actualising them (Gibson, 1979). Subsequently, affordances, even when they need to be understood as relational in the environment-person transactions, are also invariant or consistent, which means that they are always ready to be perceived (Gibson, 1979). Gibson explained this aspect of affordances with the following words:

> The affordance of something does not change as the need of the observer changes. The observer may or may not perceive or attend to the affordance, according to his[/their] needs, but the affordance, being invariant, is always there to be perceived. An affordance is not bestowed upon an object by a need of an observer and his[/their] act of perceiving it. The object offers what it does because it is what it is (Gibson, 1979, p. 130).

In simpler terms, affordances can exist independently regardless of whether an individual is actively perceiving the affordance (Heft, 2001).

Marketta Kyttä (2002, 2003, 2004), an environmental psychologist from Finland, has taken the idea of invariant or ever-present affordances and called them potential affordances. According to Kyttä (2002, 2003, 2004), affordances can be differentiated into *potential, perceived, used*, and *shaped* affordances. Potential affordances are understood as affordances that potentially exist that might or might not be perceived by an individual and further used (actualised) or shaped (changed to fit the use) according to the person-environment transaction (Kyttä, 2002, 2003). For example, the climbing, leaning on, and sitting on affordances perceived in Figure 2 above exist even when the child does not perceive and actualise these affordances in the moment. These affordances might exist for other users with different characteristics, such as a child with greater muscle strength. This means that multiple potential affordances exist simultaneously and may or may not yet be perceived and actualised (Kyttä, 2002, 2003).

Gibson's theory of affordances has been utilised by several disciplines, such as occupational science, landscape architecture, education, environmental psychology and industrial design (Heft, 1988; Jansson, 2010; Kernan, 2010; Lerstrup & van den Bosch, 2017; Lynch & Stanley, 2018; Norman, 2013; Sandseter, 2009; Storli & Hagen, 2010). The affordances theory could be considered a middle-range theory, as conceptualised by Merton (1967), who categorised middle-range theories as more specific and focused than grand-level theories but broader in scope than specific empirical hypotheses. This puts the theory of affordance in an ideal position to explain a phenomenon, for example, how the environments support and entice play, while at the same time allowing for further empirical testing and refinement.

2.4.1 Affordance Taxonomies

One helpful way in which affordances have been utilised in outdoor play research is through empirically derived affordance taxonomies, which describe a physical environment not by its concepts, but by its functionalities (Heft, 1988). This idea was already represented in Gibson’s original work on affordances, where he proposed that affordances are perceived by someone

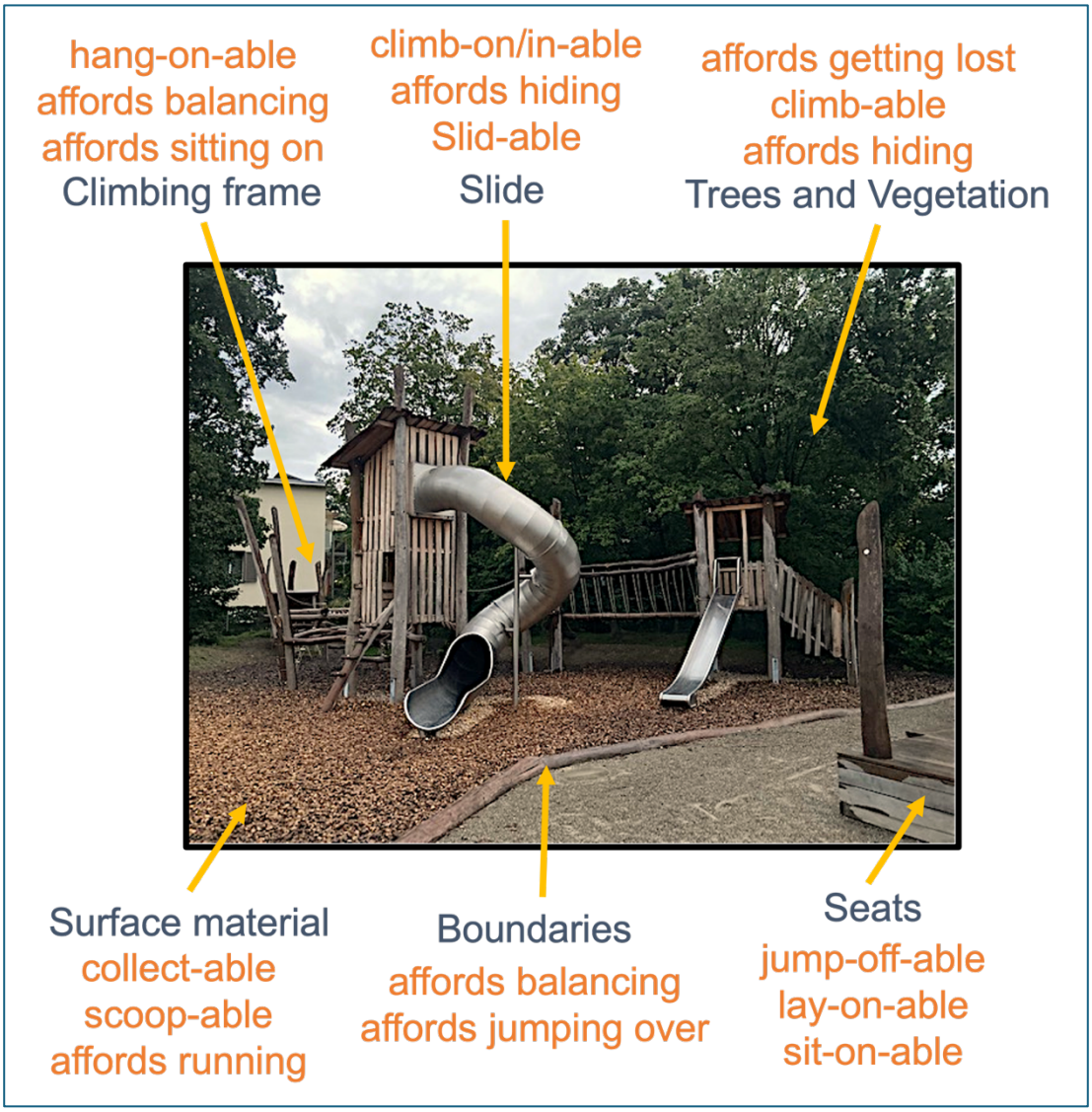
and not the abstract concept: “You do not have to classify and label things in order to perceive what they afford” (Gibson, 1979, p. 134). According to Gibson (1979), perceiving the environment is a direct process which opposes the notion of indirect or mental representations of the environment (as often proposed, for example, by occupational therapy, cognitive psychology, and other disciplines). In other words, Gibson (1979) stated, “to see these things [environment] … is to perceive what they afford. This is different from the accepted categories of what there is to perceive as described in the textbooks” (p. 240). Gibson (1979) further critiqued that these accepted categories of the environment are often how people talk, write and describe the environment.

Heft (2001, 2003) further elaborated on these two different ways people describe the environment, naming them *conceptual* and *perceptual meaning* (see Table 1 for a comparison). Conceptual meaning can be understood as an abstraction of the environment and provides only cognitive concepts or categories of the environment. Perceptual meaning highlights an affordance perspective, which is immediately experienced in the environment-person transaction, which is often subtle and habitual, leading to their potential oversight (Heft, 2001, 2003). This differentiation offers two ways in which environments can be described, written and discussed (see Figure 3 for an example of conceptual and perceptual meaning).

Table 1. *Distinction of the Conceptual and Perceptual Meaning of Heft*

Conceptual meaning	Perceptual meaning
Naming concepts or categorization	Affordances or meaningful functional significance perceived in the environment-person transaction
Is an analytical way and abstraction of the environment	Is directly perceived and unmediated experienced which is automatic and habitual.
Examples: slide	Example: sliding, climbing up, hiding in slide

Figure 3. *Examples of Concepts (Environmental Features) and Affordances*



Note. Photo taken by Thomas Morgenthaler 2021. Playground Oberwinterthur, Switzerland.

From this idea of different ways of describing the environment, environmental taxonomies have been proposed as useful in environmental analysis for outdoor play (Heft, 1988; Lerstrup & van den Bosch, 2017). The first attempt was made by Heft (1988), who conducted a secondary data analysis of three research datasets about children's outdoor environment use of approximately five to thirteen year old children. Heft (1988) extracted sections in the data set describing what a child was doing in and with what environment (child-environment transactions). Out of these extractions, a functional affordance taxonomy of children's outdoor environments was

created (see Table 2) (Heft, 1988). This functional taxonomy consists of ten different functional classes linked to potential affordances. Heft's taxonomy was further extended by scholars from Denmark, Lerstrup and van den Bosch (2017), who conducted a case study using observations in two pre-schools outdoor environment use (see Table 2 for a comparison). While these taxonomies explain the connection between environment and play, and how different environmental features support various play, they lack a clear method for operationalisation. Both taxonomies provided only a limited set of environmental characteristics, did not explain in detail how the data was extracted and analysed, and failed to describe the extend of the data sets. This thesis aims to find ways of making the concept of play value measurable and base it in the theoretical perspective of affordances. To do that it is necessary to explore and unpack the concept of play value based on its current understating in playground literature.

Table 2. *Heft's and Lerstrup & van den Bosch's Taxonomies*

Conceptual categories[1] (Heft, 1988)	**Affordances identified by Heft (1988)**	**Conceptual categories[2] (Lerstrup & van den Bosch, 2017)**	**Extension of identified affordances by (Lerstrup & van den Bosch, 2017)**
Flat, relatively smooth surface	• Affords walking, running • Affords cycling, skating, skateboarding	Open ground	• Affords driving • Affords playing ball, song • games, games in bigger groups
Relatively smooth slope	• Affords coasting down (e.g. on bike, wagon) • Affords rolling, sliding, running down • Affords rolling objects down	Sloping terrain	• Affords jumping down, climbing up, • Affords jumping over, building over, hiding in, sitting in
Shelter	• Affords microclimate • Affords prospect/refuge • Affords privacy	Shielded places	• Affords hiding in, lying in, sitting in
Aperture	• Affords locomoting from one place to another • Affords looking and listening into adjacent place	Not defined	

Attached object	• Affords sitting on • Affords jumping-on, over, down, from	Rigid fixtures	• Affords running around, hiding behind, building on
Climbable feature	• Affords exercise, mastery • Affords looking out from • Affords passage from one place to another (e.g. stairs, ladder)		• Affords lying-on, climbing, balancing-on, hanging by arms/legs
Non-rigid, attached object	• Affords swinging on (e.g. tree branch)	Moving fixtures	• Affords swaying-in, seesawing-on, looking out from, spinning, sitting in, lying on, springy, jumping
Graspable/ detached object	• Affords drawing, scratching • Affords throwing • Affords hammering, batting • Affords spearing, skewering, digging, cutting • Affords tearing, crumpling, squashing • Affords building of structures (e.g. raw materials for forts	Loose objects	• Affords picking, gathering, sorting, arranging, making patterns, • Affords throwing, sawing, carving, bending, breaking, thatching, crushing, hacking, • Affords tasting, eating, kicking in, walking on
Mouldable material	• Affords construction of objects (e.g. pottery) • Affords pouring • Affords modification of its surface features (e.g. sculpting)	Loose material	• Affords moving around, Affords moulding, smearing, kneading, smashing, digging-in, • raking, sifting, kicking in, gliding in
Water	• Affords splashing • Affords pouring • Affords floating objects • Affords swimming, diving, boating, fishing • Affords mixing with other materials to modify their consistency	Water	• Affords gathering, throwing into, jumping in, floating with the stream, building of dams
Not defined		Creatures	• Affords following, catching, caring for
Not defined		Fire	• Affords feeding, poking with sticks, sitting by, • Affords cooking, drawing with charcoal, putting out

Notes. [1]Heft (1988) originally termed them 'Functional classes of outdoor features.' [2]Lerstrup and van den Bosch (2017) originally named them 'Classes of outdoor features.'

2.5 Connecting the Theory of Affordances to the Concept of Play Value

Play value is the central construct that this thesis aims to find ways to operationalise. To make a concept such as play value measurable, exploring its meaning and how it has been described in the past is relevant (Bryman, 2012b).

This section summarises what is known about the concept of play value, followed by the conceptualisation of play value adopted in the playground audit tool under development. Before providing an overview of the play value concept, it is important to explore its two components: ***play*** and ***value***. Grasping the meaning of both terms is crucial for understanding play value.

For the first component of '*play',* the relevant question to ask is: '*How is play defined?'* Chapter One introduced a definition of play guided by the (UNCRC, 2013). It defines play as a process, recognised for its own sake, intrinsically motivated, directed by the child, and meaningful for the child in the here and now. However, play can also be defined from an instrumental perspective by emphasising outcomes of play such as learning, being physically active, or supporting social and motor development (for an critique see Lester & Russell, 2008, 2014). When play is valued as instrumental for growth and learning, the understanding of play value is inherently defined by whether an environment fosters these developmental outcomes. Therefore, how play is defined and valued reflects the positionality what play should do and subsequently also what environments such as playgrounds should do.

For the second component, '*value',* the following question needs to be discussed: '*Who assigns or defines values?'* This question is subsequently linked to the first component and the definition of play. If play is recognised for its own sake, then the value should be guided by the children themselves. What children want to play and what they want to experience in their play. While playing and experiencing should lay with the children themselves, the inquiry is raised about how the adults can provide an environment for play where children can still self-direct, initiate, and experience play important to them.

Although play preferences are individual to every child (Bundy, 2011), it is possible to gain a general understanding of children's play preferences through evidence literature on children's perspectives. Essentially it is important to understand how children utilise the environment for play and why. Since adults are often the gatekeepers to children's play (Finney & Atkinson, 2020; Gemmell et al., 2023; Sterman et al., 2016), it is relevant that adults carefully position their understanding of play and underlying values. This thesis is about children's play and what children want to experience while playing on playgrounds; therefore, I am positioning myself as an adult trying to understand children's play preferences and desires for play and how the playground environment could support these play occupations.

2.5.1 Understanding the Multiple Conceptualisations of Play value

Overall, play value is a difficult concept to define, and no clear or commonly used definition has been found in the literature. In total, 17 pieces of literature were identified that mentioned play value spanning from 1987 to 2023. Before going into the details of each of these papers some key insights of this review are presented. One key insight includes that the construct of play value is consistently used to foreground the role the environment has on play. In other words, the value *for* play that the environment, including any play equipment, objects, materials, spatial characteristics, social characteristics, or atmospheric characteristics, brings to children's play and the experiences children desire while playing. Another key insight is the shift in how the play value construct was utilised over time. This shift appeared from an argumentation of the benefits of development through play (Ball, 2002; Frost, 1992; Heseltine & Holborn, 1987; Woolley & Lowe, 2013), to the argument of opposing play value against safety considerations (Ball, 2002; Frost, 1992; Heseltine, 1995; Heseltine & Holborn, 1987; National playing fields association, 1995), to direct perspectives to valuing a diversity of play affordances (including different play types) for children with diverse backgrounds including disabilities (Casey & Harbottle, 2018; Children's Play Policy Forum & UK Play Safety Forum, 2022; Frost, 1992, Frost, 2006; Lynch,

Moore, Edwards, et al., 2018; Lynch, Moore, & Prellwitz, 2018; Moore et al., 2023; Parker & Al-Maiyah, 2022; Playright, 2016; Wenger, Lynch, et al., 2024; Woolley & Lowe, 2013), and most recently to highlight perspectives of children's experiential meanings while playing (Lynch, Moore, Edwards, et al., 2018; Wenger, Lynch, et al., 2024). Altogether, four different perspectives of how play value were formed and clustered:

(1) Play value is understood by developmental benefits
(2) Play value is understood by the diversity of play affordances (or play types) supported by environmental features
(3) Play value is understood by a playground design/provision catering to users with diverse backgrounds, ages and abilities
(4) Play value is understood by children's subjective experiential meanings of play.

The four perspectives in which play value was understood are not entirely distinct but rather overlapping. However, clustering the literature on play value into these four perspectives allowed it to differentiate the concept of play value and create diverse avenues for investigation and operationalisation. The four clusters in which play value was understood are presented in the next section and provide the starting point for operationalising play value in this thesis.

(1) Play Value is Understood by Developmental Benefits

Play value understood by developmental benefits explains how the environment caters for a greater diversity of developmental and learning opportunities. For example, Frost (1992) noted play value as an avenue for learning and development by describing active, social and creative play value. An outcome and developmental focus underline this understanding of play value; whereas active play value "contributes to the development of a child's coordination, balance, and strength" (p.185-186), social play value "encourage group interaction or relationship" (p.186) and creative play value "provide an opportunity for children to use their imagination to shape and build their environments" (p.186). In line with the understanding of play value for

developmental benefits, several authors argue that playground safety standards are too strict and should be questioned (Ball, 2002; Frost, 1992; Jambor, 1996; National playing fields association, 1995). These authors argued that the play value of playgrounds is diminishing or is overshadowed by safety measures, resulting in a reduction of adequate learning and developmental opportunities (Ball, 2002; Frost, 1992; Jambor, 1996; National playing fields association, 1995).

In essence, play value understood through developmental benefits prioritises the long-term outcomes or future potential for children through play rather than valuing play for its own sake in the present moment. Therefore, this interpretation of play value was excluded, as it did not align how play was defined in the thesis.

(2) Play Value is Understood by the Diversity of Play Affordances (or Play Types) Supported by Environmental Features

This understanding of the play value concept explains how environmental features support diverse play affordances or play types. For this play value understanding two aspects need to be explored: first, play affordances (and play types), and second, environmental features.

While some authors referred to play affordances (Casey & Harbottle, 2018, p. 9; Playright, 2016), other authors referred to play types as a more abstract way to cluster play affordances (CPPF & UKPSF, 2022; Moore et al., 2023; Parker & Al-Maiyah, 2022; Woolley & Lowe, 2013). Three almost identical definitions of play value were identified in grey literature align with this play value understanding; however, none of the references referred to one another and therefore are all presented individually (See Table 3).

Table 3. *Definitions of Play Value Identified in Grey Literature*

Definitions of play value
"The term 'play value' is used to describe the value an environment, object, or piece of equipment brings to children's experience of play. Something may be described as having high play value if children are able to play with it in many different ways, integrate it into their own play or use it to expand or elaborate on their own ideas and actions. Simple play things (e.g. sticks, balls, sand) and 'classic toys or games often have high play value than complex and expansive toy or equipment" (Playright, 2016, p. 12).
"The term 'play value' is also used to describe the value an environment, object or piece of equipment brings to children's experience of play. Something may be described as having high play value if children are able to play with it in many different ways, integrate it into their own play or use it to expand or elaborate on their own ideas and actions. A tree stump may have huge play value as a spark to the imagination: a stage, a den, a prison, to jump off or lie on " (Casey & Harbottle, 2018, p. 9).
"Play value describes the value an environment, object or piece of equipment brings to children's experience of play. A space rich in play value creates opportunities for a variety of physical, social and sensory play experiences. Something will have high play value if children are able to play with it in many different ways, integrate it into their play or use it to expand on their own ideas and actions" (Children's Play Policy Forum & UK Play Safety Forum (CPPF & UKPSF) 2022, p. 2).

The play affordances argument becomes most clear by Casey and Harbottle (2018), who wrote:

> The 'affordances' of an object or space are all the things it has the potential to do or be for different children. A swing for example may have been created to swing on, but children may use it as a gathering place; to sit and chat; they may stand on it and yell; it's a place to put your collection of leaves; it's a barrier in hide and seek and so on (p. 9).

Furthermore, Casey and Harbottle (2018) noted that an affordance perspective of play value may look at the diversity of potentially available play affordances across the entire playground.

An abstraction of play affordances through play types is a common way to understand this play value perspective (CPPF & UKPSF, 2022; Moore et al., 2023; Parker & Al-Maiyah, 2022; Woolley & Lowe, 2013). Woolley and Lowe (2013) translated the identified developmental benefits[3] to the five play types: constructive, functional, fantasy, social and games with rules. Parker and Al-Maiyah (2022) noted nine different physical play types, five non-physical play types and five social play types. Moore et al. (2023) described four play types of physical play, sensory play, social play and cognitive/dramatic/imaginative play and provided examples of play affordances in each of these play types. While Woolley and Lowe (2013) and Moore et al. (2023) noted play types that are supported by play equipment as well as other features of the playgrounds such as landscape, pathways, materials, and others, Parker and Al-Maiyah (2022) only focused on play equipment neglecting other features relevant for play.

After elaborating on how play affordance and play types are utilised in the literature to describe play value, the next step is to explain how the environment relates to play affordances and play types. For example, two of the definitions of play value (see Table 3) referred to different environmental features including toys, natural loose parts, materials like sand, play equipment, natural features such as tree stump, boulders, vegetation, and hills and mounds (Casey & Harbottle, 2018; Playright, 2016). This is in line with Woolley and Lowe (2013), who defined in total 12 different environmental features, including fixed and moveable play features, open spaces, variety of size of space, vegetation, variety in landform, loose materials, natural materials, water and sand, boundaries and fencing, seating, surface material. Woolley and Lowe's (2013) offer an approach to assessing play value by counting the amount and variety of these environmental features which are

[3] Woolley and Lowe (2013) based their play types of play value based in previous scholars that focused on developmental benefits (Play value understating 1; See above).

theorised to afford play. Casey and Harbottle (2018) emphasised the importance of understanding play value beyond play equipment and consider the whole space. They argued that “the play value of a play space is not … associated solely with the variety or quantity of equipment but with all the ways children can play in the whole space“ (p. 9). However, Casey and Harbottle (2018) did not provide a way of evaluating this premise. Wenger, Lynch and colleagues (2024) described the environment by two attributes of variety and variability of environmental features. Variety was proposed by variety of open spaces and in-between places and variability was stated as flexibility in the variety of play experiences noted in the variety of designed (play equipment) and non-designed aspects (nature and loose parts) (Wenger, Lynch, et al., 2024). Combined, all these authors emphasise the importance of the diversity of different spaces, objects and materials provided to support versatile play affordances and play types.

A unique aspect regarding environmental features was elaborated on by Frost (1992) by emphasising the importance of understanding environmental features in combination which could enhance each other play value. Frost (1992) provided examples such as “the play value of sand is enhanced by the provision of a second fluid material, water, and this is further enhanced by … providing sand and water play materials [such as] buckets, pans, shovels, and strainers” (Frost, 1992, p. 102). Therefore, the combination of different spatial features and objects/materials in the playground and how those are combined might be relevant to a playground’s play value.

Overall, this understanding of play value as the quantity and diversity of play affordances (or play types) supported by environmental features is most prominent in the literature. Play value is understood by the diversity and richness of potential play affordances or potential play types available to children, which are afforded by diverse environmental features and their combinations. This conceptualisation can be understood as the versatile use of the playground, which is something that will be further unpacked in Study 2, (Paper II).

(3) Play Value is Understood by a Playground Provision/Design Catering to Users with Diverse Backgrounds, Ages and Abilities

The understanding of play value as part of playground provision for children with different backgrounds, ages and abilities is more recent and draws from the literature originated around the topic of including and providing play opportunities for children with diverse abilities (Casey & Harbottle, 2018; CPPF & UKPSF, 2022; Lynch, Moore, Edwards, et al., 2018; Lynch, Moore, & Prellwitz, 2018; Moore et al., 2023; Parker & Al-Maiyah, 2022; Playright, 2016; Wenger, Lynch, et al., 2024). The CPPF & UKPSF (2022) argued the importance of equally rich play value for children with and without disabilities. Lynch et al. (2020) noted the need for challenging and varying complexities "that cater for people of different ages and abilities, resulting in equality of experience" (p. 120). A different perspective comes from Moore et al. (2023) reviewed inclusive playground guidelines and identified play value design considerations needed when playgrounds for children with disabilities are designed. These design considerations included 'engaging people of all ages and abilities' for example meaningful opportunities for inclusive, intergenerational play, 'selecting playground equipment' with a focus on careful consideration of the social experience in play available to everyone, 'accessing play space equipment' for example to play opportunities that are potentially most fun and 'grouping play space equipment' that does not segregate children based on age and ability. Combined, this reviewed literature exemplifies how play value and usability are linked together.

To sum up, this recent understanding of play value argues for the importance of a diverse environment that considers diverse users on the playground, including their ages, abilities, and backgrounds. Thus, usability can be thought of being part of the play value concept.

(4) Play value is Understood by Children's Subjective and Experiential Meanings of Play

This understanding of play value centres around children's subjective and experiential value afforded by the environment. There is an

interconnection between play affordances (what children perceive to do and may act upon, the observable) and what children prefer and want to experience while playing (the meaning experienced while playing, the unobservable). Wenger, Lynch et al. (2024) explained this relationship as follows: “Play value is characterised by the things they [children] do in playgrounds and the meanings that arise from these doings afforded by the playground environment“ (p.14). This means that experience and meaning develops while being engaged in the play. Lynch, Moore, Edwards, et al. (2018) elaborated on this relationship and noted play value by subjective and experiential values for the individual user. This understanding of play value from the user perspective defines play value by experiential opportunities while being engaged in play, such as the opportunities for challenge, risk, and fun (Lynch, Moore, Edwards, et al., 2018). Lynch, Moore, Edwards, et al. (2018) portrayed that the “play experiences that offer the most fun and that are most popular for the children are those that have highest play value” (p. 142). Such a conceptualisation of play value tries to unpack the connections between how an environment can provide valued play experiences while being engaged in play.

Several identified sources described different play experiences such as experiencing fun, excitement (Lynch, Moore, Edwards, et al., 2018; Wenger, Lynch, et al., 2024), challenges, risk, mastery, achievement (Lynch, Moore, Edwards, et al., 2018; Lynch, Moore, & Prellwitz, 2018; Moore et al., 2023; Wenger, Lynch, et al., 2024; Woolley & Lowe, 2013), experiencing opportunities to create and shape the physical environment (Lynch et al., 2020; Wenger, Lynch, et al., 2024) or described as an experience of incorporating the environment into their play and expand on own ideas and actions (Casey & Harbottle, 2018; CPPF & UKPSF, 2022; Playright, 2016), experiencing social opportunities including play with and along other children (Casey & Harbottle, 2018; Lynch, Moore, & Prellwitz, 2018; Wenger, Lynch, et al., 2024) and experiencing a welcoming atmosphere for play (Wenger, Lynch, et al., 2024).

To sum up, the experiential meanings of play value are most recently linked to the concept of play value. A diversity of play experiences relevant to children has been identified. This understanding of play value centres around children as the primary informants of play. A relationship is anticipated between what children do (actualised affordances) and what children want to experience (associated meanings).

2.5.2 Initial Conceptualisation of Play Value in this Thesis

As explored in detail play value might be understood in four different perspectives, which are overlapping. This study aims to construct an audit tool to evaluate the physical environment of public playgrounds for play value, drawing from perspectives two, three and four. Primarily, this study focuses on the diversity of potential and multiple play affordances supported by diverse, varied and combined environmental features supported by conceptualisation two, which was also identified to be the most prominent perspective of play value and, therefore, promising for further and more nuanced extension. The understanding of play value by play experiences (conceptualisation four) will also be considered by gaining a better understanding of these play experiences valued by children (Study 1, Paper I). Conceptualisation three of play value of playgrounds catering to diverse user groups will be further considered by incorporating the concept of usability (See definition in Chapter One).

2.6 Summary of Chapter Two

This chapter aimed to provide an overview of the theoretical frameworks that guided this study and reviewed in detail the central concept of play value in this thesis. Taking a transactional perspective as a starting point guides the worldview. This perspective recognises the interconnected relationship between the playground environment and the children. It emphasises the relevance that we can only fully understand outdoor play within the environment that shapes and influences the play occupations. A transactional worldview foregrounds the need to research the changing and stable

relationships between the environment and children. This chapter also elaborated on the theory of affordances as a helpful approach to understanding these transactional relationships. Finally, this chapter unpacked the concept of play value, which was identified as ambiguous and overlapping. With a comprehensive review of the concept of play value, this chapter provides an initial start to situate play value from the perspective of an environment that affords potential and diverse play and play experiences for children of varying abilities. This suggests a potential way play value might be operationalised by a playground audit tool aimed to be developed in this thesis.

Based on this foundation the Third Chapter aims to review previous research to provide additional argument for this thesis purpose of developing an evidence-informed playground audit tool to capture play value for diverse user groups.

CHAPTER THREE — REVIEW OF THE LITERATURE

"The best playgrounds are never finished but evolve to meet children's changing needs"
(Frost & Woods, 2015, p. 337).

3.1 Introduction to Chapter Three

Playgrounds are the main setting of interest in this thesis. In Chapter One, playgrounds were defined as spaces open to the public in diverse community settings, including parks and schools (Burke, 2013; Woolley & Lowe, 2013). Playgrounds may be located in diverse settings, including inner cities, suburban neighbourhoods, rural villages or other natural landscapes such as forests and sea sites (Hahn, 2018). Hahn (2018) offered an overview of today's playgrounds, which present a great variety of play equipment that may stand alone or be integrated into larger structures constructed from wood, plastic, rock, or metal. The design and layout of playgrounds can vary significantly, reaching from being more abstract to more suggestive structures, and their surfacing may consist of concrete, rubber, grass, wood chips, sand, gravel, or other materials (Hahn, 2018). Moreover, playground sites may be flat or feature topographical variation (Hahn, 2018). Playgrounds are noted as an essential part of the contemporary landscape to cater to outdoor play, especially in the literature covering the global north (Kylin & Bodelius, 2015; Pitsikali et al., 2020), and with a prediction that about 60% of all children will call urban environments their home by 2030, (UNICEF, 2018a) playgrounds will just become more relevant to be high in play value for all children.

Chapter Three will review the literature and research on playgrounds, outdoor play on playgrounds, designing for play, and playground auditing processes. This will provide an overview of the literature leading to the research gap of supporting the development of a new audit tool that captures the play value and usability of playgrounds. Chapter Three starts with a brief history of playgrounds, then considers the influencing nature of the physical environment on the play, followed by summarising identified problems in

playground provision from the users themselves, and concludes with a review of available audit tools and their potential benefits for using them in practice.

3.2 A Brief History of Playgrounds

From a historical perspective, the idea and development of playgrounds can be understood within situated movements, concerns, and societal discourses at a given time. Lester (2020) and Pitsikali et al. (2020) identified that the historical developments of playgrounds are aligned with fears about the loss of childhood and potential deficits and concerns about children's futures. It is relevant to understand the historical influences of the playground movement as these are lingering into contemporary playground provisions to date (Lester, 2020; Winder, 2023) and, therefore, influence how playgrounds are evaluated. This section of Chapter Three will overview some historical developments in playground evolution from the global north. It includes growing motorisation alongside a changing societal perspective that considers child welfare, the idea of developmental benefits of playgrounds, and the development of playground standards, all of which influenced playground development and current playground provision.

Motorisation. In the USA and Europe, playgrounds emerged as a response to the growing threat posed by motor vehicles in the early to middle of the 20th century (Gill, 2021). This sparked the creation of designated spaces where children could play safely and away from dangerous streets (Gill, 2021; Kernan, 2005). For instance, in New York City, concerns about children who play on streets were described as a risk to children's safety and health because the streets were seen as dirty and frequented by vehicles (Hart, 2002). Consequently, playgrounds were established to provide safe spaces for children to play, which separated children from the danger of the streets (Gill, 2021; Hart, 2002; Lester, 2020). Motorisation is an ongoing challenge and continues to influence contemporary playground provisions, for example, in the argument of needing fences and boundaries to separate playgrounds from dangerous streets. In some contexts, the presence and extent of boundaries have been criticised for isolating playgrounds from other public spaces, creating designated zones where outdoor play is accepted and deemed to be

safe (Gill, 2021; Pitsikali & Parnell, 2020). Motorisation and street traffic are not the only reasons why playgrounds are sometimes fenced, but they are often used as an argument for keeping children physically safe on playgrounds (Gemmell et al., 2023; Visser & van Aalst, 2022).

Child welfare. In line with getting children away from dangerous streets, playground provision was also influenced by the growing importance of the children's welfare movement. For example, in the early 20th century in New York City playgrounds were established as a safe solution for keeping children away from the crime and violence associated with street life (Hart, 2002). At the same time, this welfare movement of playground provision was seen to monitor where children played, to assure adults that the children stayed out of trouble (Gill, 2021; Hart, 2002). Therefore, playgrounds were utilised "for getting children off the street, away from bad influences and under the control of known socialising agents" (Hart, 2002, p. 138). For example, sand gardens, which were inspired by a German model of Friedrich Fröbel, the founder of kindergarten, were installed in the late 19th century in disadvantaged districts in Boston to improve the living conditions of children (Cavallo, 1981 as cited in Frost & Woods, 2015, p. 338). Similarly, in the 1930s, playgrounds were proposed by welfare organisations in Dublin to provide children with a space to play that met sanitary conditions and was supervised by adults (Kernan, 2005). With such child welfare moments of the era, funds were allocated to expand the provision of playgrounds, for example, in New York (Hart, 2002). Since the 1980s, other movements can be observed which also relate to children's outdoor play opportunities in playgrounds as well as beyond playgrounds often underpinned by the Convention on the Rights of the Child, such as the right to play (UNCRC, 2013) as elaborated on in Chapter One, or the child-friendly cities (and communities) initiative (UNICEF, 2018b).

Developmental benefits. Another reason why playgrounds were established was the underlying idea of supporting children's development such as their cognition, social skills and physical fitness (Frost & Woods, 2015). Frost and Woods (2015) argued that these longstanding traditions of linking playgrounds with being physically active and other potential developmental

benefits remain prevalent to this day. For example, systematic review studies focused on the relationships between playground provision and supporting fundamental movement skills (Pawlowski et al., 2023), being physically active (Escalante et al., 2014; Wray et al., 2020) and supporting physical, cognitive, social, and emotional development or health outcomes (Dankiw et al., 2020; Gately et al., 2023; Gibson et al., 2017; Pereira et al., 2024; Schipperijn et al., 2024). While these studies provide important arguments for why outdoor play on playgrounds is essential, their focus on children's future outcomes often ignores the importance of play for its own sake for children in the present.

Playground standards are a more recent development in playground provision that has transformed many contemporary playgrounds into an increasingly uniform and fairly formulaic design (Frost et al., 2004; Gill, 2021; Hart, 2002). Woolley (2007) expressed one widespread design solution in the United Kingdom as "KFC playgrounds", referring to "the Kit of equipment, the Fence to keep the dogs out – or children in – and Carpet of expansive rubber surfacing" (p.6). In other world regions, some uniform design solutions might be termed 'cookie-cutter playgrounds' (USA) or 'plastic-fantastic playgrounds' (Australia) (Gill, 2021). This uniformity of playgrounds partly reflects contemporary challenges playground providers face in many societies of the Global North, including increased concerns about liability resulting from physical injury on playgrounds (Ball, 2002; Gill, 2018; Solomon, 2017). In response to such safety concerns, stricter playground standards favour a limited range of pre-tested manufactured play equipment, and substantial safety surfacing has been adopted to minimise injury risks and potential litigation (Gill, 2018; Solomon, 2017). Such playground standards could be defined as

> industry-led documents that cover the design, construction and installation of fixed, manufactured playground equipment including swings, slides, dynamic equipment and climbing and platform structures. They also set criteria for the use of impact absorbent surfacing, fall heights and hazard-free fall zones for different types of equipment, and performance criteria. They may also include sections on maintenance and inspection regimes (Gill, 2018, p. 17).

These playground standards have an influencing role in playground guidelines and policies regulating current playground provisions. Critical perspectives emphasised that many contemporary playground safety standards overstep their ground because the strict parameters outlined substantially limit the range, variety and challenge of play activities which 'acceptable' playground features can provide (Ball et al., 2019; Spiegal et al., 2014; Verstrate & Karsten, 2016). They argue that standards must be more clearly distinguished between genuine safety hazards and appropriate risks, which are part of healthy and appealing play opportunities (Brussoni et al., 2015). Over the last decades, awareness about playground standards that are too strict has grown, and play advocates, architects, designers, playground users, and policymakers have begun implementing new standards and regulations that influence how playground provision evolved (Play Scotland, 2024). Recently, the International Organization for Standardization (IOS) has recognised this criticism by introducing a new standard highlighting the necessity of assessing playgrounds not only to ensure that playgrounds are safe but also to provide significant play value for children (IOS 2023). This new IOS 4980:2023 (Benefit-risk assessment for sports and recreational facilities, activities, and equipment) provides an internationally applicable document that addresses the need for a balanced approach in evaluating a playground's benefits along with potential hazards (IOS 2023). The new IOS 4980:2023 needs to be understood as a guiding framework for considering concepts such as play value next to safety regulations. However, it does not provide a finalised tool. Thus, the IOS 4980:2023 provides an internationally relevant call for measures that support evaluating the quality of playgrounds, for example, via concepts such as play value.

To sum up, playgrounds were historically created to provide spaces for children to play. However, playgrounds had underlying motives such as physical fitness, development, socialisation, and keeping children in an allocated space that adults saw as a safe space for play. More recent developments in playground provision are outlined, including the introduction of standards as a response to societal discourse of the fear of children getting

hurt on playgrounds. Some of these underlying motives of playgrounds are still represented in current playground provisions, and awareness of these historical developments is relevant to keep in mind as they could also influence how playgrounds are evaluated to date. Having established the relevance of considering playground audit tools for play value from a historical perspective, we must now understand how the environment, especially the physical built and natural environment of playgrounds, influences what children can do there. Therefore, the following section will review research on the connection between play and environment, including what kind of play is expected to happen in what environment.

3.3 Design for Play

Pre-post intervention studies have shown that carefully altering playground environments aiming to provide more play opportunities can lead to a greater diversity of available play affordances. These studies usually use different kinds of observational measures, such as behaviour mapping or measures of physical activity levels in two or more time points before and after the redesigning periods. For example, Brussoni et al. (2017) redesigned the outdoor playground of two pre-schools by adding more natural features, natural materials and natural loose parts. They found an increase in the diversity of play as well as an increase in pro-social engagement between children (Brussoni et al., 2017). Similar results were found by Farmer, Fitzgerald et al. (2017) and Farmer, Williams, et al. (2017), who altered the physical environment by leaving cut tree logs behind, letting the grass grow higher, introducing loose parts, and providing suitable clothing for wet weather. They found that children engaged in more risk-taking and challenging play opportunities after alterations (Farmer, Fitzgerald, et al., 2017; Farmer, Williams, et al., 2017). Kuh et al. (2013) redesigned a preschool outdoor playground focusing on including more natural features and natural loose parts. In a post-installation observation, they found more diverse play opportunities and a longer-lasting engagement in the redesigned playground areas (Kuh et al., 2013). Similarly, Squires et al. (2024) found longer lengths

of engagement in free play in naturalised playground designs. These authors noted that the re-designed naturalised playground provided a greater diversity of affordances than the equipment-based playground before the intervention (Squires et al., 2024). Other research described alterations to the physical environment aiming to increase the free active play of children in school playgrounds (Frost et al., 2018; Squires et al., 2024; Webster et al., 2023). Webster et al. (2023) introduced floor markings on hard surfaces, which did not result in the study's aim of higher intensity of physical active play and Frost et al. (2018) redesigned a school playground by introducing new play equipment and toys such as balls, hula hoops that supported higher intensive free active play. Other intervention studies focused on modifying both the physical and the social environment (Bundy et al., 2011; Engelen et al., 2013; Niehues et al., 2013; Ramsden et al., 2022; Sterman et al., 2020). For example, interventions aimed to provide loose parts in schoolyards to support numerous and unscripted play opportunities (Bundy et al., 2011; Chard & Pierse, 2011; Sterman et al., 2020), addressed adults' attitudes regarding children's risk-taking behaviour (Niehues et al., 2013), reframed teaching staff's perspectives regarding the value of play in their school culture (Grady-Dominguez et al., 2021) and addressed changes in rules and policies governing free play opportunities in pre-schools (Ramsden et al., 2022). Combined, these findings from intervention studies provide evidence for the importance of the environment as to how it can be the target of interventions. Such environmental interventions contribute to playground design which enables a shift to more diverse play occupations.

Besides intervention studies, a lot can be learned from studies that researched how children utilised different environmental features in their unstructured play, such as between-group comparison or between playground-type comparison study designs. Some studies compared different types of playgrounds, such as those dominated by manufactured play equipment, versus those that included natural environments and loose parts. For example, playgrounds with varied topographical features, open spaces, natural features, loose parts and materials supported diverse open-ended

play, including playing with peers, constructing, exploring or imaginative play (Cetken-Aktas & Sevimli-Celik, 2023; Dankiw et al., 2023; Fjørtoft, 2001; Loebach & Cox, 2022; Luchs & Fikus, 2013; Zamani, 2016), and supported more self-directed risk-taking opportunities (Cetken-Aktas & Sevimli-Celik, 2021; Loebach et al., 2023; Loebach & Cox, 2022). Meanwhile, playgrounds dominated by manufactured play equipment tended to foster more repetitive physically active play, which was observed as limiting play to one specific form of play (Cetken-Aktas & Sevimli-Celik, 2023; Dankiw et al., 2023; Dyment & O'Connell, 2013; Luchs & Fikus, 2013; Zamani, 2016). Cetken-Aktas and Sevimli-Celik (2021) reported that when no or limited natural features were provided on playgrounds, children tended to walk around, looking for something to do, and there were few risk-taking opportunities. Some studies suggested the importance of considering both in playground provisions, natural environmental features including loose parts, and play equipment, which in combination, contribute to different play opportunities (Cosco et al., 2010; Dankiw et al., 2023). Other studies found that the presence of certain playground features was significantly associated with longer stays on the playground and the play duration, such as the provision of restrooms, mature trees, larger playground sizes and variations of play opportunities including swinging, climbing and spinning (Cohen et al., 2023).

Largely unexamined research has focused on specific environmental features, their characteristics, and how they relate to specific play opportunities. For example, characteristics of surfaces such as asphalt and rubber surfaces were identified to support functional play, which is more physically active play, and forest floor and sand surfaces support more constructive play opportunities (Storli et al., 2024). In addition to surfaces, the layout characteristics of playgrounds might have a similar impact. For pathways, Cosco et al. (2010) found that children preferred pathways that loop around circularly compared to straight paths when children engaged with toys with wheels (such as bikes and scooters). Additionally, the ground surface characteristics influenced how paths were used as children preferred firm surfaces such as concrete, asphalt or compacted soil in contrast to loose

materials such as sand or woodchips when engaged with wheeled toys (Cosco et al., 2010). Others have pointed out the relevance of understanding what topography characteristics, such as steepness, support diverse play (Loebach et al., 2023; Loebach & Cox, 2022). Loebach & Cox (2022) found that variety in topography, which they described in varying-sized boulders and stumps, supported diverse play forms and graduated challenges for the observed children. Such research indicated the relevance of environmental characteristics that afford specific and diversity of play.

In summary, these research findings highlight the significance that the physical environment has in supporting, shaping, and influencing children's outdoor play. Previous research explored the impact of the type of playground, certain features of the playground, and specific characteristics of features on the form of outdoor play. Furthermore, this section highlighted that intervening with the physical environment impacted what form of play is afforded and is therefore relevant to further investigation.

3.4 Design for Diverse User Groups

The reviewed research above primarily used data by observing children's usage of playground environments, giving a solid understanding of the environment-child-play relationship. This section will review research that considers children's and their caregivers' perspectives on playgrounds and highlights the problems regarding playground design and provision they identified. A particular focus will be given to the perspectives of the user group of diverse abilities, such as children with disabilities and their caregivers.

Both children and their caregivers value playgrounds highly (Sterman et al., 2016; Wenger, Lynch, et al., 2024). From the children's perspective, playgrounds are valued spaces that offer opportunities for fun, risk-taking, self-directed challenges, and a space to be with friends and family (Haq et al., 2023; Wenger, Lynch, et al., 2024). Caregivers described playgrounds as essential spaces for the whole family, which offer diverse social opportunities, including forming new friendships and meeting new and known families from the community (Black & Ollerton, 2021; Luna-Lupercio et al., 2024; Lynch et al., 2020; Qiao, 2019; Stanton-Chapman & Schmidt, 2017). Also, caregivers

expressed a feeling of belonging for playgrounds they visited most often (Chen et al., 2020; Lynch et al., 2020) and valued these spaces as they offer opportunities for children's social and physical development and well-being (Luna-Lupercio et al., 2024; Sterman et al., 2016). A systematic review of qualitative studies on the parental perspectives of outdoor play on playgrounds discovered that playgrounds were especially valued environments that provide free and unstructured play opportunities without set objectives for their child with a disability (Sterman et al., 2016).

Despite the overall value of playgrounds as spaces for the community and free outdoor play, users also identify persistent problems with playgrounds. These problems include mismatching what the users want and what is provided, which leads to children's perspectives not being considered, and playground professionals' lack of understanding of user preferences and play needs, each of which will be explored next.

3.4.1 Mismatching What the Users Want and What is Provided

Previous research has revealed a significant mismatch between children's play preferences and existing playgrounds. For instance, playgrounds often fail to cater to the needs of the youngest and oldest children (Luna-Lupercio et al., 2024; Lynch et al., 2020; Stanton-Chapman & Schmidt, 2017). Children reported that playgrounds become increasingly boring for older children (Black & Ollerton, 2021; Caro et al., 2016; Lynch et al., 2020) and lack variety, leading to repetitive play over time (Caro et al., 2016; Jansson et al., 2016).

Besides that, a lack of physical accessibility within the playground is particularly highlighted in studies investigating children with disabilities' perspectives and their caregivers. For example, caregivers as well as their children who had physical disabilities found inaccessible surfacing and the form of ground cover a significant barrier to play (Luna-Lupercio et al., 2024; Lynch et al., 2020; Prellwitz & Skär, 2016; Talay et al., 2010; van Engelen et al., 2021). Some users pointed to the need for flat ground, which is firm enough to roll on and support access to various play opportunities (Ripat & Becker,

2012; Stanton-Chapman & Schmidt, 2017), including equipment on elevated levels (Lynch et al., 2020; Ripat & Becker, 2012). Prellwitz and Skär (2016) found that inaccessibility restricted children to onlooker play, while Lynch et al. (2020) discovered that inaccessibility forced children to rely on parental assistance to use the playground. These studies pointed out that playgrounds were more accessible to younger children due to caregivers' help, but older children with physical disability were not just heavier, they also sought more independence from their caregivers (Lynch et al., 2020; Prellwitz & Skär, 2016; Ripat & Becker, 2012; van Engelen et al., 2021). This means that design must account for diverse needs, including those with disabilities to ensure accessibility. For those unfamiliar with users of diverse abilities, it may not be obvious that design choices can unintentionally create barriers for a wide range of users.

The usability of playgrounds was also expressed to be low for some users with disabilities, including as examples, for children with vision impairments or partial blindness, playgrounds did not have enough colour contrast (Prellwitz & Skär, 2016); for children with muscle weakness, the play equipment needed too much force to be used, and no opportunities with full-body support were considered (Birkner et al., 2021; Luna-Lupercio et al., 2024); for children with cochlear implants, plastic slides that build up electric charge were unusable, and no other sliding mechanisms where considered (Luna-Lupercio et al., 2024); for children with intellectual disabilities playgrounds were too complex (Birkner et al., 2021; Prellwitz & Skär, 2016; Ripat & Becker, 2012), and for neurodiverse children who experienced sensory sensitives playgrounds sometimes were experienced as too noisy with little opportunity to withdraw (Burke & Stafford, 2023; Fahy et al., 2021). Besides that, children voiced a lack of diverse play opportunities (Horton & Kraftl, 2018; Jansson, 2008) and novel opportunities within a playground over time (Caro et al., 2016; Jansson et al., 2016). Children expressed the need for simple to complex play opportunities that support diverse children's play preferences overall (Birkner et al., 2021; Caro et al., 2016; Jansson et al., 2016; Prellwitz & Skär, 2016; Ripat & Becker, 2012; Stanton-Chapman & Schmidt, 2017).

To sum up, concerns were raised by children and their caregivers about the usability and accessibility of current playgrounds. Their feedback can provide valuable insights into what a high-quality playground should offer in terms of play value and usability and how these environmental characteristics could be represented in a future playground audit tool.

3.4.2 Children's Perspectives are Not Considered

Children's dissatisfaction with current playground provision poses the question of whether children participate in playground design in the first place and if children participate in how existing playgrounds are planned, designed, managed and maintained. Systematic literature reviews reported on adults devaluing children's perspectives, participation, and desire to contribute with their insights when playgrounds are developed (Finney & Atkinson, 2020; Jansens et al., 2023; Schoeppich et al., 2021). Schoeppich et al. (2021) found that adults hold mixed attitudes concerning children's participation in playground development. However, adults' viewpoints may also shift and range from scepticism and devaluing, misconceiving and decontextualising children's ideas towards a change in adult attitudes described as a transformative process that values and acknowledges children's participation in playground design (Schoeppich et al., 2021). From the children's perspective, children felt that their viewpoints were not taken seriously compared to the adult perspectives, that adults overlooked their ideas and that participation was tokenistic (Finney & Atkinson, 2020; Schoeppich et al., 2021). Schoeppich et al. (2021) also pointed out that children appreciated working together with adults and appreciated participation processes in the development of playgrounds.

Although more research is needed on children's satisfaction with playground management, some evidence exists of their views and dissatisfaction with certain issues such as upkeep and maintenance activities. For example, in some studies, children reported that adults removed highly valued play equipment from playgrounds without consulting with children, leaving children dissatisfied with the new playground provision (Jansson,

2008; Prellwitz & Skär, 2007). Similarly, adults responsible for the upkeep of playgrounds complained about how children manipulated a playground to fit their play preferences (Jansson, 2015). Playground professionals viewed children's play preferences as an act of vandalism, which they found difficult to accommodate within their regular maintenance tasks (Jansson, 2015).

There is an apparent misalignment between children's and adult's responsibilities for designing and managing playgrounds. Dunn and Moore (2005) wrote that to provide good play provision, it is essential to put children and their families at the heart as the primary users. Their participation should be considered at different stages of play provision, such as in design as well as in evaluation and management (Dunn & Moore, 2005). The argument for children's participation aligns with GC17 which emphasises that children should have a central role in playground provision as a matter that affects them (UNCRC, 2013).

3.4.3 Playground Professionals' Lack of Understanding of User Preferences and Play Needs

The points raised above suggested including user-based knowledge, such as a broader range of diverse children, including children with and without disabilities, in playground design and management (Lynch, Moore, & Prellwitz, 2018; Moore et al., 2020; Moore & Lynch, 2015). Such approaches can potentially contribute to inclusive and effective playground design and development. For example, previous research noted a positive outcome in meeting user needs in playground provision when local communities and their playground users are involved (Jansson & Ramberg, 2012). However, to date, playground designers, planners, and providers often lack sufficient knowledge and experience in creating playgrounds that cater to a diverse population, including children with and without disabilities. This issue has been identified in many countries such as Australia, Ireland, Sweden, Switzerland, the United Kingdom and the United States (Dunn & Moore, 2005; Moore et al., 2020, 2022; Prellwitz et al., 2001; Stanton-Chapman & Schmidt, 2019; Sterman et al., 2019; Wenger et al., 2023; Woolley, 2013). For example, Wenger et al. (2023) identified a lack in expertise in participatory approaches to involve

children with disabilities in playground design processes in Switzerland. Moore et al. (2022) in Ireland found lacking experience among playground professionals, including local authorities, architects, playground suppliers and others, in how inclusive design principles, such as Universal Design principles could be applied in playground design. Similarly, Stanton-Chapman and Schmidt (2019) in the United States concluded that current playground provisions are not guided by evidence-based information on what children with disabilities need on public playgrounds. Stafford (2017) from Australia identified tensions between adult-directed design and the play preferences of children with disabilities. Likewise, research from Ireland and Sweden found that playground management and designers prioritised safety, management to keep risks low, and playground upkeep (Jansson, 2015; Lynch et al., 2020; Moore et al., 2022). This means that the professionals who manage and design playgrounds still focus on playground standards, and playgrounds were not built and managed to maximise their play value (Lynch et al., 2020; Moore et al., 2022).

Combined, the reviewed evidence highlights the importance of understanding playground users' preferences and emphasises the need for solutions that foreground and prioritise these user perspectives. Ideally, such solutions should be informed by children themselves as a mismatch exists between current playground provision and their play preferences. One potential solution might be how playgrounds are audited for their play value and usability, which ideally should go beyond just considering a playground's safety and upkeep. Therefore, the following section will review the literature on playground audit tools focusing on play value usability characteristics or similar constructs.

3.5 Playground Audit Tools

While previous evidence is emerging that clearly highlights the need for improved playground design, no comprehensive tool has yet been developed to support the audit of playground provision. As introduced in Chapter One, audit tools or environmental audit tools are utilised in an auditing process to evaluate the physical environment and environmental characteristics of

playgrounds without requiring the presence of space users (Meng & Wang, 2022; Taylor et al., 2023). For this study, the aim was to develop a playground audit tool that focuses on assessing environmental qualities which support multiple, diverse and potential play affordances as a way to evaluate the play value for various user groups. In this section, the research literature on audit tools will be reviewed by first reviewing research that has utilised audit tools to evaluate playgrounds and describing what can be learned from this research, second by highlighting the potential benefits of using playground audit tools and third by reviewing existing playground audit tools by exploring the constructs operationalised, intended purposes and how they were developed. This underscores why playground audit tools are valuable for practice and research and lays the foundation for the need to develop a new playground audit tool that focuses on play value and usability.

3.5.1 Research on Auditing Playground Environments for Play

This section will review existing research that utilised playground audit tools and present empirical evidence derived from utilising playground audit tools. Overall, it is more common that research utilised audit tools to evaluate playground environments for other means than for play. Such research tried to find associations between the provided environment and other means, such as increasing physical activity (for example; Reimers et al., 2018; Zhang et al., 2021) and obesity prevention (for example; Cosco et al., 2014; McCarthy et al., 2017). Furthermore, some audit tools predominantly focused on school or preschool playground environments (for example; Bento & Costa, 2022; Bisceglia et al., 2009; Herrington & Lesmeister, 2006; Hyndman & Chancellor, 2017; Perlman et al., 2004) or full park audits (for example; Bedimo-Rung et al., 2006; Joseph & Maddock, 2016; Kaczynski et al., 2012; Saelens et al., 2006; Veitch et al., 2013). Furthermore, there is a lack of suitable and well-developed audit tools, as some research used generic and non-empirically developed playground audit tools. For example, Farmer, Williams et al. (2017) asked an expert from playwork to rate the quality of the playground environment, but no audit tools based on evidence were used. Similarly, Wang

et al. (2024) presented a list of potential indicators consisting of environmental qualities and environmental features and rated them on a five-point Likert scale. However, they did not describe how their indicators and scoring system was developed and what evidence supported their development (Wang et al., 2024). Since these tools did not elaborate on how and for what purpose they were developed and what concept they try to operationalise, their results must be carefully interpreted. Other research mentioned using playground audit tools to investigate a playground's play value or similar constructs but does not report on the findings derived from using these audit tools (Chandwania & Natu, 2021; Lynch et al., 2020; Wenger, Schulze, et al., 2021). For these studies it is unclear how the findings derived from the auditing process have supported the research findings.

Generally, research that utilised playground audit tools that focus on environmental characteristics supporting outdoor play in public playgrounds is rare. Still, some information can be gained from existing studies to understand their usefulness and potential benefits. In this next section, a focus will be placed on these aspects to highlight both the potential benefits and subsequently the relevance of such tools.

3.5.2 Potential Benefits of Using Playground Audit Tools

Very little research has explored the potential benefits of using playground audit tools. Most of this research only hypothetically suggests advantages and did not test these empirically. For example, it has been proposed that playground audit tools may support an informed decision-making process to improve the quality of playgrounds, give directions on what a specific playground needs regarding upgrading or refurnishing, and assist decision-making for determining funding allocations (Meng & Wang, 2022; Taylor et al., 2023; Zallio & Clarkson, 2021). Meng and Wang (2022) additionally proposed that evidence-informed audit tools might be helpful to not only provide an in-depth understanding of how a playground supports play but also validate which relevant environmental qualities support children's outdoor play. Taylor et al. (2023) suggested that audit tools have the potential

to bridge the research-practice gap since audit tools could support grassroots advocacy work, for example, to emphasise the lack of inclusive playground provision.

Other potential benefits of using audit tools might be for local authorities who manage playgrounds. For example, Jansson and Lindgren (2012) described aspects of landscape management include maintaining and developing existing playgrounds. These management practices might include "processes for implementing, maintaining and improving landscape structures" (p. 954), such as playgrounds (Jansson et al., 2019). Therefore, audit tools informed by evidence might be well suited for communicating, negotiating, and explaining management practices, explaining why certain environmental modifications would benefit the community, explaining how environmental qualities could benefit diverse playground users, and also what already works well for users (Jansson et al., 2020).

Another potential benefit of using audit tools was suggested by Zallio and Clarkson (2021), who suggested that audit tools that evaluate the physical environment might influence future practices and design processes. Zallio and Clarkson (2021) conducted a literature review comparing the timeline of audit tools being published in relation to new policy regulations. They discovered that the relationship between audit tools and policy regulations is like two parallel railway tracks, consistently inspiring each other (Zallio & Clarkson, 2021). This mutual evolution implies that audit tools can also contribute to policy changes (Zallio & Clarkson, 2021).

To summarise, playground audit tools may offer multiple benefits. These might include raising awareness for playgrounds with low play value or usability. Playground audit tools could support an informed decision-making process regarding funding allocation and decision-making to improve the quality of what playgrounds offer to children and families and influence policy changes. This situates playground audit tools between practice and research.

3.5.3 Potential Benefits Derived from Using Specific Playground Audit Tools

Research utilising playground audit tools offers valuable insights into the key aspects being evaluated and how these evaluations may guide improvements. Unlike the theoretical discussions above, this section provides concrete evidence of how findings gathered from playground audit tools may be interpreted.

Taylor et al. (2008) and Jenkins et al. (2015) used the Play Space Quality Assessment Tool (PSQAT) which was developed by (INSPIRE Consultancy Ltd. & Play England, 2009). Taylor et al. (2008) examined the physical environment of 494 playgrounds from five municipalities in England and concluded that using such a tool allowed the municipality members who conducted the audits to shift their perspective towards considering relevant characteristics for play from a child's perspective. They stated, "it gets managers to look at assessment in a slightly different way" (p. 221). While previously utilised audits, which predominantly focused on safety, led to the removal of play opportunities, audit tools that identify potential indicators for play enabled authorities to concentrate more on information regarding where renewal and quality improvements were needed (Taylor et al., 2008). These findings support the fact that audit tools which focus on play could potentially support playground management practices in foregrounding play before another indicator, such as safety.

Using the same tool (PSQAT), Jenkins et al. (2015) investigated the overall quality of 11 playgrounds across two communities with diverse income and ethnic compositions. They found that the PSQAT could detect significant differences in the overall quality of playgrounds between the communities, indicating that playgrounds in lower-income areas with more diverse and marginalised populations were of lower quality than those in higher-income, predominantly Caucasian communities (Jenkins et al., 2015). Perry et al. (2018) had similar findings using the PARC's tool (Evaluation tool for assessing the accessibility and usability of community parks and playgrounds), a tool developed by these authors. They audited 21 playgrounds and found

that playgrounds located in areas of high deprivation had reduced accessibility to sensory play opportunities compared to playgrounds in areas of low deprivation (Perry et al., 2018). It is important to flag that the PARC's tool was intentionally developed to foreground accessibility aspects which potentially influenced their finding (Perry et al., 2018). Both studies demonstrated that such audit tools might be a useful way to detect differences between communities (Jenkins et al., 2015; Perry et al., 2018).

Kaştaş-Uzun and Dikmen-Güleryüz (2024), Lynch, Moore and Edwards et al. (2018) and Cetken-Aktas & Sevimli-Celik (2023) utilised Woolley and Lowe's (2013) play value audit tool. Kaştaş-Uzun and Dikmen-Güleryüz (2024) analysed 25 playgrounds in one neighbourhood in a Turkish city revealing features that were available or missing in the neighbourhood's play provision. They found that specific play opportunities were completely absent, such as opportunities to construct, opportunities for rule-based games, opportunities afforded by loose parts, and opportunities to engage with the natural environment. Only one playground offered access to water play, and all playgrounds were built for 5 to 12-year-old children, neglecting other age groups. Overall, most playgrounds provided the same types of play equipment in form and amount, which they concluded as insufficient and leading to overall low play value for the whole neighbourhood. Kaştaş-Uzun and Dikmen-Güleryüz's (2024) study suggested audit tools were useful not only for evaluating individual playgrounds but also for understanding the overall play value of playgrounds in a neighbourhood.

Lynch, Moore, Edwards, et al. (2018) analysed five playgrounds in one city in Ireland and found that Woolley and Lowe's (2013) play value audit tool identified one of the playgrounds to be significantly higher in play value compared to the other playgrounds. They found that the playground which scored lower lacked natural features, loose materials and a variety of surfaces, had limited seating and were smaller in size. Furthermore, the lower-rated playgrounds lacked sensory, social and cognitive play opportunities (Lynch, Moore, Edwards, et al., 2018).

Cetken-Aktas and Sevimli-Celik (2023), who also used Woolley and Lowe's (2013) play value audit tool, analysed six preschool playgrounds and conducted behavioural mapping of children playing. They did not utilise any statistical analysis combining results from these two methods, but still, they qualitatively found higher scores derived from the auditing process related to more diverse play opportunities observed. Such research further strengthens the interpretation of a playground play value audit tool. Ideally, there should be a detailed explanation of how these combined methods complement the interpretation of a playground audit tool.

Combined, these empirical findings demonstrated that playground audit tools support detecting differences in play value when comparing playgrounds and neighbourhoods within a community. Such information is crucial in deciding what changes might be most urgent to address during the retrofitting and updating process and where resources such as funds should be allocated as explored in section 3.5.2. However, none of these previous studies points to one commonly used playground audit tool; therefore, the next section will review available playground audit tools.

3.5.4 Reviewing Existing Audit Tools to Evaluate Public Playgrounds

To assess the play value and usability of playgrounds, a suitable audit tool needs to be sourced. If a suitable audit tool is found that supports an evaluation of play value and usability, no new playground audit tool needs to be developed. In particular, this review of existing playground audit tools was guided by the following three questions: *What playground audit tools are available? What constructs do these playground audit tools try to operationalise? How were these playground audit tools developed, including what source of evidence support the test content, and are test criteria available)?*

To identify suitable tools, two recently published systematic literature reviews were identified that provided an initial overview of available playground audit tools and the status of their development (Meng & Wang, 2022; Taylor et al., 2023). Meng and Wang (2022) did not explicitly focus on playgrounds but

searched for audit tools that audit any children-focused public open spaces for play. Of the 11 identified tools, only three focused on playgrounds (Woolley and Lowe's (2013) Play Value tool, Play Space Quality Assessment Tool (PSQAT) (Jenkins et al., 2015), Brief Play Space Audit Tool (PSAT) (Gustat et al., 2020), four focused on park spaces, two focused on any public space, and another two focused on parks/playground/green spaces. They found that most of the tools included evidence of reliability evaluations; however, only one of the tools, which focused on parks not playgrounds, had supporting content validity evidence by expert judgment (Meng & Wang, 2022). Taylor et al. (2023) searched for audit tools in grey literature and peer-reviewed journals that specifically focused on inclusivity aspects of playgrounds and included 14 audit tools in their final analysis. Taylor et al. (2023) evaluated the 14 identified tools against the inclusive design recommendations identified by a scoping review from Brown et al. (2021). Brown et al. (2021) design recommendations mainly focus on accessibility aspects of playgrounds from the built environment including a wide and free of obstacles entry point, flat, uniform and relatively firm and stable surfaces, ramps and pathways, access to play equipment on the ground and elevated levels. Other design recommendations from Brown et al. (2021) point more to the play value and usability of a playground; however, they did not name it play value and usability. These included a variety of play opportunities that accommodate age and ability, sensory play components, solidary play opportunities, recognisable design features for imaginary play, signage and information for users and shade provision, as well as the presence of trained staff and user involvement in design processes (Brown et al., 2021). Taylor et al. (2023) main conclusion of reviewing the 14 tools was threefold: first, most of the tools only focus on the accessibility aspects of a playground, second none of the audit tools are used widely and third none of the tools represented best-practice for inclusive playground design. Taylor et al. (2023) did not report on the reliability and validity evidence of the identified tools but highlighted the need for a suitable evidence-informed tool. Such a playground audit tool should have a solid foundation based on validity evidence.

Since none of these existing literature reviews (Meng & Wang, 2022; Taylor et al., 2023) answered the questions about available audit tools that investigate play value and usability in combination or provided information on how these audit tools were developed, a separate literature review was conducted (See Table 4). This review of audit tools focused on four aspects of interest. First, audit tools that investigate play value or similar constructs rather than focusing solely on specific play types, such as physically active play. Second, audit tools aimed at investigating public playgrounds as their unit of analysis were considered, while audit tools that focused on school and preschool settings or full-park audits were excluded. Third, audit tools that focus on diverse users and include items related to playground usability were included. Fourth, only audit tools cited in at least one original research paper written in English were considered, excluding those found in the grey literature. Some tools were identified in grey literature (see Appendix 1). However, as these tools lack evidence of how they were developed and have never been used in research, no further analysis was conducted on them.

Seven potential playground audit tools were identified in the literature review and were appraised for their strengths and weaknesses (see Table 4 with references). In part, some of the tools were also reviewed by Meng and Wang (2022) and Taylor et al. (2023) (see Table 4). However, the identified tools were analysed, specifically focusing on which constructs they operationalised, how they were developed, and what methods were used in their development to gain a better understanding of the strengths and weaknesses of the playground audit tool.

Table 4. *Audit Tools Sourced in Published Literature*

Audit tools developed for public playgrounds (published in peer review literature)					
Name of Tool (Reference) [Country]	**Intended Use**	**Test Content in Domains (Number of Items)**	**Evidence Base of Test Content[1]**	**Test format**	**Strengths (+) and Limitations (-)**
Playability Tool Kit (PTK) [3] (Ontario Parks Association, 2001) [Canada]	Evaluate playground playability	8 domains: arrival point (5), pathways (17), entrance to play space (5), play events (15), play space layout (7), surfacing (4), amenities (5), signage (6)	Expert opinions, children's and parent's perspectives	Checklist using yes/no Children/Parents Questionnaire (Checklist and open Questions)	+ Is a grey literature tool but a modified version was used in one research study (Yantzi et al., 2010) - No information on content validity provided - Mostly focused on accessibility but not usability and play value
Tool to Assess Play Value and Design of Play Spaces [2] (Woolley & Lowe, 2013) [United Kingdome]	Assess the relationship between play value and design of play space	3 domains: play types (5), physical characteristics (13), environmental characteristics (5)	Literature review	On-site evaluation Using counting of items and scoring on an ordinal scale	+ Used in several research projects: (Bao et al., 2021, 2022; Cetken-Aktas & Sevimli-Celik, 2023; Kaştaş-Uzun & Dikmen-Güleryüz, 2024; Lynch, Moore, Edwards, et al., 2018) + Describes theoretical argument that underscores content validity - Only one item focused on diverse user groups

Play Space Quality Assessment Tool (PSQAT) [2] (INSPIRE Consultancy Ltd. & Play England, 2009). [United Kingdome]	Measure the quality of dedicated play areas created by local authorities and others	3 domains: locations (7), play value (1), care and maintenance (7)	No information provided	On-site evaluation Using Six-point ordinal scale from absent to excellent	+ Is a grey literature tool but was used in several research projects: (Jenkins et al., 2015; Taylor et al., 2008) + Intra-class correlation above 0.85 (excellent inter-rater reliability) (Jenkins et al., 2015) + Internal consistency reliability Cronbach alpha 0.8-0,9 (good to excellent) (Jenkins et al., 2015) - No information on content validity provided - Only one item focused on diverse user groups
PARC - Evaluation tool for assessing the accessibility and usability of community parks and playgrounds[3] (Perry et al., 2018) [New Zealand]	Assess the accessibility and usability of parks and playgrounds across ages	6 domains: approachability to park parking and bus routes (10), path surfaces (10), play areas and equipment usability (65), rest areas (7) restrooms (13) drinking fountain (7)	Literature review, expert opinions, consultation with advocacy groups and city council members, pilot testing	Checklist using yes/no	+ Inter-rater reliability: Cohen's Kappa (k=0.9) indicated near perfect agreement (Perry et al., 2018) - Test content comprehensively developed but no information on content validity provided - Mostly focused on accessibility aspects - Does not evaluate play value; focused on presence and absence of features and accessibility characteristics

Brief Play Space Audit Tool (PSAT) [2] (Gustat et al., 2020) [United States of America]	Assess the playability based on presence and condition of playground features	4 domains: general playground overview (15), surface, terrain, vegetation (5) pathways and path segments (10) play equipment and structure (18)	Interview with caregiver on playground, revisions	Checklist using yes/no (sometimes a third option)	+ Inter-rater reliability acceptable reliability with high kappa values between .79 and .90 for all items in domains (Gustat et al., 2020) - No information on content validity provided - Not looking at play value characteristics; focused on presence and absence of features - Not focused on diverse user groups
Play Park Evaluation Tool (PPET) [3] (Parker & Al-Maiyah, 2022) [United Kingdome]	One aspect of the tool evaluates play value based on play types	Access, entrance(s) to play park, internal access, non-play equipment, play equipment, play value (19)	Literature review	Counting play equipment items and assigning score from 1-3	+ Infographic makes it easy to identify what play opportunities are provided - No test criteria available - No information on content validity provided - Focuses on provided play equipment, not other features of playgrounds - Does not investigate environmental qualities; focused on presence and absence of features
Playground Rating System (FPRS) (J. L.	Not defined	3 domains	No information provided	On-site evaluation	- No test criteria available - No information on content validity provided

Frost et al., 2001; cited in Olgan & Kahriman-Öztürk, 2011) [United States of America]		what does the playground contain? (20), is the playground in good repair and relatively safe? (20), what should the playground do? (20)		Using Six-point ordinal scale from not existing to all elements exist, excellent function	- Not focused on diverse user groups - Strong focus on safety

Note. [1] Type of evidence that supported the construction and that supported the development of the content (items and domains).
[2] Playground audit tool also identified and reviewed by Meng and Wang (2022).
[3] Playground audit tool also identified and reviewed by Taylor et al. (2023)

An overview and specific reference for each tool is presented in Table 4. First, the question '*What constructs do these playground audit tools try to operationalise?*' needs to be answered. From this review, four of the seven tools (Woolley and Lowe's Play Value tool, Play Space Quality Assessment Tool (PSQAT), Brief Play Space Audit Tool (PSAT) and Frost's Playground Rating System (F-PGRS)) focused on the idea of play value or similar constructs such as 'playability' but did not or had a minimal emphasis on usability aspects (for example only one item asked for children with disabilities). Two audit tools (Playability Tool Kit (PTK) and the Evaluation tool for assessing the accessibility and usability of community parks and playgrounds (PARC's tool)) focused on children with disabilities, but the construct and the content focused more on accessibility, less on usability and did not include enough details to make it a valuable audit for play value. Only one instrument, the Play Park Evaluation Tool (PPET), claimed to incorporate play value evaluation with considerations for diverse users; however, PPET has a strong focus on play equipment and did not incorporate other important features provided on playgrounds for play such as natural features, natural materials and loose parts, topographical features, which are relevant for play and therefore did not support all environmental features relevant for play value.

Second, the question of 'How were these playground audit tools developed and what source of evidence supported the test content as well as if test criteria were evaluated?' will be answered. Three of the seven audit tools (PSAT, PARC's, PSQAT) provided information on inter-rater reliability. None of the audit tools provided information on construct validity. The validity evidence of test content of the examined audit tools were unsystematic literature reviews for three audit tools (Woolley and Lowe's Play value tool, PARCs tool, PPET), and experts' consultation for two audits; however, they did not detail how experts were involved (PTK, PARCs tool). Another source of validity was reported via consultation with potential users, such as parents, for another two audits; however, they did not note how this influenced the content (PTK, PSAT). The other two tools did not elaborate on their validity evidence based on test content (PSQAT, F-PGRS). Furthermore, two tools

(PARCs tool and PSQAT) were developed from the content of other tools whose initial idea was not to focus on outdoor play. Therefore, their content needed to be interpreted with caution. Overall, none of these audit tools elaborated in detail how their various sources of evidence have influenced forming the respective audit tool and what adjustments have been made when gathering various sources of evidence.

In summary, having reviewed two systematic reviews and completed an analysis of seven tools, it is clear that available playground audit tools did not capture play value combined with usability for diverse users. The reviewed playground audit tools failed to report on how they were developed and what sources of evidence informed and shaped their test content. A significant lack in developed tools was that none of the tools claimed to focus on evidence from a child's perspective when their tool was developed. Overall, a gap was identified in the availability of evidence-informed playground audit tools that centre on play value for diverse users. This gap supports the relevance of developing a new audit tool.

3.6 Summary of Research Gaps

In Chapter Three, the literature on the influence of the physical environment on outdoor play, diverse user needs and play preferences, and the potential benefits and limitations of playground audit tools was reviewed. Research confirmed the profound impact of the physical environment on outdoor play, with different playground types, features, and characteristics significantly shaping children's play. This highlights the importance of utilising the physical environment as a basis for evaluating current playground provisions and subsequently their play value and usability. However, a mismatch between playground design and users' preferences—particularly those of children and children with disabilities—was identified in playground planning, design, management, and evaluation. This evidence emphasises the need to prioritise users' preferences to ensure high-quality playgrounds.

One potential solution is the development of playground audit tools, which may support informed decision-making, funding allocation, improve

playground quality, raise awareness of playgrounds with low play value and usability, and influence policy changes as suggested in the reviewed literature. However, the review of existing tools revealed that none sufficiently address both play value and usability for diverse users, nor do they provide transparency regarding their development and the evidence informing their content. This underscores the need for a new, evidence-based playground audit tool focused on capturing play value for users with diverse abilities.

To address this gap, a new playground audit tool needs to consider the following aspects identified. First, this new playground audit tool needs to be informed by user-based evidence or, in simpler terms, what children themselves value and prefer in their playground provision. Such information could be most informative for the potential future users of such a playground audit tool, who are expected to be adults responsible for playground provision. In this chapter, it was noted that adults need solutions that foreground what children prefer and not what adults believe is needed. Second, this new playground audit tool must be grounded in a solid theoretical perspective that supports its interpretations. For this new playground audit tool, the theory of affordances grounded in a transactional worldview offers an adequate theoretical perspective, as Chapter Two outlined. Third, the development of this new playground audit tool should be transparently documented to ensure clarity in its construction. Guided by these three aspects, Chapter Four will now outline the methods and methodologies used in this thesis.

CHAPTER FOUR — METHODOLOGY AND METHODS

"Every new instrument must start with an idea—the kernel of the instrument, the 'what' of the 'what does it measure?', and the 'how' of 'how will the measure be used?' When this is first being considered, it makes a great deal of sense to look broadly to establish a dense background of knowledge about the content and uses of the instrument"
(Wilson, 2005, p.19).

4.1 Introduction to Chapter Four

As introduced in Chapter One, this study hopes to develop evidence-informed and space-oriented approaches for socio-spatial inclusion in play provision and practice. Underpinned by a transactional worldview and the theory of affordances as a theoretical perspective, the overall objective is to develop a new playground audit tool that supports an evaluation of playgrounds' play value with consideration for diverse users, particularly children with disabilities.

Consequently, there is a requirement to design research that is congruent with these concepts and objectives. The study design, methodologies and methods that support these objectives will be further explained in this chapter and the rationale for their selection provided. Before delving into the study design and methodology, the next section will describe the ontological position guiding this research.

4.2 Ontological Position

Ontology is concerned with the nature of reality and, respectively, how knowledge within reality is understood (Guba & Lincoln, 1994). Guba and Lincoln (1994) have argued that the ontological positions of positivists and interpretivists are fundamentally incompatible. They argued that positivists believe that an observer is separate from the observed and that the reality of what is to be found is true, whereas constructivists believe that findings are subjectively tinted and created as well as bound to specific contexts (Guba & Lincoln, 1994). This means that positivists believe that reality is real and

apprehensible, not subject to the interpreter, while constructivists believe that reality is constructed through the mind of the observer based on someone's interpretation of the world (Guba & Lincoln, 1994). According to Cupchik (2001), these boundaries drawn between positivism and constructivism are arbitrary, and a reconciliation of the two positions is possible through the acknowledgement of their similarities. For example, either of the two belief systems accepts the relevance of positioning social phenomena in an ecologically meaningful way that effectively supports the interpretation of the research findings (Cupchik, 2001). Neglecting this aspect would lead to inadequacies in both ways of knowledge production. For example, positivists who rigidly quantify phenomena risk reducing the phenomena to a mere numerical representation that might lose its substantive meaning, while constructivists, who emphasise subjective interpretation, may produce meanings that are only accessible to themselves, the constructors of such interpretations (Cupchik, 2001). Therefore, both approaches offer complementary views on phenomena under investigation (Cupchik, 2001). A constructivist realism ontology suggests that while an external reality exists independently of a person's mind (realism), the way we come to know and understand that reality is through social and cognitive constructions (constructivism) (Cupchik, 2001). In other words, reality itself is objective, but knowledge of it is subjective and constructed through transactions with that reality, others, and the environment.

For this study, a constructivist realism ontology has been considered an appropriate choice when the objective is to develop an evidence-informed audit tool. A constructivist realism ontology supports richness and in-depth accounts that offer contextualised and nuanced interpretation needed when a new instrument is developed. Simultaneously, the precision and effective clarification of the phenomenon being studied is supported by integrating an objective yet comprehensive understanding of the phenomena (such as the play value of playgrounds). Constructing a new playground audit tool needed considerations of how to make phenomena measurable. At the same time, a rich and thick description of the phenomena under investigation is necessary

(Wilson, 2005). Measuring a phenomenon such as the play value of playgrounds would need considerations of a positivist ontology by considerations of determining what the unit of analysis is and how to quantify the phenomena (Wilson, 2005). However, quantifying also means to subjectively interpreting a phenomenon based on what is presented to the person who uses the playground audit tool. This interpretation includes the items, the intended purpose of the audit tool and the unit of analysis—the physical environment (American Educational Research Association (AERA) et al., 2014; Sireci & Benítez, 2023; Wilson, 2005). Based on a constructivist realism ontology, this study draws on various theoretical positions, including a transactional worldview and affordance theory (See Chapter Two), to research and understand outdoor play occupations on public playgrounds. Underpinned by a constructivist realism ontology for the development of this new playground audit tool, the next step was to look at test construction theory, starting with the validity concept as a fundamental idea when new tests are developed. The process of developing a new playground audit tool may include steps of constructing, evaluating, and modifying the tool, considering content, format, administration, scoring, item design, scaling, and defining the tool's intended purpose (AERA et al., 2014).

4.3 Validity in Test Development

Validity is a fundamental concept in test development and evaluation (AERA et al., 2014) and needs consideration from the onset when a new tool is developed (AERA et al., 2014; Sireci & Benítez, 2023; Wilson, 2005) As identified in the review of existing audit tools, validity has not been documented in detail for previous playground audit tools (see Chapter Three).

Historically, validity was defined as the extent to which a test measures what it intended to measure (Wilson, 2005). Contemporary and more nuanced interpretations of the concept of validity define it as "the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests" (AERA et al., 2014, p. 11). In other words, validity is not characteristic within a test but instead relates to the justification of using the test for a particular purpose, supported by theory and evidence, but invalid for

another purpose (Sireci & Benítez, 2023). Such an understanding of validity is considered an ongoing procedure in gathering relevant evidence supporting a robust foundation for proposed score interpretation (AERA et al., 2014).

In the Standards for Educational and Psychological Testing validity is explained as a unitary concept, with five sources of validity evidence, which all contribute to the intended interpretation of test scores (AERA et al., 2014). These sources of validity evidence can be described in relation to (a) the test content (for example, the represented test content in relationship to the construct—what items measure play value?), (b) the response process (for example, the cognitive response process of test takers answering to test content—how do potential auditor understand the item), (c) the internal structure (for example, the relationship to which items and the construct support the score interpretation), (d) to other variables (for example, the relationship of the construct to external variables such as other tests theorised to measure similar construct) and, (e) consequences of testing (for example, positive and negative consequences of test use, for example, a specific type of playground or size of the playground and its consequences for interpretation) (AERA et al., 2014).

The concept of validity is compatible with a constructivist realism ontology as it is based on interpretation. Still, at the same time, these interpretations are guided by empirical evaluation of different sources of validity. Validity needs to be understood as an ongoing process of gathering evidence which supports a tool's use and interpretation (AERA et al., 2014). Stated otherwise, with every new evaluation, the body of validity evidence is extended and subsequently supports the interpretation of the tool in development. This thesis focuses mainly on sources of validity in relation to test content, which is commonly the first source of validity evidence evaluated when new tests are developed and which was identified as lacking in existing playground audit tools (see Chapter Three, review of audit tools).

4.3.1 Validity Evidence Based on Test Content

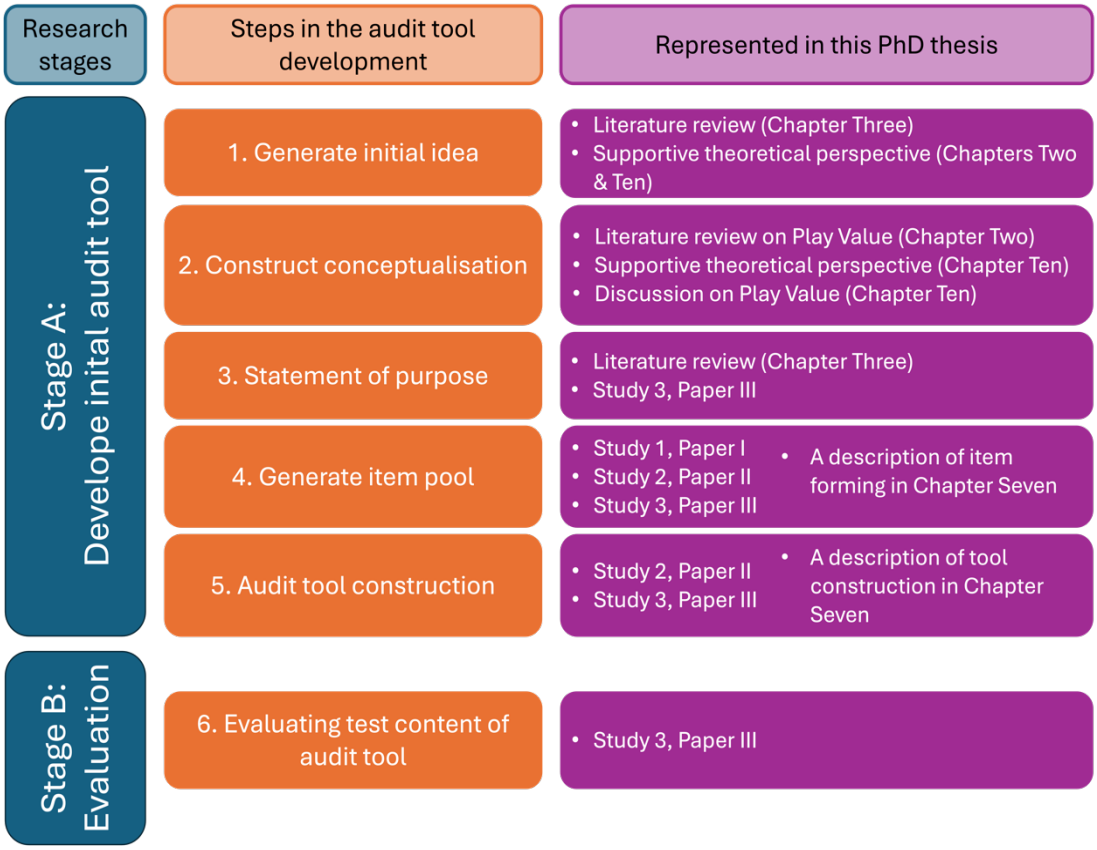
Validity evidence in relation to test content refers to the representativeness of the test content including the items and domains which represent the construct intended to be measured (AERA et al., 2014). This means that validity evidence based on test content supports how the test scores are interpreted (AERA et al., 2014). While other sources of validity evidence are commonly gathered, content-based validity is frequently insufficiently documented, representing a potential threat to the quality of a test and its use (Almanasreh et al., 2019; Zapata-Ospina & García-Valencia, 2022). Gathering content validity evidence is an invaluable first step, especially when new tests are being developed (AERA et al., 2014; Zapata-Ospina & García-Valencia, 2022). Therefore, evaluating and obtaining the evidence based on test content is inherently connected when a new test is developed, such as when a new audit tool is developed that aims to investigate environmental qualities for play value and usability. Ideally, the test content is formed and constructed in response to existing evidence, supported by a clear definition of a measurable concept like play value, and underpinned by an appropriate theoretical framework such as the theory of affordances. All of these aspects were aimed to be considered to establish evidence based on the test content of this new playground audit tool.

4.4 Overall Study Design

This thesis followed AERA's et al. (2014) and Wilson's (2005) recommendations about test development, which aligned well with the understanding of validity in relation to test content, as explained above. The overall study design can be outlined in two general stages, both of which support the evaluation of evidence based on test content. These stages were Stage A, Developing the Initial Draft of the Audit Tool and Stage B, Evaluating the Test Content ((see Figure 4); AERA et al., 2014; Wilson, 2005). Figure 4 provides an overview of the two stages and the six steps involved and where these steps were considered in this thesis sections. The name of the evolving tool in development, the "Playground Play Value and Usability Audit" (PVUA) tool, emerged in Study 3. For readability, the PVUA tool will be referred to by

this acronym throughout the remainder of the thesis. However, when appropriate the acronym will be spelt out to remind the reader.

Figure 4. *Research Stages and Steps Used in the Development of the Playground Play Value and Usability Audit Tool*



The process of developing the PVUA tool included steps of constructing the tool, evaluating its content, modifying the tool's content, making considerations regarding its format, administration, scoring, item design, scaling, and creating a definition of the tool's intended purpose (AERA et al., 2014). Furthermore, developing a new audit tool can be suggested as an ongoing and dynamic process incorporating steps of drafting and redrafting (Wilson, 2005). While Figure 4 depicts a linear process comprised of six successive steps, the development of the PVUA tool was an iterative process of back and forth that needed refinements and adjustments from previous steps while following the steps as a general roadmap. Therefore, these steps can be thought of as relating to one another and evolving iteratively; when one

aspect was changed, the other aspect needed adjustments. For example, step two of construct conceptualisation started with reviewing the existing literature on play value (Chapter Two), which was further refined in the discussion section (Chapter Ten), as argued in this thesis. Similarly, step four of creating an item pool started with evidence literature but was further informed by the expert panel study, and therefore, it can be thought of as an evolving process with refinements made throughout this thesis. These six steps (see Figure 4) are described in more detail below.

4.4.1 Stage A: Development of the Initial Playground Audit Tool

Generate the Initial Idea

Developing of a new tool always begins with a general idea about the construct to be measured, which this, in turn, demands careful conceptualisation of that construct (Wilson, 2005). The general idea of this research was to investigate the play value by the connections between outdoor play and the supporting environment and how it can be measured. While this general idea was conceived at the start of my PhD journey, upon reflection four years later, this general idea has morphed into something more tangible through the creation of the Playground Play Value and Usability Audit (PVUA) tool. This process of developing the PVUA tool might be best explained by the literature explored during this journey. The literature reviewed included how outdoor play can be characterised and experienced by children, how the environment supports outdoor play, how children with disabilities experience outdoor play on playgrounds, and how environmental aspects are measured via audit tools, alongside the adaption of a theoretical perspective (Chapter Two) that embraces a perspective which acknowledges the shared agency of the environment in relation to children's outdoor play. All these aspects have contributed to the general idea that has transformed into the PVUA tool.

Construct Conceptualisation

A construct is defined as the general concept or idea someone intends to measure (AERA et al., 2014). While a construct might be a theory-based

concept, in test development, it is important to find a way to operationalise the construct (Almanasreh et al., 2019; Wilson, 2005; Zapata-Ospina & Gracia-Valencia, 2022). Wilson (2005) outlines constructs as having dichotomous extremes that span “from one extreme to another, from high to low, small to large, positive to negative, or strong to weak” (p. 6). When responding to these extremes, individuals or an environment assessed by an auditor may stand somewhere along that spectrum (Wilson, 2005). This indicates that a construct is described by having some discernible qualitative levels between its extremes, which are helpful in an interpretation (Wilson, 2005). In this thesis, the primary constructs of play value and usability were operationalised by observing the physical environment, its environmental characteristics, and combinations that support diverse play experiences and affordances, which are assessed by an auditor. Some playgrounds might be high in play value and usability by meeting more identified characteristics, while others are lower in play value and usability by meeting fewer characteristics.

The conceptualisation of the play value construct in this thesis is supported by several sources of evidence, including a review of the literature on play value (see Chapter Two), the further extension of the play value construct as discussed in Chapter Ten, positioning the PVUA tool from a theoretical perspective in affordances (see Chapter Ten), and empirical evidence of all three research studies. For example, Study 2 (Paper II) provides a synthesised taxonomy of playground features and their characteristics, linking them with potential play affordances.

Statement of Purpose and Intended Use

After establishing the general idea and the construct and how it is operationalised, it is relevant to formulate a statement of purpose and intended use, which is part of the validity of an instrument. To rephrase, validity justifies how the test scores are interpreted and used for a particular purpose (AERA et al., 2014; Sireci & Benítez, 2023). The statement of purpose should include a description of the type of test, a description of the purpose of the test and a description of the test users—so the person who will administer the test (AERA

et al., 2014). The following statement was formulated for the PVUA tool in development at its current version and was also presented in Study 3 (Paper III) (see Table 5). This statement at this stage can be considered broad and might change over time when new sources of validity are gathered with the PVUA tool. Again, this represents the evolving nature in instrument development.

Table 5. *Statement of Purpose of the Playground Play Value and Usability Audit Tool*

Proposed Purpose of the PVUA tool
The PVUA tool was developed as an observer-rated evaluation of the environmental qualities of public playgrounds. This audit tool aims to evaluate a playground's potential play value and usability by assessing the qualities and characteristics of the public playground and their potential for supporting diverse play affordances and high-quality play experiences instead of simply providing an inventory of various playground features. The results of the PVUA tool can then be used to justify improvements or changes during a retrofitting or expansion process. The PVUA tool could potentially be used by various professionals, including outdoor play researchers, municipality leaders responsible for playground provision/management, landscape architects, health professionals such as occupational therapists, and play advocates.

Generating Item Pool

An item can be generally defined as a statement or question of a test that elicits a response from a test taker (AERA et al., 2014). In test development, generating an item pool consisting of more items than needed is common (AERA et al., 2014). In this research, the item pool for the initial version of the PVUA tool was drawn from the scoping review (Study 1, Paper I) and the secondary analysis (Study 2, Paper II). Further items were generated through experts' suggestions in the expert panel study (Study 3, Paper III). For example, Studies 1 and 2 (Paper I, Paper II) supported the identification of

relationships between what children do in a playground environment and from there, characteristics from the physical environment were identified and formed into potential items. Similarly, Study 2 (Paper II) supported the structure and terminology used in the item pool, and Study 3 (Paper III) evaluated the item pool and supported refinements and extensions of the item pool.

Audit Tool Construction

The construction of the PVUA tool was the last step in Stage A, where the initial version was developed. It included clustering the items to content domains and finding alignment between instructions, item format and response format (AERA et al., 2014). This process was supported by a secondary analysis (Study 2, Paper II) that aimed to develop an environmental taxonomy using the evolving environmental categories of spaces and objects as the content areas where items of environmental qualities are clustered around. Therefore, the environmental taxonomy supported the formation and outline of the PVUA tool. The expert panel study (Study 3, Paper III) supported the test construction by generating new and missing items, relocating items into other content areas of the PVUA tool and alignment between instructions, item format and response options. The step 4 (Generating the Item Pool) and 5 (Audit Tool Construction) are described in detail in Chapter Seven.

4.4.2 Stage B: Evaluation

Evaluating Test Content of Audit Tool

Evaluating the test content used empirical data collection through an expert panel study (Study 3, Paper III). While developing the initial draft of the PVUA tool was guided mainly by evidence literature on children's perspectives, evaluating the gathered and synthesised evidence solicited through an expert panel is the next step of validation in relation to the test content (AERA et al., 2014; Sireci & Benítez, 2023). In detail, an expert panel was asked to provide feedback by jugging the initial draft of the PVUA tool, suggesting amendments, and providing insight into how future users might interpret this content. The reason for eliciting an expert panel was to utilise

their experience on the topic. An expert panel is well-suited to suggest missing items that might not be captured through the evidence literature, suggest constructing irrelevant items, and guide how the content might be interpreted (AERA et al., 2014).

4.5 Research Methods and Data Collection

Following the general overview of the study design in this thesis and the iterative steps relevant to developing a new playground audit tool, this section will present a detailed explanation and justification of the methods employed. As described above, Stage A, Developing the Initial Draft of the PVUA Tool, involves five steps, and Stage B, Evaluating the Test Content of the PVUA tool, involves one further step. Different methods were used in these stages. Stage A was primarily based on synthesising evidence literature through systematic literature reviews (Arksey & O'Malley, 2005) and a secondary analysis of the identified evidence literature (Johnston, 2014). Stage B collected empirical data evaluating a new playground audit tool's initial draft using a modified online Delphi method (AERA et al., 2014; Keeney et al., 2011; Nasa et al., 2021). Table 6 provides an overview of methods utilised in corresponding studies and papers.

Table 6. *Overview of Methods Used in this Thesis*

	Study 1, Paper I	Study 2, Paper II	Study 3, Paper III
Aim	To summarise the experiences of children with and without disabilities and gain insight into environmental qualities that maximize play experiences for all children on community playgrounds.	To investigate the relationship between the physical environmental characteristics of outdoor play spaces and children's outdoor play and develop an environmental taxonomy to support the analysis of play affordances within community play spaces.	To develop and explore the preliminary evidence of validity in relation to test content of the Playground Play Value and Usability Audit tool.
Method	Systematic scoping review following guidelines from Arksey and O'Malley (2005), Levac et al. (2010), and Peters et al. (2020).	Secondary analysis of a scoping review following Johnston (2014).	Expert panel study in two iterative rounds following a modified online Delphi study design using semi-structured interviews and online survey methods (AERA et al., 2014; Keeney et al., 2011; Nasa et al., 2021).
Data collection	51 Qualitative and quantitative research studies	45 Qualitative and quantitative research studies	22 international and interdisciplinary experts in outdoor play
Data analysis	Qualitative data analysis process guided by Graneheim and Lundmand (2004).	Guided by Elo and Kyngäs (2008) a qualitative content analysis used Heft's approach (1988) focusing on child-environment transactions.	• Hsieh and Shannon (2005) directed content analysis was used for refinements in textual content. • Descriptive statistical analysis was used to assess agreement ratings. • Non-Parametric statistical analysis was used to assess stability between the two rounds of expert evaluation.

4.6 Study 1 – Scoping Review

To achieve the overall objective of this thesis—to develop an evidence-informed playground audit tool that supports an evaluation of playgrounds' play value with consideration for diverse users—the first step was to gain an in-depth understanding of children's play preferences. Study 1 (Paper I), therefore, aimed to summarise children's experiences with and without disabilities and gain insight into environmental qualities that maximise play experiences for all children on community playgrounds. Chapter Three identified several gaps in the development of existing playground audit tools, specifically their failure to report on i) details on their development process, ii) details of the sources of evidence informing their content, and iii) whether these sources reflect recent research findings on outdoor play in playgrounds. Given these gaps, a scoping review method was selected (Arksey & O'Malley, 2005; Levac et al., 2010; Peters et al., 2020). Scoping reviews are recognised under the umbrella of systematic literature reviews (Tricco et al., 2016) and are recommended in the literature on test development (AERA et al., 2014; Wilson, 2005). They provide a comprehensive synthesis of available evidence, making them an appropriate starting point for developing new tools (AERA et al., 2014; Tricco et al., 2016; Wilson, 2005).

Scoping reviews are conducted to explore the extent and breadth of a specific topic in the literature that has not been extensively reviewed (Peters et al., 2020). The aim is to map and summarise the available evidence, providing insights to guide future research (Arksey & O'Malley, 2005; Levac et al., 2010; Peters et al., 2020). While other systematic reviews typically focus on one predetermined study designs (such as quantitative or qualitative studies) and appraise the quality of the included studies, scoping reviews have the flexibility to include any type of evidence relevant to answering the research question regardless of their methodological quality and study design (Arksey & O'Malley, 2005). Therefore, a scoping review was considered an appropriate methodology that allowed the management of inclusion and exclusion criteria without relying on the methodological quality of research papers, meaning the

full scope of available evidence could be included (Arksey & O'Malley, 2005; Peters et al., 2020).

4.6.1 Data Collection Study 1

The scoping review was conducted following the five stages proposed by Arksey and O'Malley, (2005) supported by recommended refinements from Levac et al. (2010) and Peters et al. (2020). For an overview, see the summary in Table 7; details are presented in Paper I.

Table 7. *Proposed Stages of Scoping Reviews*

Stage as proposed by Arksey and O'Malley (2005)	Description of the stage following Arksey and O'Malley (2005) and proposed refinements from Levac et al. (2010) and Peters et al. (2020)
Stage 1: Identify the research question	• Identify a broad research question and objectives relevant to the research question.
Stage 2: Identify relevant studies	• Develop a search strategy encompassing the identification of relevant keywords and formation of a search string, a selection of relevant databases and peer review journals and conducting pilot searches.
Stage 3: Study selection	• Described as an iterative approach, it involves defining inclusion and exclusion criteria based on the research question. • The process of selecting studies entails at least two independent reviewers per study. In the first step screen title and abstract resulting in a reduced number of studies. Followed by independently reviewing the full texts of each study. In both steps conflicts between independent reviewers are resolved through a third independent reviewer.
Stage 4: Charting the data	• First, included studies are charted using data extraction form which included for this study: reference, origin where data was collected, study design, description of participants, description of playground type and location. • Second, a qualitative content analysis of the included studies was performed.
Stage 5: Collating, summarising and reporting	• Presenting the results in a meaningful way what includes a descriptive numerical summery and the qualitative content analysis.

Next to these five stages, additional steps were taken, including registering a protocol and implementing a reporting scheme to ensure the methodological quality of this scoping review. The review protocol was registered in the 'Open Science Framework' (See protocol in Morgenthaler, Lynch, et al., 2021) and updated regularly as recommended (Peters et al., 2020). For publications of scoping reviews, the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews' (PRISMA-ScR) was followed to ensure the methodological quality of the scoping review (Tricco et al., 2018). The PRISMA-ScR where submitted alongside the manuscript to the journal.

The scoping review topic was conceptualised with all supervisors. I was responsible for generating the search string, including finding the appropriate keywords and databases to search. At this stage, information specialists from UCC's library were consulted. All three supervisors supported the screening and full-text review process to elect the final sample of research papers. Charting the research papers was solely conducted by myself.

4.6.2 Data Analysis Study 1

A convergent synthesis design was utilised for the analysis, meaning that regardless of the research designs of the original papers (quantitative, mixed or qualitative), the same qualitative content analysis was followed (Hong et al., 2017). A convergent synthesis design supported data transformation and synthesis across different study designs (Hong et al., 2017). For example, numerical data from quantitative and mixed method research papers was transformed into textual form via codes, categories and themes, while data from qualitative research papers were already in a textual form (Hong et al., 2017). Hong et al. (2017) declared that a convergent synthesis design is well aligned with a scoping review methodology that aims to conduct a qualitative content analysis.

Other scoping reviews also used this qualitative content analysis (Javadizadeh et al., 2024; Morville & Erlandsson, 2016). The qualitative content analysis followed the steps proposed by Graneheim and Lundmand

(2004): First, familiarisation with the data set by reading the whole study and summarising the main research findings relevant to the research question to get a sense of the whole data set (Graneheim & Lundman, 2004). The second step included open coding, which Graneheim and Lundmand (2004) suggested as first identifying meaning unites, then condensing the meaning unites, and last, creating or applying a code. A meaning unit can be “the constellation of words or statements that relate to the same central meaning” and could include words, sentences, or full paragraphs (Graneheim & Lundman, 2004, p. 106). Condensing meaning units can be described as the reduction process while preserving the meaning and applying a code, which is explained as an abstraction of the meaning but still conveys the main meaning (Graneheim & Lundman, 2004). In the scoping review, the meaning units included children’s experiences and preferences, including observational and verbal data about their play and their relations to playgrounds' social and physical environment. The coding was conducted in two rounds, and during this process, code names were adjusted and translated from one study to the next. The coding phase involved an iterative back and forth between codes and extracted meaning units to ensure that interpretation can be confirmed (Graneheim & Lundman, 2004). In the last stage, codes were organised into descriptive themes, and finally, all included data was synthesised into a text (Graneheim & Lundman, 2004). The qualitative content analysis was performed in Atlas.ti 22 Windows (2023). All supervisors supported the process through weekly supervision meetings. In detail, the analysis started with joint coding of the first four studies, reflecting on the meaning units extracted, relevance for the research question, and what codes were suitable to be applied. Afterwards, I independently analysed all other research papers, and discussions with the supervisor team supported the synthesis and forming of themes.

4.7 Study 2 – Secondary Data Analysis

After conducting the scoping review, it became clear that its findings would help generate the content of the PVUA tool; however, this new audit tool

that aims to capture a playground's play value needed to be grounded in an adequate theoretical perspective. A reanalysis of the subsample of identified research papers was needed in order to progress towards the goal—to develop an evidence-informed playground audit tool that supports an evaluation of playgrounds' play value with consideration for diverse users. As identified in Chapter Three, existing playground audit tools were not grounded in a theoretical perspective. Therefore, this Study 2, under the theoretical perspective of affordances, aimed to build the theoretical foundation of the PVUA tool. Existing affordance taxonomies (Heft, 1988; Lerstrup & van den Bosch, 2017) examined in Chapter Two provided a departure point for this secondary analysis. To recap from Chapter Two, these existing affordance taxonomies were never developed for specific settings of public playgrounds. Furthermore, Heft (1988) noted that a taxonomy might be extended if new evidence becomes available. This supported the decision to utilise current evidence from the scoping review papers in a secondary analysis to develop a new affordance taxonomy for public playgrounds that supports the development of the PVUA tool.

Secondary data analysis can be described as a post hoc analysis of a quantitative or qualitative dataset that someone else has gathered to answer a different and new research question (Johnston, 2014; Ruggiano & Perry, 2019). For this secondary analysis, a subsample of research articles that were identified in the scoping review were reanalysed for a different purpose with a different analysis method. Commonly, secondary data analysis utilises a subset of a larger dataset (Ruggiano & Perry, 2019), such as data that has not yet been analysed for a new research question (Johnston, 2014). Secondary data analysis was conducted because of the possibility of utilising an existing and adequate dataset to answer a research question (Johnston, 2014). This has the benefit that no time and other resources must be allocated to gathering new data, which is often time-consuming (Johnston, 2014). Despite this advantage, secondary data analysis has been reported as an underused research method in many research fields (Johnston, 2014; Ruggiano & Perry, 2019). While secondary data analyses are more often described as a method

utilised for additional analysis of original qualitative and quantitative datasets, they are less common in systematic literature reviews, where a subset of the research papers from an original review is used in additional analysis to answer a new research question. Despite this, some examples of scoping reviews were found using secondary data analysis (for example Johnson et al., 2023; Recto et al., 2022).

4.7.1 Data Gathering Procedures Study 2

No methodological guidance papers specifically documented how a secondary data analysis of scoping reviews could be conducted. Therefore, more general guidance was followed from other methodological papers on secondary data analysis. For example, the three steps proposed by Johnston (2014) provided a procedure that supports secondary analyses of scoping review datasets, as utilised in previous secondary analyses of scoping reviews (Johnson et al., 2023). These three steps are first, developing a new research question; second, identifying an appropriate dataset that has the potential to answer the formed research question and has not been analysed regarding the addressed research question; and third, performing a comprehensive evaluation of the data set (Johnston, 2014). Additionally, Ruggiano and Perry's (2019) suggestions of applying a new analytical strategy to further a clear distinction between the original study and the secondary analysis were followed. For the last step, the evaluation of the data set, Johnston (2014) recommended following the guidance of Stewart and Kammins (1993), providing a description and evaluation of (a) what was the purpose of the original study, (b) who the researchers responsible for collecting the data were, (c) what specific data was collected, (d) when was the data collected, (e) how was the data obtained (indicating the need of information of the primary research methods), (f) ethical considerations in how data was accessed, and (g) how consistent was the information obtained from one source with information available from other sources (for example can be several datasets be obtained?). For Study 2, following these procedures, for a secondary analysis of a scoping review, it was essential to provide a detailed description

of the original scoping review, outlining how the data was originally gathered, by whom, when, and for what specific aims. This description is followed by a clear presentation of the new research question and objectives, an explanation of the new analysis methods and what theoretical perspective supported the analysis. This description supports the idea that the potential audience can adequately judge the novelty of the secondary data analysis (Ruggiano & Perry, 2019).

4.7.2 Data Analysis Study 2

A structured qualitative content analysis was conducted using three main stages: coding, grouping codes, and synthesising (Elo & Kyngäs, 2008). Elo and Kyngäs (2008) proposed a structured content analysis as one that can be guided by an inductive, deductive, or mixed approach. This study utilised a mixed approach. The deductive approach was guided by a preconceived theory (Gibson's (1979) affordance theory). This was guided by previous research (existing taxonomies (Heft, 1988; Lerstrup & van den Bosch, 2017)), while at the same time, an inductive approach was considered by being open to new insights that extend previous taxonomies. Heft's (1988) approach was utilised to develop the affordance taxonomy based on existing literature. Heft's (1988) original taxonomy was also a secondary data analysis of a small data set. Since the publication of Heft's original taxonomy in 1988, the research on outdoor play and the environment has been growing extensively. This secondary analysis aimed to extend the existing taxonomies (Heft, 1988; Lerstrup & van den Bosch, 2017), create an affordance taxonomy specifically for playgrounds and support this new taxonomy in current evidence. Following Heft's approach, the analysis started with reading the research papers and identifying sections that provided information on how the physical environment supports children's play (environment-play transactions). These transactions were coded with up to four types of codes: (a) what children did, (b) with what objects/materials and/or their environmental characteristics. (c) the space or spatial characteristics where children play, and (d) with whom children play. From an occupational perspective, Hocking (2009) indicated the what, with

what, where and with whom as observable aspects of occupations. Therefore, this data analysis approach was seen as well aligned with occupational science and suitable for researching occupations such as outdoor play. The analysis focused on the physical environment-play transactions; therefore, the with whom codes were not included in further analysis and establishing the affordance taxonomy. However, some social-spatial aspects were described in the final taxonomy. During the coding process, paying close attention to the detailed description of the physical environment extracted from the included studies was relevant. These details ranged from broad descriptions of a feature, such as '*a tree stump'*, to very detailed descriptions of functional characteristics, such as a tree stump with '*soft, textured bark'* children perceived as compelling to touch. As another example, one study may refer to the '*material of snow*' utilised during play compared to another study that describes the functional characteristics of the '*malleable property of fresh fallen snow'* in forming a snowball. So, functional characteristics of the physical environment are the relevant information that children relate to inviting them to the play occupation (see also Chapter Two Section 2.4, and further elaboration Chapter Ten Section 10.2). Coding started with a subset of the papers and then translated to the whole data set. The codes, closely reflected manifested text, allowing the generation of more concrete descriptions with a lower level of abstraction and interpretation (Graneheim et al., 2017).

After coding was completed, codes were grouped into categories (Elo & Kyngäs, 2008). Codes about children's doing were clustered using the Typology of Outdoor Play Types (TOPO – Collapsed Version) from Loebach and Cox (2020). The TOPO is an extensive typology of play specifically established for outdoor play and was developed by Dr Janet Loebach, one of the co-authors of paper II. The TOPO, compared to other play types, offered a more nuanced way to categorise outdoor play as other developed play types (Loebach & Cox, 2020). The TOPO provided a useful way to organise the diversity of play codes. Utilising the TOPO offered an abstraction from play affordances while at the same time allowing enough details about play (see also Chapter Two Section 2.5). Utilising the TOPO for categorisation revealed

that not all codes could be organised accordingly. The codes that did not fit within TOPO were jointly reviewed with Dr Loebach and mostly came from qualitative research eliciting experiential aspects such as “being with someone”, which are not observable aspects of play. While these codes were few, it is relevant to acknowledge that an observable typology of play types has limits in capturing unobservable and experiential aspects of play.

Codes about spaces, objects/materials, and their functional characteristics were also clustered in categories. For example, all codes that mentioned fixed natural features, such as trees, bushes, long grass, and bounders, were grouped. At this stage, the clustered codes and extracted texts were read several times and summarised to describe the formed physical environment categories and their functional qualities representing the synthesis stage (Elo & Kyngäs, 2008).

The structured qualitative content analysis was mainly performed in Atlas.ti 22 Windows (2023). Dr Loebach reviewed the coding and independently coded 12% (6 papers) of the whole data set. Several meetings were held between Dr Loebach and me to resolve coding conflicts and terminology used in the taxonomy. This was followed by making changes to the affordance table. The supervisory team supported and oversaw the analysis and verified the final taxonomy.

The outcome of this secondary data analysis supported the development of the PVUA tool in two ways: First, it created an environmental affordance taxonomy that offers a way to systematically identify relevant physical environmental features and functional qualities of public playgrounds for play. Second, it provided a supporting theoretical perspective that grounds the development of a PVUA tool in the affordance theory.

4.8 Study 3 – Modified Delphi Method

The primary aim of Study 3 was to develop and explore the preliminary evidence of validity in relation to the test content for the Playground Play Value and Usability Audit (PVUA) tool. Using an expert panel to evaluate the relevance and clarity of new tools is a recommended approach when

developing test content (AERA et al., 2014; Sireci & Benítez, 2023; Wilson, 2005). Expert panel evaluations were used to investigate the content validity of other audit tools before (van den Bogerd & Maas, 2024). Study 3 also aimed to address the gap in playground audit tools by providing a detailed account of how the expert panel contributed to the development of the PVUA tool. As noted in Chapter Three, of the seven playground audit tools reviewed, only two used expert evaluation (see Chapter Three; Ontario Parks Association, 2001; Perry et al., 2018). However, these tools did not explain how expert evaluations were conducted or how they influenced changes to the tools' content.

Specifically, this expert panel study used a modified Delphi method following guidance by Spranger et al. (2022) and von der Gracht (2012). The Delphi method is an iterative process designed to gather expert opinions over multiple rounds, providing controlled feedback on evolving insights and emerging changes between rounds (Keeney et al., 2011; Spranger et al., 2022). The primary goal of Delphi studies is to build consensus among an expert panel and track any consensus changes across rounds (Spranger et al., 2022; von der Gracht, 2012). In this context, consensus is defined as a collective agreement among experts (Keeney et al., 2011; von der Gracht, 2012). The way consensus is achieved and interpreted can vary across Delphi studies, so it is crucial to specify how this process was managed in each study (Keeney et al., 2011; Spranger et al., 2022). In this study, consensus was defined and measured through qualitative content analysis, agreement ratings, and statistical analysis of expert ratings between rounds (see the data analysis section for further interpretations).

A traditional Delphi study typically begins with an open-ended first survey round to gather ideas from a panel of experts on a proposed topic (Keeney et al., 2011). However, a modified Delphi study, may incorporate alternative methods, such as a combination of semi-structured interviews and surveys, as employed in this study (Keeney et al., 2011). There are several reasons for choosing a modified Delphi approach over a traditional format.

First, an open-ended initial round was unnecessary because the content and conceptual framework of the PVUA tool had already been established in

Studies 1 and 2. Therefore, this modified Delphi study aimed to refine and expand the initially developed version of the PVUA tool. Second, semi-structured interviews were more suitable than surveys for the first round, as they provided an opportunity to clearly present the PVUA tool's purpose and concept. This level of explanation would have been difficult to achieve through a survey alone. The semi-interviews also allowed for greater flexibility, enabling panellists to ask clarifying questions and engage more deeply with the material. For experts who were not able to take part in a semi-structured interview, an alternative method was offered, which included a pre-recorded presentation outlining the PVUA tool's purpose and development, followed by the survey.

Ethical approval for this study was obtained (for more details, see Section 4.9 Ethical Considerations and Data Management)

4.8.1 Recruitment and Participants Study 3

The participants in Study 3 (Paper III) were experts. There is no definitive guidance on the optimal number of experts in Delphi studies. The number of experts should be determined by the topic of interest and the aim of the particular study (Keeney et al., 2011; Spranger et al., 2022). In the context of playgrounds and outdoor play, previous studies, including the scoping review (Study 1, Paper I), have demonstrated that knowledge is derived from a broad range of disciplines (Martin et al., 2023; Morgenthaler, Schulze, et al., 2023a). Therefore, the sample should be representative of this diversity of disciplines. Additionally, since this study focuses on developing and evaluating the content of a new playground audit tool intended for both practical application and research, the sample should also encompass expertise from both professional areas.

The term expert is very vague, and a definition of what an expert is, along with clear inclusion criteria, needs to be provided (Nasa et al., 2021; Spranger et al., 2022). Experts in this study were considered to be people with experience and knowledge about the topic of interest (Nasa et al., 2021). For this study, the inclusion criteria for selecting expert panels proposed by Adler

and Ziglio (1996) were followed (see Table 8 for a description of inclusion and exclusion criteria). Eligible experts needed professional experience related to playground design and/or evaluation in children's outdoor play, experience with children and families with and/or without disabilities, and sufficient time to participate.

Table 8. *Inclusion and Exclusion Criteria (Study 3, Paper III)*

Inclusion criteria	Exclusion criteria
Experts who identify themselves as having knowledge and expertise in topics of playground and outdoor play, inclusive play(grounds), playground designing/provision/evaluation	No experiences on the topic of outdoor play, play and playgrounds
Experts who identify themselves as having knowledge and expertise in topics of outdoor play of children with disabilities, typical developed children, or both	Expert who only have experiences regarding considering adult perspectives on play
Experts who have the capacity and willingness to participate, including time.	Experts who do not have the capacity and time to participate
Experts who have the communication skills and capacities (English speaking, and German speaking, internet access, computer, use of email)	Experts without sufficient English or German skills
Additionally, but not necessary experts who identify themselves as having expertise in instrument development	
No limitations were set regarding geographical location and professional background.	

Participants were purposefully recruited (Bryman, 2012a). Recruitment aimed at a sample of different professions, from research and practice, including play researchers, play advocates, and experts from practice, such as experts working with families and children. This inclusion criteria aimed to support an adequate breadth of expertise and representation of various geographical contexts. Experts were identified through the research team consortium or are known experts in the field, such as published authors. In total, 42 experts were invited individually by email. Experts who had not replied to the initial email were sent a reminder invitation a week later. In the invitation

email (see Appendix 2), potential experts were informed about the study, the value of taking part in this study and potential risks. Experts were informed through an information leaflet (see Appendix 3) and a pre-recorded video providing the same information. Thirty-four experts replied to the invite, ten declined to participate because of the time commitment, and 24 agreed to participate. Two experts retracted their participation before starting the first round of expert consultation. The final expert panel comprised 22 experts in the first round and 17 experts in the second round.

4.8.2 Data Collection Methods Study 3

This expert panel study used two data collection methods: semi-structured interviews in round one and surveys in both rounds. This methods are commonly used in modified Delphi studies (Keeney et al., 2011; Nasa et al., 2021; Spranger et al., 2022).

Semi-structured Interview

In round one, panellists could opt to provide feedback either by semi-structured interview or by online survey using open-ended questions. The two options were provided to accommodate panellists' availability and maximise participation. Semi-structured interviews follow a prepared guide while allowing flexibility in question sequencing and follow-up inquiries (Bryman, 2012a). Semi-structured interviews follow a prepared guide while allowing flexibility in question sequencing and follow-up inquiries (Bryman, 2012a).
Before the scheduled interviews, panellists received the first version of the PVUA tool, an overview of the research aim, and interview instructions (Appendix 4). The interview guide (see Appendix 5) included a brief presentations about the research project, an introduction to the construct play value, and guiding questions to elicit structured yet flexible feedback. Open-ended questions, such as *“What are your first impressions of the audit tool?”* and “*Do you have specific suggestions for changes in [domain/item]?”*, were used to capture expert insights. Follow-up questions encouraged panellists to elaborate on unclear or missing aspects. The semi-structured interview method was beneficial for gathering new and missing content in the

playground audit tool and allowed to address any unclear aspects of the content that experts encountered. This approach supported a shared understanding of why items were generated in the first place while at the same time helping to solicit more detailed insights from experts on new or revised content. The interview guide underwent a pilot testing phase before the first interview session and was reviewed by the supervisors for final adjustments.

The interviews were conducted individually or with two panelists, depending on availability across time zones. Most were individual, ensuring focused discussions. When two panelists participated, both were actively engaged in discussions. Each interview lasted between 90 and 114 minutes. Three interviews included a supervisor (Dr. Christina Schulze or Dr. Helen Lynch), but I led them. Interviews were recorded via Microsoft Teams, with transcripts refined upon relistening. In total, 17 semi-structured interviews were conducted: 13 individually and four with two experts.

Survey Method

In both rounds (round one and two) the survey method was used. Surveys have been proposed as valuable methods to collect data by self-completion questionnaires at a single time (Bryman, 2012a) and have been used before when new audit tools were developed (van den Bogerd & Maas, 2024). Surveys typically use different questions to elicit quantitative responses (closed-ended questions including multiple-choice and Likert scales) and qualitative responses (open-ended questions with text fields) (Gidion, 2012). The survey method was applied in four key ways:

(i) Demographic data collection (Pre-Round One): Experts provided demographic information through five closed and ten open-ended questions covering professional background, expertise, associated populations, testing experience, years of experience, language(s) spoken, and country of residence (Appendix 6).

(ii) Alternative to interview (Round one): The audit tool content was converted into a survey, allowing experts to provide feedback at their convenience. The survey featured the audit tool content followed by an open-

ended question: “Do you have any specific comments or suggestions for changes regarding [domain/item]?”

(iii) Overall Usefulness raiting (Post-Round one and two): After each round, experts rated the audit tool’s usefulness on a four-point scale (not useful to very useful). This evaluation helped track changes in perception across rounds.

(iv) Primary data collection method (Round one): The round two survey primarily collected quantitative data, supplemented by optional qualitative responses. Experts rated the relevance and clarity of content areas and provided item-specific feedback in open-ended fields. The survey was structured to group related items, reducing the burden of individual ratings while still allowing specific feedback. Table 9 describes question types and answer options; examples of the survey can be found in Appendix 7.

Table 9. *Type of Questions Round 2 Experts Consultation*

Type of question	Question	Answer options
Closed-ended	How relevant do you find the content of [individualized per section] to be included in the audit?	• Very relevant. • Somewhat relevant. • Not relevant.
Open-ended	Please provide your suggestions (e.g. specify items you find NOT relevant to include and/or relevant items you find missing).	Open text field
Closed-ended	Is the content of [individualized per section] easy for you to understand?	• Yes, very easy to understand. • No, could be clearer. • No, not clear at all.
Open-ended	Please provide your suggestions to make content [individualized per section] more clear.	Open text field

All surveys were created, disseminated and managed via REDCap (Research Electronic Data Capture), an electronic data capture tool hosted at the Zurich University of Applied Sciences (Harris et al., 2009, 2019). REDCap

is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources (Harris et al., 2009, 2019).

All created surveys were piloted before data collection using cognitive interviews to explore the appropriateness of questions and identify any issues with wording or response options (Collins, 2003). This study employed cognitive interviews to explore the cognitive processes while questions were read, interpreted and responded to (Collins, 2015). Furthermore, piloting helped to understand how potential responders navigated the survey and whether the flow and structure were intuitive. The cognitive interviews were conducted online with several individual pilot panellists. The think-aloud method was used for the cognitive interviews (Willis, 2005). Pilot panellists were asked to share their screen via Microsoft Teams and fill out the survey while being encouraged to think out loud to give insights into their thought processes. This was followed by asking specific questions about potential questions and response options changes. The cognitive interviews were not audio or video recorded but resulted in adjustments to the survey questions and potential response options in the wording of questions, for example. Five individuals piloted the survey in round one, while four individuals piloted the survey in round two. Pilot panellists were purposively recruited and included experts with profound knowledge of the topic and those without expertise (Collins, 2015).

4.8.3 Data Analysis Methods Study 3

This research involved both qualitative and quantitative data analysis. Qualitative content analysis was used for qualitative data, and descriptive and non-parametric statistical analysis was used for quantitative data.

Qualitative Content Analysis Study 3

A directed content analysis was used (Hsieh & Shannon, 2005). Directed content analysis was chosen because this research aimed to extend and refine the initial version of the audit tool. Pre-determined codes, based on the audit tool's content, were used to categorise expert feedback (Hsieh & Shannon, 2005). Additional codes were assigned to new or revised content. The directed content analysis was used separately in both expert panel rounds to refine the audit tool versions and to get insights into how the experts interpret the content.

The analysis started with preparing the data. The preparation for the first round of the expert panel included listening to the audio recording and making refinements to the automatically generated transcripts. The preparation for the second panellist round included downloading the provided textual data from REDCap and generating a Microsoft Word document. After data preparation, coding started. Hsieh and Shannon (2005) suggested that coding may start by assigning the pre-determined codes to the textual data, followed by identifying sections of the texts which do not fit the pre-determined codes. These sections should be given new codes (Hsieh & Shannon, 2005). After coding, all codes were reviewed and clustered according to similar content. For example, when experts provide insights for the same content area item, this was followed by reading all the clustered information and judging what adjustments to the audit tool items or content areas were needed. These adjustments included the following types: (a) minor adjustments but do not change the meaning, (b) clarify intended meaning, (c) delete an item, (d) create a new item, (e) merge two or more items to one, (f) shorten or length an item but keep meaning, (g) relocate item, (h) new content area, (i) adjust the name of content area, or (j) delete content area. The audit tool content was adjusted based on at least one expert recommendation. In cases where experts provided divergent perspectives, the whole research team decided on the most suitable adjustment. In the last step, the changes were counted and summarised in a table that included a numerical description of the type of changes separately for both rounds (see Appendix 8).

This study aimed to evaluate validity in relation to content. As described above, content validity is also judged by how potential test users interpret the content and, subsequently, how test scores are assigned (AERA et al., 2014). Therefore, getting insights into how the international and interdisciplinary expert panel interpreted the test content can give a flavour of how potential future users might interpret the test content. To identify these potential interpretations, the answers from panellists that provided insight into how they interpreted the test content were first extracted and then coded based on potential interpretations. The codes were subsequently grouped by similar topics of interpretation, and finally, the results were summarised in topic summaries, along with panellists' quotations to support the interpretations.

The structured content analysis was conducted independently, with supervisory input for final decisions on content adjustments.

Descriptive Statistical Analysis Study 3

Descriptive statistics were used in Study 3 (Paper III) to describe demographic data and survey data (Norman & Streiner, 2014b). Data types and corresponding analysis included:

(i) Nominal data[4] (e.g., professional background and sex of panellists): Frequencies and percentage

(ii) Ordinal data[5] (e.g., overall usefulness, relevance, and clarity ratings): Frequency and percentage

(iii) Ratio data[6] (years of experience and age of panellists): Mean and standard deviation.

The level of agreement (consensus) among the panellists was evaluated for relevance and clarity ratings. Van der Gracht (2012) recommended evaluating ordinal-level data using percentages and frequencies. In this study, a sufficient level of agreement was set to a threshold

[4] "A nominal variable consists of named categories, with no implied order among the categories" (Norman & Streiner, 2014b, p. 4).
[5] "An ordinal variable consist of ordered categories, where the differences between categories cannot be considered to be equal" (Norman & Streiner, 2014b, p. 4).
[6] "A ratio variable has equal intervals between values and a meaningful zero point" (Norman & Streiner, 2014b, p. 4).

of 70% or higher in very relevant and very clear ratings, which were both the highest possible scores on the three-point rating scale (Diamond et al., 2014). If agreement was below 70%, qualitative feedback guided content revisions. This demonstrates how both the descriptive analysis and the content analysis described above supported the revisions of the PVUA tool in round 2.

Statistical Analysis Study 3

The statistical analysis in this study was about the stability of responses from the panellists. The stability of responses is considered a criterion in studies that examine ratings of the same participant groups at several time points, such as Delphi studies (von der Gracht, 2012). In this study, stability was defined as "the consistency of responses between successive rounds of a study" (Dajani et al., 1979, p. 84). Stability was considered achieved when no statistically significant differences in overall usefulness ratings between rounds one and two were found, which supported the decision to conclude the panellist consultation phase (von der Gracht, 2012). Response stability was evaluated using the Wilcoxon Signed-Rank test, a non-parametric test for ordinal data (Norman & Streiner, 2014a). The test compared overall usefulness ratings from rounds one and two:

> Null Hypothesis (H0): There is no difference in scores of panellists' overall usefulness ratings between round one and round two.
>
> Alternative Hypothesis (H1): There is a difference in scores of panellists' overall usefulness ratings between round one and round two.

According to Norman and Streiner (2014a), if the null hypothesis were true, we would anticipate that the average rank of the overall usefulness ratings from panellists from round one to round two would be about the same. In other words, the "difference between rankings would all be small, and the sum of rankings for both the positive and the negative differences would be small" (Norman & Streiner, 2014a, p. 280). This would lead to an acceptance of the null hypothesis. In the case of this study, this means that the panellists' ratings between round and two are stable.

Paired data were analyzed, including only panelists who provided ratings in both rounds (Norman & Streiner, 2014a). In the case of this study, this would include the panellists who have completed overall usefulness rantings in both rounds. This excludes the panellists who have only participated in one panellist round and those who only provided an overall usefulness rating in one of the two rounds. For this statistical test, the significant level was set to 0.05. See Appendix 9 and Appendix 10 for raw data and descriptive statistics.

Descriptive and statistical data analysis was conducted using the Social Sciences version 28 (IBM Corp, 2021), independently reviewed and confirmed by the supervisory team.

4.9 Ethical Considerations and Data Management

This research followed the ethical principles and values of the European Code of Conduct for Research Integrity (All European Academies (ALLEA), 2023) and the UCC internal Code of Research Conduct (University College Cork, 2021). The following sections will be provided information on ethical approval, informed consent, confidentiality and anonymity, as well as data management and open-access publishing procedures.

4.9.1 Ethical Approval

No ethical approval was needed for Study 1 (Paper I) and Study 2 (Paper II) due to the nature of using published literature. For Study 3 (Paper III), ethical approval was obtained from the University College Cork Social Research Ethics Committee, which is responsible for non-clinical research involving human participants [Log 2022-190] (see Appendix 11). When the ethical application was submitted, the audit tool was still in development, and no initial version was finalised. Therefore, after finalising the initial version of the audit tool, including data collection instruments (survey and interview guide) and before starting recruitment and data collection, an amendment request was approved [Log 2022-190A1] (see Appendix 12). When conducting this research study, I was employed at the Zurich University of Applied Science (ZHAW) in Winterthur, Switzerland. The infrastructure from ZHAW was used

including REDCap and Microsoft Teams both used for data collection. Therefore, additional ethical approval in Switzerland was obtained. In Switzerland, a declaration of no objection was issued by the ethical commission of the municipality of Zurich [Req-2022-00922] (see Appendix 13). Declarations of no objection meant that the study did not aim to collect any health-related data from the participants. Hence, the study was not subject to the Swiss federal act on research involving human beings (Humanforschungsgesetz [Federal Act on Research Involving Human Beings], 2014). No additional ethical approval was needed from Queen Margaret University's Research Ethics Panel, but information on obtained ethical approval from other partner institutions was forwarded and noted by them.

4.9.2 Informed Consent

Participation in this study was entirely voluntary. Participants were informed about the possibility of withdrawing from the study without repercussions at any time, whether before the study started or while the study was ongoing. Information about the study and potential participation was provided to potential participants in several different modalities, including written via email (see Appendix 2), information leaflet (see Appendix 3), via a pre-recorded video presentation and, if wished, through phone or video calls. In addition, informed consent was provided digitally before the participant entered each online survey round. For the surveys, participants were only able to participate if the consent was given. For the online interviews, participants were provided additional verbal and data protection information about the study. They were asked if they understood and consented to participate verbally (continuous consent) only after additional verbal consent recording was initiated.

4.9.3 Confidentiality and Anonymity

All participants in this study were experts in a specific field; therefore, they might likely be known by and know fellow respondents, and complete anonymity might not be possible. Insights from the experts on their evaluation of the audit tool in development can be considered as not being confidential

data. Following recommendations from experts' involvement in research (Keeney et al., 2011), the experts in this study could opt to be acknowledged with their names in the following publications, including presentations, thesis and publications. This was obtained in a separate question while gaining their consent (*Do you want your name to appear in the acknowledgement section of further publications (e.g. in the instrument manual, acknowledgements in a published article, PhD thesis)?)*. This question was asked in both rounds of the expert panel study, and only experts who have given their consent in both rounds will be acknowledged by naming them in acknowledgement sections. However, their name will not be linked to any specific data and information they provide to ensure anonymity.

This research project collected personal data, including sociodemographic data and email addresses, that could identify experts. Any identifying information that potentially links individual participants to data was removed or encoded in subsequent publications, including this thesis. All potential identifying data was anonymised for all publications to protect participants' privacy.

4.9.4 Data Management and Open-access Publishing

This research project was conducted with three partner universities: University College Cork, Queen Margaret University and Zurich University of Applied Sciences. A data management plan to manage the risk of data sharing and protection was written to handle ethical considerations in handling data between the three universities. Following the principles of collaborative working, all involved universities take on responsibility for research integrity, data sharing and protection (ALLEA, 2023). In detail, while the research project was ongoing, I was responsible for data capturing, metadata production, data storage, data naming, data archiving, and anonymised data sharing. During data analysis, the anonymised datasets were made available to supervisors (Dr Christina Schulze, Dr Helen Lynch, Dr Duncan Pentland). After finalising the project, data responsibility will be transferred to supervisors. The data management plan followed the FAIR principles (Finable, Accessible,

Interoperable and Reusable), ensuring access to the data was as open as possible (ALLEA, 2023). For this study, an anonymised dataset was created and made available for open access through the open science database Zenodo (zenodo.org) under the European Union's Horizon 2020 Marie Skłodowska-Curie grant agreement project titled P4Play [No 861257]; To access the dataset see (Morgenthaler, Loebach, et al., 2024). All participants were informed and asked to consent to the data collection, publication, storage and anonymised open data set on Zenodo. This anonymised dataset consists of the following data: quantitative ratings from rounds 1 and 2, anonymised qualitative answers from experts of rounds 1 and 2, and metadata alongside all blank survey instruments, blank information leaflets, blank informed consent sheets and the semi-structured interview guide from round 1. Data withheld to make open access was sociodemographic raw data, signed informed consent from rounds 1 and 2, and transcripts of round 1 semi-structured interviews, as those were all data that was possible to trace back to individual experts, and anonymisation would have led to making the data set unusable.

4.10 Summary of Chapter Four

This chapter presents this thesis's ontological position, study design, methods and ethical considerations. Both qualitative and quantitative methods were used to approach this thesis from a constructivist realism ontology. In detail, this chapter provides an overview of the steps taken to develop, construct, and evaluate the content of the PVUA tool, a new playground audit tool that investigates the play value and usability of public playgrounds. This chapter provides the basis for the following upcoming chapters, which are the two stages of this thesis, including the three published studies.

CHAPTER FIVE — STUDY 1, PAPER I

Responding to the overall aim of this thesis, this scoping review (**Study 1, Paper I**) aimed to review empirical evidence as a basis to build the content of the proposed new playground audit tool. Specifically, the aim of the scoping review was *to summarise the experiences of children with and without disabilities, and to gain insight into environmental qualities that maximize play experiences for all children on community playgrounds.*

Under the guidance of the supervisory team (Dr Christina Schulze, Dr Duncan Pentland, and Dr Helen Lynch), the research design was developed. The research design, data collection, data extraction and data analysis were conducted by me. The supervisory team supported data collection such as the screening procedures and oversaw data extraction and data analysis through weekly supervisory meetings. I wrote the paper with guidance and mentoring from his supervisory team. This study was published on the 18th of January 2023 in the *International Journal of Environmental Research and Public Health* following one round of minor revisions in response to four peer reviewer's comments. Peer review reports were published alongside the final article and can be accessed online. The main revisions included the need to update the search, a clearer presentation of the research aims and significance of this study as well as shortening of the introduction and discussion sections. These minor revisions strengthened the paper to be more precise and being more up to date with recent literature. The article can be accessed open access:

Morgenthaler, T., Schulze, C., Pentland, D., & Lynch, H. (2023). Environmental qualities that enhance outdoor play in community playgrounds from the perspective of children with and without disabilities: A scoping review. *International Journal of Environmental Research and Public Health*, 20(3), 1763. https://doi.org/10.3390/ijerph20031763

The study is presented in the thesis formatted aligned with this thesis but followed outline of headings as it appeared in print. The literature used in the publication is partly the same as used in other sections of this thesis

consequently, there is some overlap with the previous sections of this thesis. A separate reference list was compiled specifically for this chapter.

5.1 Title: Environmental Qualities That Enhance Outdoor Play in Community Playgrounds from the Perspective of Children with and without Disabilities: A Scoping Review

5.2 Abstract

For children, playgrounds are important environments. However, children's perspectives are often not acknowledged in playground provision, design, and evaluation. This scoping review aimed to summarise the users' (children with and without disabilities) perspectives on environmental qualities that enhance their play experiences in community playgrounds. Published peer-reviewed studies were systematically searched in seven databases from disciplines of architecture, education, health, and social sciences; 2905 studies were screened, and the last search was performed in January 2023. Included studies (N = 51) were charted, and a qualitative content analysis was conducted. Five themes were formed which provided insights into how both physical and social environmental qualities combined provide for maximum play value in outdoor play experiences. These multifaceted play experiences included the desire for fun, challenge, and intense play, the wish to self-direct play, and the value of playing alone as well as with known people and animals. Fundamentally, children wished for playgrounds to be children's places that were welcoming, safe, and aesthetically pleasing. The results are discussed in respect to social, physical, and atmospheric environmental affordances and the adult's role in playground provision. This scoping review represents the valuable insights of children regardless of abilities and informs about how to maximise outdoor play experiences for all children.

5.3 Keywords

Affordances; environment; inclusion; outdoor play; participation; playground; playthings; play value; vulnerable populations

5.4 Introduction

Play is a fundamental right of children that is essential for health, well-being, and development, as stated in Article 31 of the United Nations

Convention on the Rights of the Child (UNCRC) (United Nations, 1989). The general comment 17 (GC 17) emphasises every child rights to play and defines play as “any behaviour, activity or process initiated, controlled and structured by children themselves; it takes place whenever and wherever opportunities arise… play itself is non-compulsory, driven by intrinsic motivation and undertaken for its own sake, rather than as a means to an end” (UNCRC, 2013, pp. 5–6). This scoping review examines children’s perspective of play on playgrounds. Other research considers play from different perspectives, particularly its use to foster physical activity, or social and motor development (Farmer et al., 2017; Flores et al., 2019; Vincent et al., 2018; Wray et al., 2020). This instrumental view of play has been critically discussed by scholars from multiple disciplines, including play-work, education, and health professionals (like occupational therapists) (Brown & Lynch, 2023; Goodley & Runswick-Cole, 2010; Lester & Russell, 2008, 2014; Wood, 2007) who emphasise moving beyond such a perspective (Lester & Russell, 2008) and taking a reflective stance on how professionals value and utilise play through practice and research (Brown & Lynch, 2023; Goodley & Runswick-Cole, 2010). Instead, in line with the GC 17, professionals have begun to move to the consideration of how to provide time and space for play as an important approach to ensuring the right to play is addressed.

Playgrounds are one important environment mentioned in the GC 17 that should cater for play for all children, regardless of ability (United Nations, 1989). While playgrounds can exist in diverse community settings, for this review, they are defined as outdoor environments containing play opportunities provided for the purpose of play, located in public parks or schools available to the general public (Burke, 2013, p. 83). In many countries, community playgrounds are important spaces where children play (Loebach & Gilliland, 2010; Lynch, 2009; Moore & Lynch, 2015; Sterman et al., 2016; van Heel et al., 2023) that are regularly visited by children and families of various ages and abilities (Little & Eager, 2010; Loebach & Gilliland, 2010, 2019; Nicholson et al., 2015). Physical and social environmental qualities shape how, and in what outdoor play, children engage (Finney & Atkinson, 2020; Moore et al., 2022b;

Moore & Lynch, 2018). For playgrounds, physical environmental qualities are natural, and built environments, that is, objects and spaces provided for play, and social environmental qualities encompass potential opportunities to engage with others as well as attitudes, rules, and so forth (Finney & Atkinson, 2020; Moore & Lynch, 2018; Woolley & Lowe, 2013).

As children are the main users of playgrounds understanding of how they use playgrounds, and what their wishes and preferences are for playgrounds, should be the lynchpin of playground provision, design, and evaluation. By considering children's perspectives on playgrounds, this study follows Rasmussen's (2004) differentiation between *places for children* compared to *children's places*. Places for children can be playgrounds that are designed and built with adults' ideas of what a playground should contain. However, not every place built for the purpose of play is a children's place. Places for children can become children's places when children connect to the playground through outdoor play, allowing them to attribute meaning to the playground environment (Rasmussen, 2004).

Considering children's perspectives has been found to contribute to positive outcomes such as meeting their needs (Jansson & Ramberg, 2012), fostering community belonging and interest in spaces (Gallerani et al., 2017), and making spaces more inclusive (Dunn & Moore, 2005; Wenger et al., 2023). Similarly, research has suggested that children's perspectives as user-based knowledge is valuable and should include a broader range of diverse groups of children with and without disabilities in playground provision (Lynch et al., 2018; Moore et al., 2022b; Moore & Lynch, 2015; Wenger et al., 2023). Despite the importance of considering children's perspectives, previous research found that playground designers, planners, and providers have insufficient knowledge and experience in providing playgrounds that supports play experiences for a diverse population, including children with and without disabilities (Dunn & Moore, 2005; Moore et al., 2022b, Moore et al., 2022a; Olsen & Dieser, 2012; Prellwitz et al., 2001; Sterman et al., 2019; Van Melik & Althuizen, 2022; Wenger et al., 2023; Woolley, 2013). Recent reviews found that evidence relies on caregivers' perspectives, such as parents as a proxy

for children with disabilities, and a “user-based knowledge including the broad range of diverse groups of children who are identified to be most at risk for play deprivation” (Moore et al., 2022b, p. 17) should be considered in future research. Moreover, research from the United Kingdom and Switzerland concluded that good play provision need to consider perspectives of children with disabilities and their families as an important reference point for other stakeholders (Dunn & Moore, 2005; Wenger et al., 2023). Until now the perspective of children with disabilities in playground provision is often neglected (Moore et al., 2022b). Since playgrounds are places that are used by a diversity of children, this scoping review will include perspectives of children with and without disabilities to better understand what play experiences are important for such a diverse group of users.

To summarise, diverse children’s perspectives have not yet been sufficiently acknowledged in playground provision, design, and evaluation. Since playgrounds are built for the purpose of children’s play, children’s perspectives on playgrounds need to be taken more seriously and acted upon. This requires a better understanding of what children with and without disabilities seek in playgrounds. No other review has been found (Brown et al., 2021; Fernelius & Christensen, 2017; Finney & Atkinson, 2020; Jerebine et al., 2022; Moore, Boyle, et al. 2022; Moore, Lynch, et al., 2022b; A. Moore et al., 2023; Moore & Lynch 2015; Sterman et al., 2016) that investigated published peer-reviewed literature that considered perspectives of children with and without disabilities and their play experiences on the playground. This scoping review aims to summarise the users’ (children with and without disabilities) play experiences and gain insight into what environmental qualities maximize the play experience on community playgrounds for all children. Such new synthesized knowledge will provide evidence of considering children as informants and insight into how playgrounds can be understood as children’s places, where meaningful play experiences can take place.

5.5 Materials and Methods

A scoping review methodology was applied following the five stages proposed by Arksey and O’Malley (2005). Scoping reviews aim to

systematically identify and map the extent, range, and nature of available evidence on a broad topic. Scoping reviews have the advantage of allowing an extensive investigation of the entire scope of relevant primary research from a variety of disciplines regardless of study design and methodological quality (Arksey & O'Malley, 2005; Peters et al., 2020). Levac et al. (2010) and guidelines from the Joanna Briggs Institute (Peters et al., 2020) were followed to ensure methodological rigor. A protocol was published prior to the investigation (Morgenthaler et al., 2021).

5.5.1 Identify the Research Question (Stage 1)

The following research question was formulated**:** What is known about how environmental qualities of public playgrounds contribute to the user experience of outdoor play in children with and without disabilities? We aimed first to summarise users' (children with and without disabilities) experiences to gain insight into what environmental qualities maximize the play experience on public playgrounds for all children.

5.5.2 Identifying Relevant Studies (Stage 2)

A three-step search strategy was undertaken. First, an initial search helped identify relevant articles and other key search terms. Second, a test search in one database with an initial search string was performed. In this phase, information specialists from the University College Cork library were consulted to validate the search string and strategy. Third, the systematic search using the revised search string was conducted in August 2021; a follow-up-search was performed January 2023. – see Table 10 for search terms.

The systematic search of peer-reviewed studies was conducted in seven databases (Academic Search Complete, Avery Index to Architectural Periodicals, CINAHL, MEDLINE, PsycINFO, Scopus, and Web of Science) relevant to disciplines of health, education, social sciences, and architecture, which allowed a broad range of literature from different professional audiences to be included. No limitations were set for publication year. The executed search string (see Table 10) was built using the Boolean operator OR between synonyms and the Boolean AND operator between concepts (playground,

environmental qualities, and population). The search terms were applied to text fields of title, abstract, and keywords in included databases. Additionally, the Journal of Children and Youth Environments was hand-searched as it is an important journal for the review topic (February 2022).

Table 10. *Search Terms (Study 1, Paper I)*

Concepts	Search terms
Playground	playground* OR playscap* OR playspac* OR "play spac*" OR "play area*"
Environment	buil* OR design* OR provi* OR natur* OR outdoor OR inclusive
Population	child* OR kid* OR caregiver* OR parent* OR mother* OR father* OR famil*

5.5.3 Study Selection (Stage 3)

A two-step review process involved scanning titles, abstracts, and full texts. All citations were transferred into the online review software COVIDENCE (*Covidence Systematic Review Software*, 2023). Duplicates were removed. As recommended for scoping reviews, we applied an iterative review process resulting in the creation of inclusion and exclusion criteria. Title and abstract screening was divided into two rounds, with discussion of inclusion and exclusion criteria between the two screening phases. Round one helped identify the scope of studies and facilitated the identification of major areas irrelevant for this review, such as environmental hazards, safety concerns on playgrounds, or research on instrumental views on outdoor play such as play for physical activity, social behaviour, learning, health, development, or cognitive gain. Each paper was screened by two independent reviewers, and conflicts were solved by a third independent reviewer. Studies considered questionable for inclusion were taken into the next round. Round two of title and abstract screening was performed with refined inclusion criteria found in Table 11. Again, each paper was reviewed by two independent reviewers, and disagreements between reviewers were resolved in a group discussion within the review team. For the full-text review, each paper was screened by two independent reviewers following inclusion criteria. Inconsistent decisions about papers were resolved in a team discussion.

Reasons for exclusion were recorded in the full-text screening phase. To get an in-depth understanding of the published research scope, we first included perspectives of children and family caregivers. Studies that only represented family caregiver perspectives were excluded in the full text review (see Appendix 14), but studies that contributed both the perspectives of children and family caregivers remained in this scoping review. However, only the children's perspectives were included in further analysis.

Table 11. *Inclusion and Exclusion Criteria (Study 1, Paper I)*

Inclusion criteria	Exclusion criteria
The primary focus is on public playgrounds built for the purpose of play, including playgrounds in community environments such as parks and schools.	Spaces used for play but not built for the purpose of play (e.g., forest area used for play, studies concerning community neighbourhoods)
Studies that consider environmental qualities and outdoor play	Studies that only investigate environmental qualities (e.g., accessibility) and do not relate environmental qualities to outdoor play
Studies about outdoor play considering play for the sake of play	Studies about outdoor play for other means: (1) health reasons (e.g., outdoor play for physical activity), (2) learning, (3) restoration, (4) social interaction, or (5) interventions
Studies with populations of children and youth between 0 and 12 years, with and/or without disability.	Studies only addressing children and youth populations older than 12 years of age. Studies addressing only family caregiver (parents, legal guardians) and expert perspectives (e.g., teachers, landscape architects, playground providers, health professionals)
A primary peer-revied study including qualitative, quantitative, and mixed methods	Not a primary research study (e.g., opinion pieces, editorials, systematic reviews, methodological papers, historical papers, papers concerning measurement development, conference proceedings)
Written in English or German	Languages other than English or German

5.5.4 Charting and Analysing the Data (Stage 4)

As recommended by Levac et al. (2010), two phases of data extraction and analysis were completed. The first phase, by author (T.M.), included the

extraction of study characteristics into a Microsoft Excel spreadsheet. The data extraction form was piloted with three studies and approved by the review team to ensure relevance and clarity of extracted characteristics (Peters et al., 2020). This data was analysed descriptively and provided an overview of the published research on the topic under investigation.

The second phase included a convergent synthesis design using the same content analysis on qualitative, quantitative, and mixed-method studies (Hong et al., 2017). The qualitative content analysis was guided by Graneheim and Lundman (2004), starting with familiarisation with the data set by reading through all findings/results sections and note-taking relevant to the research question, as well as key study findings. The coding process started with a close reading of each study to first identify meaning units, which were formulated into condensed meaning units and abstracted to a code relevant to the research question. Multiple coding was applied if several meanings were identified in one meaning unit. The coding phase was subjective to the researcher's (T.M.) interpretation in searching for patterns of meaning within the individual studies and throughout the whole data set. The coding process was done in Atlas.ti 22 Windows (2023) in two rounds. Codes were sorted into categories that were compared to each other and translated from one study to the next. In this phase, codes were refined. In the last phase, the overarching themes were formed through the identification of underlying meanings relevant to the research question of environmental qualities contributing to play experiences. Analysis started with a joint coding of the first four studies (approximate 8% of all studies) with the review team. The other studies were analysed by the first author (T.M.) and guided by discussions with the whole review team to confirm formed codes and themes. The authors of this review are experienced occupational therapists, and two of them (C.S., H.L.) have advanced knowledge of research on children's play.

5.5.5 Collecting, Summarizing, and Reporting the Results (Stage 5)

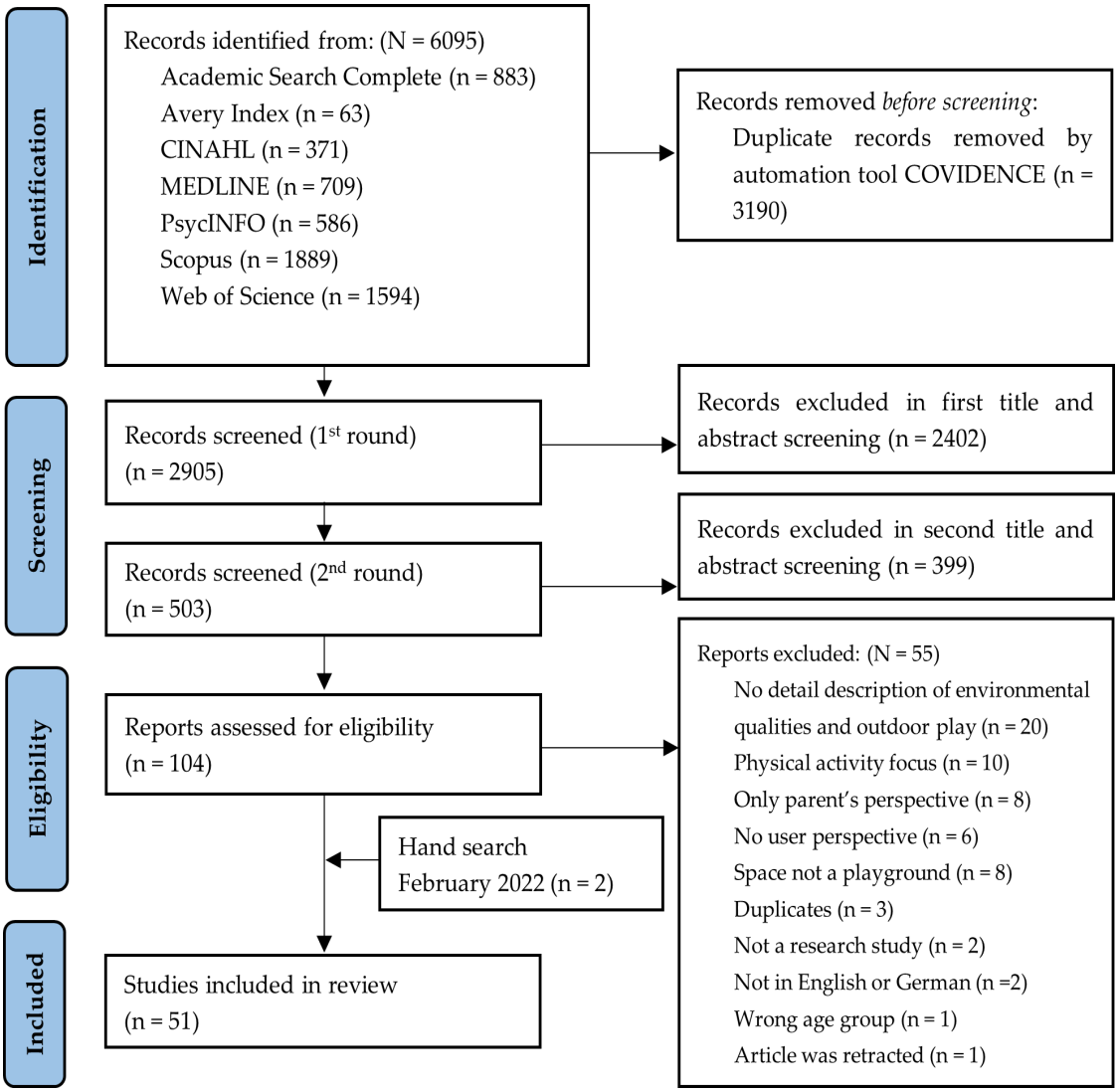
Findings where charted and summarised by the first author (T.M.). First, the scope of the included studies is summarised. In the second part, themes

from the qualitative content analysis are presented. In approaching this review from a children's perspective, including children with and without disabilities, the findings only elaborate on a specific population when findings were only found for that specific population.

5.6 Results

The searches revealed a total of 6095 references, which was reduced to 2905 after duplicates were removed. Articles were reduced in two rounds of title and abstract scans first to 503 studies and, after refinement of inclusion criteria, to 104 studies. Full text reviews identified 49 studies meeting the inclusion criteria. Two additional papers were identified in a hand search resulting in the final sample of 51 studies. For the selection process, see Figure 5.

Figure 5. *Prisma Flowchart Identification, Screening, Eligibility, and Inclusion of Studies (Study 1, Paper I)*



5.6.1 Descriptive Numerical Analysis of Included Studies

A detailed description of included papers can be found in Table 12. Publication dates range from 1974–2022, (see Figure 6). Most studies were conducted in Europe (*n* = 25), Australia and New Zealand (*n* = 11), followed by Asia (*n* = 8) and North America (*n* = 7). No studies from Africa or South America met the inclusion criteria (See Figure 6).

Interdisciplinary contribution to the topic came from Architecture and Landscape Architecture (*n* = 16), Education (*n* = 15), Occupational Therapy (*n* = 6), Psychology (*n* = 4), Exercise, Sport and Nutrition Sciences (*n* = 4), Human

Geography (*n* = 3), Occupational Science (*n* = 1), Public Health (*n* = 1), and Practitioner Researcher (*n* = 1).

Most papers employed qualitative (*n* = 30) methods, followed by quantitative (*n* = 13) and mixed methods (*n* = 8). Most studies used multiple data collection methods (see Table 13), whereas most methods were semi-structured interviews (*n* = 23), focus groups (*n* = 10), walk-along talks (*n* = 10), and observational methods referred to as systematic (*n* = 11) and unsystematic (*n* = 9).

Figure 6. *Number of Included Publications in the Review Period 1974 –2022 (n = 51) by Continent (Study 1, Paper I)*

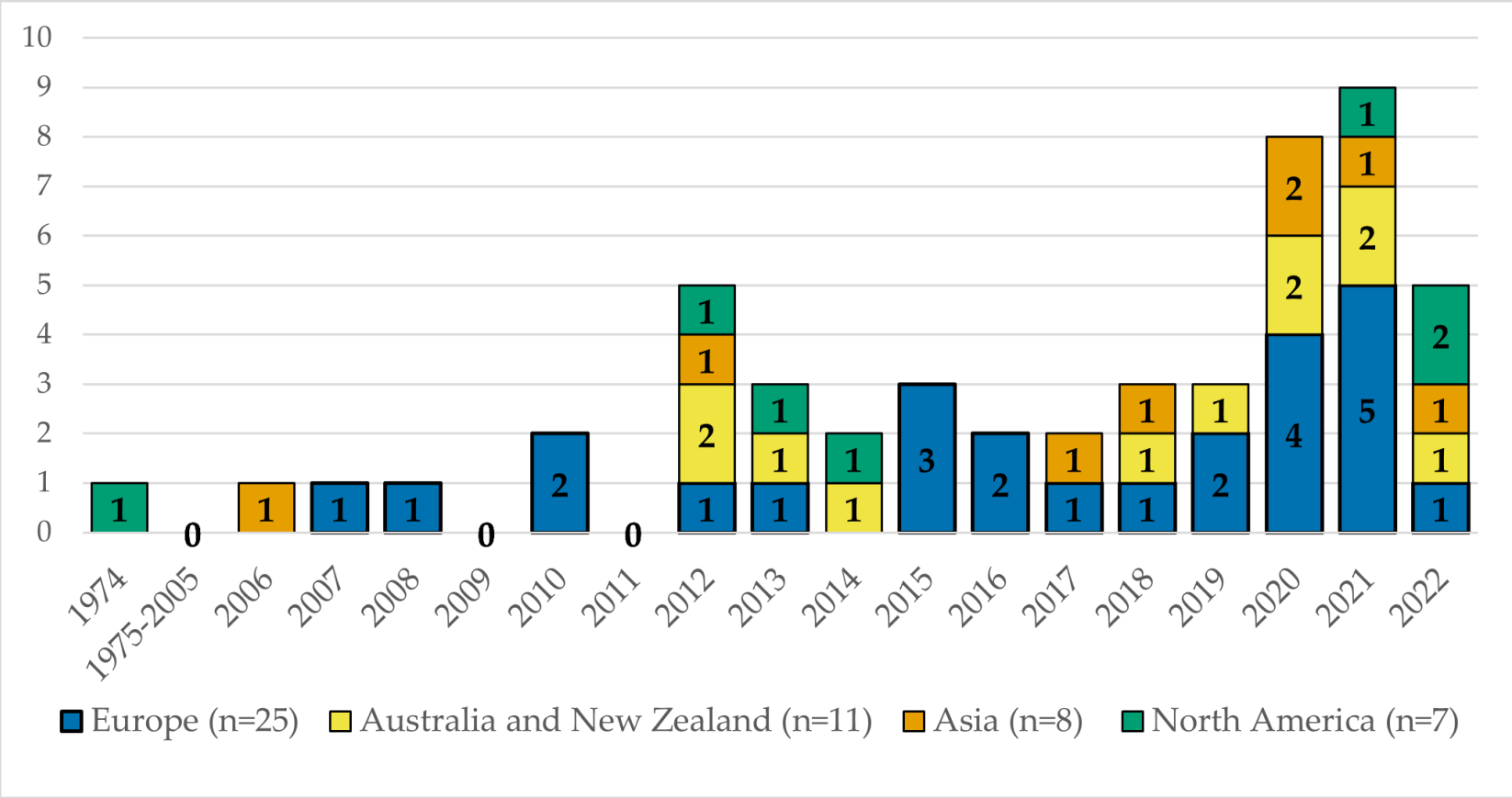


Table 12. *Included Publication's Characteristics, Participants, and Playgrounds Sample (Study 1, Paper I)*

Study Location of data collection	Study design	Methodology	Participants sample		Playground sample	
			Children population (n, age range, sex, disabilities if applicable)	Adult population (role, n)	Type of playground (n)	Urban/ suburban / rural
Aminpour et al., (2020) Australia	Qual	Qualitative descriptive	[a] n=228 (8-10 years) Sex is missing	N/A	School playground (naturalized) n=3	Urban
Aminpour, (2021) Australia	Qual	Qualitative descriptive	[a] n=228 (8-10 years) Sex is missing	N/A	School playground (naturalized) n=3	Urban
Birkner et al., (2021) Germany	Mixed	Descriptive qualitative and quantitative	n=17 (2-14 years) Male n=1 Female n=16	Parents n=29	N/A	N/A
Bourke & Sargisson, (2014) New Zealand	Quant	Case study	n=1534* (0-14 years) Male n=763, Female n=771	Park manager n=2	Public playground n=1	Suburban
Burke, (2012) Australia	Qual	Case study	n=72 (6-10 years) Male n=42 Female n=30 Diagnosis: intellectual impairment, balance difficulty, muscle weakness motor impairment, autism	N/A	Public playground n=missing	Missing
Caro et al., (2016) The Netherlands	Qual	Participatory qualitative study	n=18 (9-12 years) Male n= 8 Female n= 10	N/A	School playground n=3	Urban
Cetken-Aktas & Sevimli-Celik (2022) Turkey	Qunat	No information	n=102 (5-6 years) Male n=55 Female n=47	N/A	School playground (Early childcare) n=6)	Missing
Chen et al., (2020) China	Qual	Case study	n= 11 (4-7 years) Male n=missing Female n=missing	Parents n=20	Public Playground n=8	Urban

Czalczynska-Podolska, (2014) USA	Quant	Case Study	n=2217* (2-12 years) Male n=1028 Female n=1184	N/A	Public Playground n=10	Suburban
Dyment & O'Connell, (2013) Australia	Quant	No information	n= 2361* (years: missing) Male n= 1350 Female n=1011	N/A	School playground (Early childcare setting) n=4	Missing
Fahy et al., (2021) Ireland	Qual	Ethnography	n=5 (6-9 years) Male n= 5 Female n=1 Diagnosis: autism	Teacher n=3	School and public playground n=missing	Rural
Goodenough et al., (2021) United Kingdom	Qual	Ethnography	n=12 (7-10 years) Male n= missing Female n=missing	N/A	Public adventure playground n=1	Missing
Hayward et al., (1974) USA	Mixed	No information	n=91 in Interview n=missing observation (years: missing) Male n= missing Female n= missing	N/A	Public traditional, contemporary, and adventure playground n=3	Missing
Horton & Kraftl, (2018) United Kingdome	Mixed	No information	n=1243 survey n= 151 observation (5-13 years) Male n=693 Female n=730	N/A	Public playground n=3	Urban
James et al., (2022) Canada	Quant	Naturalistic observational	n=1332* (0-13 years) Male n=51.82% Female n=48.20% Diagnosis: (n=1 observation) mobility impairment	N/A	Public playground (inclusive) n=1	Missing
Jansson & Persson, (2010) Sweden	Qual	Case study	[b] n=141 (6-11 years) Male n= missing Female n= missing	Parents n=51 Teacher n=10	Public playground n=24	Rural
Jansson et al., (2016) Sweden	Qual	Case study	n=16 (10-11 years) Male n=5 Female n=11	N/A	Public playground (and park) n= 10	Suburban
Jansson, (2008) Sweden	Qual	Case study	[b] n=141 (6-11 years) Male n= missing Female n= missing	N/A	Public playground n=24	Rural
Jansson, (2010) Sweden	Qual	Case study	[b] n=141 (6-11 years) Male n= missing Female n= missing	Parents n=51 Teachers n=10	Public playground n=24	Rural
Jansson, (2015) Sweden	Qual	Case study	[b] n=141 (6-11 years) Male n= missing Female n= missing	Local Park worker n=missing	Public playground n=24	Rural

Jeanes & Magee, (2012) United Kingdome	Qual	Case study	n=19 (4-12 years) Male n= missing Female n=missing Disabilities: visual impairment, deafness, autism, Down syndrome	Parents n=14	School playground n=1	Urban
Khan et al., (2020) Bangladesh	Qual	Participatory case study	n=29 (8-12 years) Male n=13 Female n= 16	Teacher n=9 Parents n=5	School playground n=1	Rural
Lerstrup & van den Bosch, (2017) Denmark	Qual	Ethnography	n=49 (3-6 years) Male n= missing Female n= missing	N/A	School playground (Early childcare) n=2	Rural
Loebach & Cox (2022) USA	Quant	No information	n=693* (0-8 years) Male n=406 Female n=287	N/A	Public playground in a museum (naturalized) n=1	Urban
Luchs & Fikus, (2013) Germany	Quant	No information	n=59 (5-6 years) Male n=33 Female n=26	N/A	School Playground n=2	Urban
Lynch et al., (2020) Ireland	Qual	Case study	n=12 (3-11 years) Male n=5 Female n=7 Diagnosis: ASD (n=2); Down syndrome; (n=1); mobility impairment (n=1); visual impairment (n=1	Mother n=6 Father n=2 Grandparent n=2	Public playground (and park) n=5	Urban
Min & Lee, (2006) Korea	Mixed	Case study	n= 91 (7-12 years) Male n=62 Female n=29	N/A	Public playground n=16	Urban
Moore et al., (2021) Australia	Qual	Case study	n= 6 (4-5 years) Male n=2 Female n=4	N/A	School playground (Early childcare) n=2	Suburban
Nasar & Holloman, (2013) USA	Quant	No information	n= 304 (9-11 years) Male n=160 Female n=143 Sex unknown n=1	Mother n=58 Father n=16 Unknown n=1	Public playground n=14	Urban
Norðdahl & Einarsdóttir, (2015) Iceland	Qual	No information	n=16 (4-9 years) Male n=8 Female n=8	Teacher n=5 Principals n=2	School playground n=2	Suburban
Nunma & Kanki, (2021) Thailand	Mixed	No information	n=58 (5-11 years) Male n=missing Female n=missing	N/A	Public playground (Under motorway) n=7	Urban

Obee et al., (2020) Norway	Qual	No information	n=38 (3-5 years) Male n=6 Female n=5 Missing sex: n=27	N/A	School playground n=1	Missing
Pitsikali & Parnell, (2019) Greece	Qual	Ethnography	n=missing (missing years) Male n=missing Female n=missing	Mother, Father, Nanny, Grandparents n=missing	Public playground And Piazza n=3	Urban
Prellwitz & Skär, (2007) Sweden	Qual	Qualitative descriptive	n=20 (7-12 years) Male n=11 Female n=9	N/A	Public and school playground n=missing	Rural
Refshauge et al., (2015) Denmark	Qual	Case study	n= 96 survey (0-12 years) Male n=44 Female n=52 n=152* Male n=97 Female n=55	Adults n=48 (survey) Adults n=60	Public playground (laboratory) n=1	Suburban
Ripat & Becker, (2012) Canada	Qual	Qualitative descriptive	n=9 (7-15 years) Male n=3 Female n=6 Diagnosis: mobility restrictions	Fathers n=4 Mothers n=8 Caregiver with disability n=2 Teacher n=1	N/A	N/A
Sanderud et al., (2020) Norway	Qual	Ethnography	n= 20 (3-6 years) Male n= missing Female n= missing	N/A	School playground (naturalized) n=1	Suburban
Sandseter et al., (2020) Norway	Quant	No Information	[c] n=86 (3-6 years) Male n=44 Female n=42	N/A	School playground (Early childcare) n=8)	Missing
Sandseter et al., (2021) Norway	Quant	No Information	[c] n=86 (3-6 years) Male n=44 Female n=42	N/A	School playground (Early childcare) n=8)	Missing
Sargisson & McLean, (2012) New Zeeland	Mixed	Cross-sectional	n= 4597* (0-10[+]years) Male n=missing Female n=missing	N/A	Public playground n=44	Urban, Suburban and Rural
Stanton-Chapman & Schmidt, (2021) USA	Mixed	Case study	n=6 (4-5 years) Male n=3 Female n=3	N/A	Public and school playground n=2	Urban

Stettler et al., (2022) Switzerland	Qual	Secondary qualitative content analysis	[d] n=5 (9-12 years) Male n=4 Female n=1 Diagnosis: Cerebral Palsy	N/A	Public playground (inclusive) n=1	Missing
Tandoğan, (2017) Turkey	Qual	No information	n=27 (5-10 years) Male n=15 Female n=12	N/A	N/A	Urban
Truong & Mahon, (2012) Thailand	Qual	No information	n=23 (8-12 years) Male n=12 Female n=11	N/A	Public playground (community centre) n=1	Missing
Veitch et al., (2020) Australia	Qual	Qualitative descriptive	n= 30 (8-12 years) Male n= 14 Female n= 16	N/A	Public playground (and park) n=9	Urban
Veitch et al. (2021) Australia	Quant	Cross-sectional	n=252 (8-12 years) Male n=105 Female n=147	N/A	N/A	Urban
Wang et al., (2018) China	Quant	Cross-sectional	n=247 (4-6 years) Male n=missing Female n= missing	Parents n=236	Public playground N/A	Urban
Ward, (2018) Australia	Mixed	Participatory	n=82 (3-9 years) Male n= missing Female n= missing	N/A	Public playground (by shopping mall) n=1	Urban
Wenger et al., (2021) Switzerland	Qual	Qualitative descriptive	[d]n=32 (7-12 years) Male n=23 Female n=9 Diagnosis: motor impairment, visual impairment, autism, intellectual disability, developmental disability	N/A	Public playground (inclusive) n=6	Urban and Suburban
Wishart et al., (2019) Australia	Quant	No information	n= 50 (4-5 years) Male n=missing Female n=missing	N/A	School playground n=2	Urban
Yates & Oates, (2019) United Kingdome	Qual	Participatory case study	n=60 (6-7 years) Male n=missing Female n=missing	N/A	Public playground n=2	Rural

Notes: Qual=qualitative studies, Quant=quantitative studies, Mixed=mixed-method studies. *Observation counts missing number of children. [+]no clear indication of how old children were. [a,b,c,d]Study sample participants and playgrounds from same dataset. N/A=not applicable for this study

Table 13. *Data Collection Methods Included Publications (Study1, Paper I)*

Methods	Study reference	*n*
Verbal accounts		
Semi-structured interviews	(Bourke & Sargisson, 2014; Chen et al., 2020; Fahy et al., 2021; Hayward et al., 1974; Horton & Kraftl, 2018; Jansson, 2008, 2010, 2015; Jansson & Persson, 2010; Jeanes & Magee, 2012; Lynch et al., 2020; Min & Lee, 2006; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Pitsikali & Parnell, 2019; Prellwitz & Skär, 2007; Ripat & Becker, 2012; Sanderud et al., 2020; Stanton-Chapman & Schmidt, 2021; Veitch et al., 2020; Ward, 2018; Wenger et al., 2021)	23
Secondary analysis of semi structured interviews	(Stettler et al., 2022)	1
Focus groups	(Aminpour, 2021; Aminpour et al., 2020; Burke, 2012; Jansson, 2008, 2010, 2015; Jansson et al., 2016; Jansson & Persson, 2010; Khan et al., 2020; Truong & Mahon, 2012)	10
Walk-along talks	(Aminpour, 2021; Aminpour et al., 2020; Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Lynch et al., 2020; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Truong & Mahon, 2012; Veitch et al., 2020)	10
Play along	(Sanderud et al., 2020)	1
Creative methods		
Children's drawings	(Fahy et al., 2021; Khan et al., 2020; Moore et al., 2021; Tandoğan, 2017; Truong & Mahon, 2012; Ward, 2018)	6
Playground model creation	(Goodenough et al., 2021; Khan et al., 2020; Moore et al., 2021; Truong & Mahon, 2012)	4
Picture sorting	(Fahy et al., 2021; Nasar & Holloman, 2013)	2
Scrapbooking	(Burke, 2012)	1
Children taking pictures	(Burke, 2012; Moore et al., 2021; Truong & Mahon, 2012)	3

Referred to participatory methods	(Caro et al., 2016; Khan et al., 2020; Truong & Mahon, 2012; Yates & Oates, 2019)	3
Referred to Mosaic approach (Clark, 2010)	(Burke, 2012; Fahy et al., 2021; Moore et al., 2021; Yates & Oates, 2019)	4
Observational methods		
Systematic observation (including behaviour mapping)	(Aminpour et al., 2020; Aminpour, 2021; Bourke & Sargisson, 2014; Cetken-Aktas & Sevimli-Celik, 2022; Hayward et al., 1974; Luchs & Fikus, 2013; Min & Lee, 2006; Refshauge et al., 2015; Sargisson & McLean, 2012; Stanton-Chapman & Schmidt, 2021; Wishart et al., 2019)	11
Unsystematic observation	(Burke, 2012; Chen et al., 2020; Fahy et al., 2021; Jansson, 2010; Lerstrup & van den Bosch, 2017; Nunma & Kanki, 2022; Pitsikali & Parnell, 2019; Sanderud et al., 2020; Wenger et al., 2021)	9
Observation using instruments	(Cetken-Aktas & Sevimli-Celik, 2022; Dyment & O'Connell, 2013; James et al., 2022; Loebach & Cox, 2022; Nasar & Holloman, 2013)	5
Systematic video observation	(Obee et al., 2020; Sandseter et al., 2020, 2021)	3
Unsystematic video observation	(Lerstrup & van den Bosch, 2017)	1
Taking photographs (by researcher)	(Aminpour, 2021; Aminpour et al., 2020; Bourke & Sargisson, 2014; Chen et al., 2020; Fahy et al., 2021; Goodenough et al., 2021; Jansson, 2010, 2015; Jansson et al., 2016; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Min & Lee, 2006; Moore et al., 2021; Nunma & Kanki, 2022; Obee et al., 2020; Sanderud et al., 2020; Sargisson & McLean, 2012; Wishart et al., 2019)	18
Auditing playgrounds	(Cetken-Aktas & Sevimli-Celik, 2022; Lynch et al., 2020)	2
Field notes	(Bourke & Sargisson, 2014; Chen et al., 2020; Dyment & O'Connell, 2013; Fahy et al., 2021; Goodenough et al., 2021; Jansson et al., 2016; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Luchs & Fikus, 2013; Min & Lee, 2006; Obee et al., 2020; Pitsikali & Parnell, 2019; Sanderud et al., 2020; Wenger et al., 2021)	14

Questionnaires/ Surveys	(Chen et al., 2020; Horton & Kraftl, 2018; Jansson & Persson, 2010; Nunma & Kanki, 2022; Refshauge et al., 2015; Veitch et al., 2021; Wang et al., 2018)	7

5.6.2 Playground and Participant Characteristics

Several reviewed studies shared the same data set. These were four studies from Sweden (Jansson, 2008, 2010, 2015; Jansson & Persson, 2010), two studies from Norway (Sandseter et al., 2020, 2021), two studies from Australia (Aminpour, 2021; Aminpour et al., 2020) and two studies from Switzerland (Stettler et al., 2022; Wenger et al., 2021). These papers have only been included once in the following description of participants and playground characteristics.

In total, 212 playgrounds were represented. The locations of playgrounds were reported in urban (*n* = 19), suburban (*n* = 6), rural (*n* = 6), and mixed (*n* = 2) areas. Location was missing in ten studies, and in two studies a reported location was not relevant based on study aims. Playgrounds were located in community areas such as playgrounds in parks or specific playground spaces (*n* = 27), schools (*n* = 16), or both public and school playgrounds (*n* = 3). Two of the papers looked at adventure playgrounds (Goodenough et al., 2021; Hayward et al., 1974), and two study focused on inclusive playgrounds (James et al., 2022; Wenger et al., 2021).

The total participant sample included *n* = 3676 children with 34.9% (*n* = 1282) male, 35.3% (*n* = 1299) female, and 29.8% (*n* = 1095) unreported sex. Six observational studies provided observation counts but not participant numbers (Bourke & Sargisson, 2014; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; James et al., 2022; Loebach & Cox, 2022; Sargisson & McLean, 2012), and one study did not report participant numbers or sex (Pitsikali & Parnell, 2019). The study population age range fell most frequently between 5 and 10 years (31 studies), with 20 studies including children aged 11–12 years and 21 studies including those aged 3–4 years. The least represented age groups were the youngest and oldest populations: 0–2 years (7 studies) and 13 and older (6 studies).

Only ten studies included children with disabilities, representing a sample of 125 participants (approximately 4% of the total sample). Of these, four studies focused on children with disabilities only (Birkner et al., 2021; Fahy et al., 2021; Jeanes & Magee, 2012; Ripat & Becker, 2012), and six studies

included mixed participant groups of children with and without disabilities (Burke, 2012; James et al., 2022; Lynch et al., 2020; Prellwitz & Skär, 2007; Stettler et al., 2022; Wenger et al., 2021). The following disabilities were represented in the studies: motor-related disabilities (Burke, 2012; James et al., 2022; Jeanes & Magee, 2012; Lynch et al., 2020; Prellwitz & Skär, 2007; Stettler et al., 2022; Wenger et al., 2021), autism spectrum disorder (Burke, 2012; Fahy et al., 2021; Jeanes & Magee, 2012; Lynch et al., 2020; Wenger et al., 2021), visual impairments (Jeanes & Magee, 2012; Lynch et al., 2020; Prellwitz & Skär, 2007; Wenger et al., 2021), developmental disabilities (Jeanes & Magee, 2012; Lynch et al., 2020; Prellwitz & Skär, 2007; Wenger et al., 2021), hearing disability (Jeanes & Magee, 2012; Wenger et al., 2021), intellectual disability (Burke, 2012; Wenger et al., 2021), and learning disability (Jeanes & Magee, 2012).

Fifteen studies also included other participants along with our population of interest; for example, parents and other family members, teachers, playground maintenance staff, play workers, or health professionals (Birkner et al., 2021; Bourke & Sargisson, 2014; Chen et al., 2020; Fahy et al., 2021; Jansson, 2010, 2015; Jansson & Persson, 2010; Jeanes & Magee, 2012; Lynch et al., 2020; Nasar & Holloman, 2013; Norðdahl & Einarsdóttir, 2015; Pitsikali & Parnell, 2019; Refshauge et al., 2015; Ripat & Becker, 2012; Wang et al., 2018). Findings from these participant groups were not included in the qualitative content analysis.

5.6.3 Findings from Qualitative Content Analysis

Five themes were identified that provide insight into the interconnection between play experiences and the environments that enhance outdoor play (see table 14). These five themes describe all children's preferences and desires for play experiences and their relation to the environment. The themes are described with an explanation of how the play experiences relate to the social and physical environment (see Table 14). Themes are presented individually but are not distinct from one another, since play experiences are

not mutually exclusive and are experienced simultaneously and in combination through outdoor play.

Table 14. *Enhancing Outdoor Play: The Relation between Children's Play Experiences and Physical and Social Environment (Study 1, Paper I)*

Theme	Play experience	Relation to the physical environment	Relation to the social environment
We seek more intense play experiences	Intense play including faster and slower, longer, heavier, deeper, bumpier, curvier further, and more elevated play	Provide a great diversity of intense and novel play opportunities.	
We want to make our own choices about what to play	Finding suitable challenges	Provide a range from easy to complex play opportunities.	
	Using the environment flexibly		Permission to exploit play opportunities of the provided physical environment.
	Having moments to unfold own play	Uninterrupted moments for play (having the space).	Uninterrupted moments for play (having adult permission).
We value both playing with and away from children and adults	Playing with children	Consider social-physical qualities like multi-player equipment, proximity placement of play equipment, and space qualities like small spaces.	Availability of peers and friends that children can relate to.
	Playing with adults		Supportive adults that know when to play with the child and when not to intercede.
	Being away from children and adults	Social-physical qualities like a variety of spaces allowing not to be seen.	Understandable adult-created rules. Possibilities to flee adult surveillance.
We want to belong to our playgrounds	Feeling connected with the playground	Location of playgrounds in own community.	Knowing the space and people, having social opportunities.
	Feeling welcome and safe	An accessible, usable, well-maintained playground with fences to protect against dangerous situations.	No othering practices. Opportunities to participate in changes made to the playground. Knowing the people.

	An aesthetic and beautiful playground	Colourful provision. Provide both: built and natural provision. Well-maintained playgrounds. Consider sensory qualities like noise and smells.
We desire fun	The experience of fun	The experience of fun was a central experience for children that were found within all other themes and physical and social environments

We Seek More Intense Play Experiences

Seeking intense play experiences describes all children's desires for diverse intense and novel play experiences, which related to engagement in intensified movements and intensified sensory experiences (see Table 15). Across studies, children consistently sought more intense play experiences, relating to playing faster, slower, longer, heavier, deeper, bumpier, curvier, further, and more elevated play. These intense play opportunities were directly linked to the physical environment and were captured by children's emphasis on bigger, taller, higher, wavier, and longer play equipment landscape features, and objects (Bourke & Sargisson, 2014; Caro et al., 2016; Fahy et al., 2021; Lerstrup & van den Bosch, 2017; Lynch et al., 2020; Obee et al., 2020; Pitsikali & Parnell, 2019; Sanderud et al., 2020; Stanton-Chapman & Schmidt, 2021; Veitch et al., 2020, 2021; Wishart et al., 2019). Table 15 describes intense play experiences and environmental affordances with supporting studies. Intense play experiences were relative to the child, meaning desired intense experience differed from child to child. For example, great speed was sometimes described as causing feelings of dizziness or nausea (Jansson, 2008; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020), in some cases leading to children actively avoid such play equipment (Burke, 2012). However, a further six studies described how children combined intense play experience and sought more intense play (Jansson, 2008; Jansson & Persson, 2010; Moore et al., 2021; Refshauge et al., 2015; Sanderud et al., 2020; Stanton-Chapman & Schmidt, 2021). Additionally, an indication of a diverse provision of intense play experiences is given in children's emphasis that only one intense play opportunity was insufficient (Bourke & Sargisson, 2014; Jansson, 2010; Jansson et al., 2016; Min & Lee, 2006; Veitch et al., 2020). Also, children compared playgrounds to one another and expressed how the novel qualities of one unique playground (see 15) contributed to the experience of intense play.

Table 15. *Intense Play Experiences and Physical Environmental Affordances (Study 1, Paper I)*

Intense play experience	Relation to the physical environmental affordances	Supporting references
Great heights, including high swinging, high climbing, elevated balancing, jumping down/up/far/high, high constructions	Play equipment that was larger in size and more elevated was found in swings, crossing bridges, as well as jumping, climbing, and balancing opportunities that elevated	(Hayward et al., 1974; Lynch et al., 2020; Refshauge et al., 2015; Veitch et al., 2020).
	Landscape features that were longer and steeper	(Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sanderud et al., 2020; Wishart et al., 2019)
	Jumping down from high points or	(Jansson, 2015; Obee et al., 2020)
	jumping elevated far distances, or	(Lerstrup & van den Bosch, 2017),
	Jumping on built environment structures at great heights, or	(Obee et al., 2020),
	Jumping really high on trampolines	(Caro et al., 2016).
	Climbing play associated with heights was expressed by children with and without disabilities as climbing as high as possible	(Jansson, 2008, 2015; Lerstrup & van den Bosch, 2017; Lynch et al., 2020; Veitch et al., 2021; Wenger et al., 2021).
	Constructing was related to accessing material that allowed forms to be built as high as possible	(Lerstrup & van den Bosch, 2017; Obee et al., 2020).
	Kicking a ball high up in the air	(Pitsikali & Parnell, 2019)
Reaching the highest point is a desirable challenge and an opportunity to have an outlook	Play equipment that offered several ways (e.g., climbing net, steps, ramp) to the highest point that is reachable for children regardless of their abilities	(Aminpour, 2021; Goodenough et al., 2021; Jansson & Persson, 2010; Jeanes & Magee, 2012; Obee et al., 2020; Prellwitz & Skär, 2007)
Great speed, including fast swinging and feeling the wind, fast sliding, fast seesawing, fast running, fast zip-	Taller, bigger, or longer play equipment or longer, steeper slopes provided more speed	(Fahy et al., 2021; Jansson, 2010; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Lynch et al., 2020; Sandseter et al., 2021; Veitch et al., 2020, 2021; Ward, 2018).
	Smooth surfaces that allowed fast driving and sliding (e.g., with wheelchairs, scooters, or bikes)	(Norðdahl & Einarsdóttir, 2015; Wenger et al., 2021).

lining, fast rolling down, fast driving	A person who is pushing the child fast, spinning, and swinging.	(Fahy et al., 2021)
Bumpier sliding	Waved slides	(Jansson & Persson, 2010)
	Sledding over bumps	(Sanderud et al., 2020).
Heavier carrying	Bigger and heavier play objects are transported and moved around	(Lerstrup & van den Bosch, 2017).
Enjoyment in going slower	Hammocks allow slow swinging and daydreaming	(Goodenough et al., 2021; Lerstrup & van den Bosch, 2017).
Digging deeper	Material property allowing digging	(Jansson, 2015; Lerstrup & van den Bosch, 2017).
Other environmental aspects affording intense play	Surfaces properties like uneven, irregular, very smooth, icy, or frosty when children engage in balance, climbing, or slide/gliding	(Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Obee et al., 2020; Sanderud et al., 2020; Wishart et al., 2019).
	Having possibilities for diverse sensory play, including getting messy	(Caro et al., 2016; Loebach & Cox, 2022),
	Tactile play through touching natural materials	(Aminpour, 2021; Jansson et al., 2016; Ripat & Becker, 2012)
	Walking barefoot	(Jansson et al., 2016; Refshauge et al., 2015).
	Tasting herbs, fruits, vegetables, ice, and snow	(Aminpour, 2021; Jansson et al., 2016; Sanderud et al., 2020).
	Smelling flowers	(Jansson et al., 2016; Khan et al., 2020).
	Watching spinning objects	(Fahy et al., 2021; Ripat & Becker, 2012).
	Creating sounds with music instruments or natural elements (crackling dry leaves).	(Fahy et al., 2021; Jansson et al., 2016)
	Having possibilities to combine or mix multiple materials with the example of sand play in combination with water, natural loose materials, or manufactured play objects	(Cetken-Aktas & Sevimli-Celik, 2022; Czalczynska-Podolska, 2014; Loebach & Cox, 2022; Sargisson & McLean, 2012; Truong & Mahon, 2012; Wishart et al., 2019).
Examples of combined intense play experiences	A tall swing that also spins	(Jansson, 2008).
	A slide that additionally to great length also incorporates waves to provide a bumpier slide down	(Jansson & Persson, 2010; Sanderud et al., 2020)

	A tall swing allows for swinging fast and jumping off at the right moment	(Refshauge et al., 2015; Stanton-Chapman & Schmidt, 2021).
	A slope with a self-built hump out of snow allows for sliding faster and jumping further	(Sanderud et al., 2020).
	A biking path incorporating a big bump allows for moving up and down quickly	(Moore et al., 2021).
Examples of novel qualities of playgrounds	Newly furnished playgrounds	(Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Sargisson & McLean, 2012),
	Inclusive play equipment and playgrounds	(James et al., 2022; Wenger et al., 2021),
	Natural surroundings and landscape features	(Goodenough et al., 2021; Jansson, 2010; Jansson et al., 2016),
	Themed play equipment e.g., animal-themed,	(Burke, 2012; Ward, 2018)
	Climbing real trees and	(Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Veitch et al., 2021)
	Real rocks or boulders	(Dyment & O'Connell, 2013; Sargisson & McLean, 2012; Ward, 2018)
	Creeks (human constructed)	(Loebach & Cox, 2022)
	Tree houses	(Goodenough et al., 2021),
	Larger playground with provision of natural loose materials that kept children's interest for longer periods	(Hayward et al., 1974; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Sanderud et al., 2020),
	Large obstacles courses	(Veitch et al., 2021),
	Provision of play objects and equipment that could be formed and shaped by children	(Caro et al., 2016; Loebach & Cox, 2022),
	And in weather conditions and seasonal changes providing additional affordances	(Aminpour, 2021; Goodenough et al., 2021; Lerstrup & van den Bosch, 2017; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sanderud et al., 2020)

We Want to Make Our Own Choices about What to Play

This theme described children's wish to choose and self-direct their play, identifying three aspects of how children engage with their playground environment: (1) finding suitable challenges, (2) using the environment flexibly, and (3) having moments to unfold their own play. This theme synthesises evidence of what the physical and social environment provided for children, especially in the context of having permission to self-direct their own play.

Children reported the importance of having ***suitable challenges*** on their playgrounds (Caro et al., 2016; Jansson, 2015; Jansson et al., 2016; Lynch et al., 2020; Refshauge et al., 2015). Suitable challenges meant having the choice to gradually engage in more challenging play. A connection with intense play affordances was identified. Suitable challenges should not be too easy (Fahy et al., 2021) and needed to match children's ages or abilities (Caro et al., 2016; Lynch et al., 2020). This was reported when a range of the same play possibilities with different difficulty levels was provided (Hayward et al., 1974; Lynch et al., 2020; Moore et al., 2021) that allowed children to choose a difficulty level according to their abilities (Birkner et al., 2021; Burke, 2012; Loebach & Cox, 2022; Lynch et al., 2020; Ripat & Becker, 2012). Similarly, for children with disabilities, a range of difficulty levels from easy to advance play opportunities needed to be provided (Birkner et al., 2021; Burke, 2012; Lynch et al., 2020; Ripat & Becker, 2012). For example, diversity in provision allowed choice of where to climb up/down, or to use a ramp instead of climbing-ropes (Burke, 2012). Children with disabilities expressed concerns and sadness when no suitable challenges were available for them compared to those provided for peers without disabilities (Lynch et al., 2020; Prellwitz & Skär, 2007; Ripat & Becker, 2012). In such cases, children with disabilities needed to rely on their caregivers' support, which meant they were not able to self-direct their play (Lynch et al., 2020; Prellwitz & Skär, 2007). This made children feel alienated compared to their peers (Lynch et al., 2020) or resulted in not using playgrounds at all (Prellwitz & Skär, 2007).

Using the environment flexibly meant exploiting any possible way to engage with play equipment and other built structures beyond their intended

use (Burke, 2012; Caro et al., 2016; Czalczynska-Podolska, 2014; Fahy et al., 2021; Hayward et al., 1974; Jansson, 2008, 2010; Jeanes & Magee, 2012; Lerstrup & van den Bosch, 2017; Luchs & Fikus, 2013; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Pitsikali & Parnell, 2019; Prellwitz & Skär, 2007; Refshauge et al., 2015; Truong & Mahon, 2012; Ward, 2018; Wenger et al., 2021; Wishart et al., 2019). Flexible use showed that children utilised any available spaces and objects provided in their play, blurring the boundary between where a playground starts and ends. Examples of flexible use included socializing on play equipment through sitting and chatting and not being active (Bourke & Sargisson, 2014; Jansson, 2008; Khan et al., 2020; Prellwitz & Skär, 2007; Truong & Mahon, 2012; Ward, 2018), climbing up swing posts (Jansson, 2010, 2015; Nunma & Kanki, 2022) or play houses (Jansson, 2008; Prellwitz & Skär, 2007; Refshauge et al., 2015), balancing on rolling bars (Refshauge et al., 2015), using play equipment to hide (Jansson, 2008, 2015), jumping over sand pits (Caro et al., 2016), or hanging from play equipment like basketball baskets (Caro et al., 2016). Other children exhausted affordances for play in a diversity of approaches to play equipment, such as sliding-play by sliding on their tummy, backwards, head-first, or climbing a slide (Fahy et al., 2021; Nunma & Kanki, 2022; Prellwitz & Skär, 2007). Additional loose materials such as water, sand or stones on slides (Hayward et al., 1974; Sargisson & McLean, 2012; Ward, 2018) or filling spinning equipment with surface materials (Jansson, 2015) were applied to play equipment. Besides play equipment, every built structure was incorporated into play, but this was mainly elaborated on in studies that focused on children without disabilities. Flexible use of built structures like fencing afforded balancing, climbing, and jumping over (Caro et al., 2016; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Nunma & Kanki, 2022; Pitsikali & Parnell, 2019), walls used for ball play (Aminpour et al., 2020), and any other low raised boundaries such as those surrounding trees used in socio-dramatic play (Aminpour, 2021; Aminpour et al., 2020; Moore et al., 2021). Benches and other seating opportunities afforded climbing, balancing, and jumping from (Aminpour et al., 2020; Bourke & Sargisson, 2014; Moore et

al., 2021); tables and seats were used to playhouse and supermarket (Aminpour et al., 2020; Truong & Mahon, 2012). Other built structures utilised for play were stairs, pillars, lampposts, window blinds, and exercise equipment intended for adults (Aminpour et al., 2020; Fahy et al., 2021; Jansson et al., 2016; Moore et al., 2021; Nunma & Kanki, 2022).

Unfolding own play was linked to social and physical environmental qualities. This was accomplished by having uninterrupted moments to unfold own play afforded by the physical and social environment. The physical environment meant having a suitable space and objects affording children to engage in their unfolding play. The social environment meant adults (and other people) granting permission for children's own play. Across studies, children or children's groups provided examples of their unfolding play in correspondence to their particular physical and social environment (Aminpour, 2021; Aminpour et al., 2020; Fahy et al., 2021; Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson, 2008; Jansson & Persson, 2010; Lynch et al., 2020; Moore et al., 2021; Pitsikali & Parnell, 2019; Prellwitz & Skär, 2007; Refshauge et al., 2015; Ripat & Becker, 2012; Veitch et al., 2020). Unfolding own play evolved during play itself, while the child was engaging in own play within and with the environment such as climbing-high-and-performing-climbing-stunts-play (Jansson, 2008; Veitch et al., 2020), fly-jump-off-the-bench-with-closed-eyes-play (Moore et al., 2021), jumping-off-swings-and-rolling-down-with-peers-on-slope-play (Stanton-Chapman & Schmidt, 2021), needle-spotting-play (Horton & Kraftl, 2018), or race-against-the-rolling-disc-play (Fahy et al., 2021). Sometimes, unfolding play meant to invent own rules (Aminpour et al., 2020; Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2022; Fahy et al., 2021; Jansson et al., 2016; Loebach & Cox, 2022; Stettler et al., 2022; Veitch et al., 2020). Sometimes, unfolding own play was evident in imaginative play such as crocodile-pulls-me-down-the-slide-play (Prellwitz & Skär, 2007), being-a-superhero-jumping-off-the-bench-play (Moore et al., 2021), the-floor-is-lava-play, spinning-object-portal-play (Fahy et al., 2021), being-dragons-protecting-the-old-tree-play, or cooking-as-mum-and-dad-play within the protection of low-hanging-branches (Aminpour, 2021). These examples

illustrated that children unfold their own play in correspondence within and with their social and physical environment.

We Value both Playing With and Away from Children and Adults

This subtheme describes the evidence showing that children value and seek opportunities to engage with a diversity of people and animals while also wanting to play by themselves, especially when playing away from adults offered treasured play experiences.

Playing with children was a key component described as enhancing children's play experiences. Examples included swinging together with one particular friend (Hayward et al., 1974; Jansson et al., 2016), rolling down hills and feeling dizzy with peers (Veitch et al., 2020), climbing with one friend on a tree (Jansson et al., 2016; Obee et al., 2020), crashing into each other while swinging side by side (Hayward et al., 1974; Norðdahl & Einarsdóttir, 2015), or having more time to talk and hang out with other children (Horton & Kraftl, 2018; Prellwitz & Skär, 2007; Ripat & Becker, 2012). Children with and without disabilities described wanting to play with peers with similar interests, of the same sex, and of similar age and ability, as this offered engagement in playful competitions and belonging (Aminpour, 2021; Aminpour et al., 2020; Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2022; Fahy et al., 2021; Hayward et al., 1974; Khan et al., 2020; Refshauge et al., 2015; Stettler et al., 2022; Veitch et al., 2020; Wenger et al., 2021). This was found for varying social forms such as two children only, small and big groups, two equal-sized groups, or gendered groups (Aminpour, 2021; Aminpour et al., 2020; Cetken-Aktas & Sevimli-Celik, 2022; Czalczynska-Podolska, 2014; Stettler et al., 2022; Wenger et al., 2021). Playing with other children meant not always doing exactly the same things, but still being included, for example, swing play meant pushing the swing while cheering friends sat on the swing (Burke, 2012). Similarly, climbing meant doing the same activity differently, such as a child in a wheelchair climbing at ground level and peers climbing on the same structure but higher up (Wenger et al., 2021). The physical environment afforded possibilities to connect with other children while playing (Bourke & Sargisson, 2014; Jeanes & Magee, 2012; Prellwitz & Skär, 2007; Ripat & Becker, 2012).

These environmental features included multi-player equipment that accommodated several children or allowed parallel play (Bourke & Sargisson, 2014; Caro et al., 2016; James et al., 2022; Jansson, 2010; Jeanes & Magee, 2012; Khan et al., 2020; Prellwitz & Skär, 2007; Wenger et al., 2021), play equipment placed in visual proximity such as circular and parallel placed swings (Hayward et al., 1974; Norðdahl & Einarsdóttir, 2015; Tandoğan, 2017), or small spaces that encouraged playing with or sitting and talking with peers (Czalczynska-Podolska, 2014; Prellwitz & Skär, 2007; Ripat & Becker, 2012). This means playing with peers sometimes included playing nearby, following each other's lead, or using other children as a source for play ideas (Fahy et al., 2021; Lerstrup & van den Bosch, 2017; Obee et al., 2020; Wenger et al., 2021).

Adults who accompanied children influenced their play (Chen et al., 2020; Prellwitz & Skär, 2007; Refshauge et al., 2015). ***Playing with adults*** occurred in the presence of supportive adults who knew how and when or when not to intercede with children's play. This was perceived in three ways. First, adults were actively involved in the same play together with the children (Caro et al., 2016; Chen et al., 2020; Norðdahl & Einarsdóttir, 2015; Refshauge et al., 2015) such as helping in constructing play (Goodenough et al., 2021) or playing together on the same play equipment (Chen et al., 2020; Ripat & Becker, 2012; Ward, 2018). Second, sharing play, wherein adults watched the child rather than being active themselves (Chen et al., 2020). This was shown through a child's desire for their parents to witness how fast they could slide down, or when the child got approval from an adult to engage in a certain play occupation (Hayward et al., 1974; Stanton-Chapman & Schmidt, 2021). The availability of supportive adults who assisted in a difficult situation was important, as this enabled children to try new challenging play (Jeanes & Magee, 2012). Third, adults and parents were not involved in the play and only accompanied the child to the playground (Chen et al., 2020; Lynch et al., 2020; Prellwitz & Skär, 2007; Refshauge et al., 2015). This was particularly important because children indicated a strong wish for less adult surveillance (Caro et al., 2016; Hayward et al., 1974; Prellwitz & Skär, 2007; Ripat & Becker, 2012)

and opportunities to socialise with peers (Prellwitz & Skär, 2007; Ripat & Becker, 2012).

Being away from adults and other children was about the experience of not being seen and showed a connection with the theme of choices and self-directed play. Children referred to being away from adults more frequently than they did being away from other children. Being away from adults was associated with privacy, having secrets, and breaking the rules. This was possible in places in the natural and built environment that afforded privacy and seclusion, such as small spaces (Aminpour, 2021; Aminpour et al., 2020; Goodenough et al., 2021; Jansson, 2015; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Prellwitz & Skär, 2007), in-between-spaces (Aminpour, 2021; Aminpour et al., 2020; Jansson et al., 2016; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Pitsikali & Parnell, 2019), and out-of-bound-spaces (places where children were not allowed) (Aminpour, 2021; Aminpour et al., 2020; Jansson & Persson, 2010; Norðdahl & Einarsdóttir, 2015). These places were out of the supervising adult's gaze and allowed uninterrupted play (Aminpour et al., 2020; Min & Lee, 2006; Norðdahl & Einarsdóttir, 2015; Prellwitz & Skär, 2007) and resting and observing (Loebach & Cox, 2022). Other studies found that smaller fully- or partly-enclosed spaces elicited homey, cosy, and relaxed feelings (Aminpour et al., 2020; Goodenough et al., 2021; Moore et al., 2021), and sometimes small spaces in the natural environment were described as secret places nobody else knew about (Goodenough et al., 2021; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015). In addition, children not under direct adult surveillance started to test boundaries by breaking adult-created rules (Caro et al., 2016; Prellwitz & Skär, 2007), such as climbing up to a high point or hanging upside down (Prellwitz & Skär, 2007), climbing on play equipment or trees not meant for climbing (Aminpour, 2021; Caro et al., 2016; Jansson, 2008), fast running (Caro et al., 2016; Fahy et al., 2021), digging under play equipment (Jansson, 2015), wandering off to out-of-bound-spaces (Aminpour et al., 2020; Horton & Kraftl, 2018; Norðdahl & Einarsdóttir, 2015) like a secret path in forestlands (Moore et al., 2021), or entering prohibited spaces (Aminpour, 2021). There seemed

to be a shared understanding between children that breaking such rules is an acceptable way to make play more exciting (Aminpour, 2021; Caro et al., 2016; Jansson, 2008; Pitsikali & Parnell, 2019; Prellwitz & Skär, 2007).

We Want to Belong to Our Playgrounds

Both physical and social environmental qualities influenced children's' feelings of connection with their playgrounds. Belonging to their playground was experienced by (i) being familiar with the playground, (ii) feeling welcome and safe, and (iii) enjoying playground aesthetics.

Feeling connected with the playground had relational qualities, including knowing the playgrounds located in the home community (Horton & Kraftl, 2018; Jansson, 2010; Lynch et al., 2020; Pitsikali & Parnell, 2019) within walking distance and regularly visited (Hayward et al., 1974; Jansson, 2008, 2015; Jansson et al., 2016; Lynch et al., 2020; Min & Lee, 2006; Pitsikali & Parnell, 2019; Prellwitz & Skär, 2007; Veitch et al., 2020), and by knowing the people using the playground (Hayward et al., 1974; Jansson et al., 2016; Stanton-Chapman & Schmidt, 2021; Wenger et al., 2021). Playgrounds provided a space to get together with friends and fostered potential social opportunities, including making new friends (Burke, 2012; Chen et al., 2020; Goodenough et al., 2021; Prellwitz & Skär, 2007; Stettler et al., 2022). The connection was strengthened by knowing that playgrounds were distinct children's places where children are the primary users (Khan et al., 2020; Lynch et al., 2020; Min & Lee, 2006; Pitsikali & Parnell, 2019). However, four studies pointed out that playgrounds were also family spaces (Chen et al., 2020; Horton & Kraftl, 2018; Lynch et al., 2020; Ripat & Becker, 2012). Children connected with their playgrounds when opportunities to shape their environments were given; that is, building their own dens or leaving permanent markings on the physical environment (Goodenough et al., 2021; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020).

Children wanted to ***feel welcome and safe*** on playgrounds, especially children with disabilities who wanted a welcoming atmosphere created by accessible and usable playground design that afforded play with others

(Jeanes & Magee, 2012; Lynch et al., 2020; Prellwitz & Skär, 2007; Ripat & Becker, 2012). This was possible when children had opportunities to participate in identifying changes to make a playground playable for children with disabilities. Welcoming feelings were undermined by attitudinal and othering practices such as name-calling, refusing to include children in play, or staring (Jeanes & Magee, 2012; Ripat & Becker, 2012; Wenger et al., 2021). Regardless of ability, children expressed the importance of feeling safe because of the availability of others, including known friends (Min & Lee, 2006; Truong & Mahon, 2012), people in the community (Horton & Kraftl, 2018), caring adults (Jeanes & Magee, 2012; Norðdahl & Einarsdóttir, 2015; Truong & Mahon, 2012), or when past positive experiences were associated with a playground (Lynch et al., 2020). Gang activity and hazardous litter contributed to feelings of danger (Horton & Kraftl, 2018). Similarly, feeling unsafe was reported when dangerous traffic was nearby (Min & Lee, 2006; Truong & Mahon, 2012) or when secluded spaces fully separated children from others in the place (Aminpour et al., 2020). Whether fences contribute to a feeling of safety was unclear. Fences functioned as a boundary from dangerous situations (Norðdahl & Einarsdóttir, 2015) but also limited play possibilities (Aminpour, 2021) or gave children a caged feeling (Caro et al., 2016). However, three studies found that children felt safer with fences (Nasar & Holloman, 2013; Veitch et al., 2020; Yates & Oates, 2019).

The connection to playgrounds was strengthened by ***children's perceptions of aesthetics and beauty*** in the built and natural environment. Children wanted to play on appealing playgrounds. Playgrounds were unattractive and ugly when they were dirty; smelled bad; were littered with glass, needles, cigarette butts, duck and dog excrement; had graffiti; or were noisy and overcrowded (Caro et al., 2016; Fahy et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015). A lack of bins and other amenities that would be useful at playgrounds were noted, including toilets, water fountains, and changing rooms (Jansson et al., 2016; Jeanes & Magee, 2012; Sargisson & McLean, 2012; Tandoğan, 2017; Veitch et al., 2020; Ward, 2018). Similarly,

five studies pointed to mouldy and rotten, broken, and damaged play equipment (Caro et al., 2016; Jansson, 2008; Jansson & Persson, 2010; Prellwitz & Skär, 2007; Truong & Mahon, 2012). Four studies found that the natural surrounding space was overgrown, hindering children's access to play (Aminpour, 2021; Aminpour et al., 2020; Sargisson & McLean, 2012; Veitch et al., 2020). Beautiful and appealing playgrounds related to a naturalized and colourful provision, and a wish for more colour, including colourful flowers, leaves, plants, playground equipment, and buildings was reported (Aminpour, 2021; Caro et al., 2016; Goodenough et al., 2021; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Ward, 2018; Yates & Oates, 2019). The importance of natural provision was expressed in the appeal of more natural elements, such as gardens, trees, flowers, fruits, grass, bushes, rocks and boulders, water and a variety of natural loose materials (Aminpour, 2021; Cetken-Aktas & Sevimli-Celik, 2022; Khan et al., 2020; Loebach & Cox, 2022; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Sargisson & McLean, 2012; Tandoğan, 2017; Veitch et al., 2020; Ward, 2018; Yates & Oates, 2019). Nature provided additional play possibilities (Caro et al., 2016; Jansson et al., 2016; Veitch et al., 2020), including exploration and discovery (Goodenough et al., 2021; Jansson, 2008, 2010; Jansson et al., 2016; Norðdahl & Einarsdóttir, 2015), connection with animals (Cetken-Aktas & Sevimli-Celik, 2022; Horton & Kraftl, 2018; Norðdahl & Einarsdóttir, 2015) and sensory play (smelling, tasting, touching, rubbing, observing,) (Aminpour, 2021; Jansson et al., 2016; Khan et al., 2020; Loebach & Cox, 2022; Refshauge et al., 2015; Ripat & Becker, 2012). A more natural environment contributed to a more relaxing and restful atmosphere (Aminpour, 2021; Aminpour et al., 2020; Horton & Kraftl, 2018; Moore et al., 2021; Veitch et al., 2020) and helped children feel calm (Goodenough et al., 2021; Moore et al., 2021).

We Desire Fun

The experience of fun was the overarching and core experience in outdoor play. Children actively sought more fun in play. Fun evolved while playing but was also anticipated when children engaged in play sometimes described as a prerequisite for play (Caro et al., 2016; Jansson, 2008; Lynch

et al., 2020). Children said an activity was play when it was fun (Caro et al., 2016), and it was not play when fun was lacking (Jansson, 2008). The experience of fun was essential and interwoven in children's outdoor play, a common thread that connected to other themes. Both physical and social environmental qualities were associated with creating fun play experiences.

For the physical environment, this was interwoven with providing intense play opportunities (Caro et al., 2016; Hayward et al., 1974; Jansson, 2008, 2015) and suitable challenges allowing for success and the experience of mastery and achievement (Fahy et al., 2021; Goodenough et al., 2021; Prellwitz & Skär, 2007). Children described fun as the feeling of a little bit of danger such as hanging upside down (Goodenough et al., 2021; Jansson, 2008; Prellwitz & Skär, 2007), play that made children dizzy (Jansson, 2008; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020), or even getting a little bit hurt, such as when jumping down from elevated heights (Jansson, 2008). Fun was associated with certain popular playgrounds that were visited more often (Jansson, 2010; Veitch et al., 2020), playgrounds were compared to each other to elaborate on what was fun on a particular playground (Jansson, 2008), and children had ideas on how to keep playgrounds fun for longer periods of time (Caro et al., 2016; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020).

For the social environment, having people and animals available to play with (Goodenough et al., 2021; Hayward et al., 1974; Horton & Kraftl, 2018; Lynch et al., 2020) often associated with having something to do (Caro et al., 2016; Fahy et al., 2021; Hayward et al., 1974; Horton & Kraftl, 2018; Lynch et al., 2020; Veitch et al., 2020) and in experiencing new memories together (Chen et al., 2020; Lynch et al., 2020). In contrast, having nobody to play with was not fun (Burke, 2012; Prellwitz & Skär, 2007). Another social aspect was having permission from adults and other children to engage in fun play (Aminpour, 2021; Caro et al., 2016; Fahy et al., 2021; Horton & Kraftl, 2018; Pitsikali & Parnell, 2019). Fun meant allowing children to self-direct play (Fahy et al., 2021; Prellwitz & Skär, 2007), engage in play in a unique way that matched their abilities (Burke, 2012; Jansson, 2015; Wenger et al., 2021), or being allowed to engage in new challenges (Prellwitz & Skär, 2007).

Fun was contrasted to the boredom experienced when the playground did not provide a sufficient diversity of play opportunities in the built and natural environment (Caro et al., 2016; Hayward et al., 1974; Horton & Kraftl, 2018; Jansson, 2008, 2010; Khan et al., 2020; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020). This was also associated with repetition, and doing the same thing repeatedly led to the feeling of being fed up (Caro et al., 2016; Jansson et al., 2016). Additionally, existing playgrounds did not present enough challenges (Caro et al., 2016; Jansson, 2015; Jansson et al., 2016; Lynch et al., 2020; Refshauge et al., 2015) for older children (Jansson, 2008; Lynch et al., 2020) and suitable challenges for children with disabilities (Burke, 2012; Prellwitz & Skär, 2007). This meant a fun playground needed to provide both suitable challenges with ways for evolving complexities that cater for all children regardless of their ability or age (Lynch et al., 2020).

5.7 Discussion

This scoping review aimed to summarise the experiences of children with and without disabilities, and to gain insight into environmental qualities that maximize play experiences for all children on community playgrounds. There were two key findings. First, this review showed that the combined qualities of the physical and social environment afforded play experiences that children preferred and desired when engaging in outdoor play. This interconnection was sometimes linked to certain environmental qualities relating only to the physical environment or only to the social environment, but commonly related to both the social and the physical environment combined in transaction. Second, the review revealed children were knowledgeable about their community playgrounds and environmental qualities that contributed to enhancing their outdoor play experiences. These play experiences were multifaceted and included having opportunities for fun and intense motor and sensory play, engaging in suitable challenges, making choices, and having moments to unfold their own play. Children valued a spectrum of play, from playing alone, to playing in small to big groups of peers and friends and playing with adults and animals. Also, children desired safe,

welcoming, and aesthetically pleasing playgrounds where they felt they belonged as they knew other users and the playground. In brief, community playgrounds with the best play value become children's place. These findings point to the importance in acknowledging children's perspective's, regardless of ability, in playground provision, design, and evaluation.

5.7.1 Physical, Social and Atmospheric Affordances for Outdoor Play

This review presented rich and varied information about how they utilised physical and social environmental affordances available to them. Environmental affordances have been successfully used in outdoor play research to understand how children perceive and use their environments for outdoor play (Aminpour, 2021; Heft, 1988; Khan et al., 2020; Kyttä, 2002; Lerstrup & van den Bosch, 2017; Luchs & Fikus, 2013; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sanderud et al., 2020; Sandseter et al., 2020; Wishart et al., 2019). This idea of affordances draws from the concept originally coined by Gibson, who describes affordances as possibilities for action that are perceived and actualized by the child in relation to the environment (Gibson, 1979; Heft, 1988; Kyttä, 2002). Findings in this review presented a variety of affordances in relation to physical, social, and atmospheric environmental qualities that provide insights into play experiences for *children's places* that went beyond simply being a place to play.

The findings of the review confirmed a persuading agency of the physical environment on affordances that children perceive and actualize in outdoor play. Persuading agency refers to the power the environment has to entice children to play. In this review, the understanding of affordances was broadened, as children not only perceived action possibilities (Heft, 1988; Kyttä, 2002; Lerstrup & van den Bosch, 2017) such as sliding, running, or climbing. Rather, children regardless of ability also perceived the intensity, novelty, and challenge in potential action possibilities, such as swinging, rolling, or digging that was faster, slower, longer, heavier, deeper, bumpier, curvier, further, and more elevated (see table 15). While these intense play affordances sound like the idea of risky play (Sandseter, 2007) the review

findings showed more diversity and choice associated with the concept of intense play affordance. Intense play affordances were not always about being risky or adventurous, but rather included a broader diversity in movements and sensory experiences, including doing something intentionally slower, experiencing intense tactile or auditory sensations, and combining intense play affordances for an even more intensified experience. These suggest the importance of providing a diversity of intense play experiences on playgrounds.

Intersections between the physical and social environmental qualities were found to contribute to the overall atmospheric and more tacit atmospheric affordances of playgrounds. Children elaborated on these atmospheric affordances in their experiences of feeling safe and welcomed and their perception of aesthetics. A physical environment that was aesthetic, colourful, clean, and contained both built and natural play opportunities contributed to an environment appealing to children. Loebach and Gilliland (2010) found that children are well aware of atmospheric qualities afforded by their physical environment, such as recognising poor aesthetics and conditions. Other research has elaborated on the importance of the nature provision of playgrounds and its contribution to atmosphere (Brunelle et al., 2016; Gill, 2014; Lund Fasting & Høyem, 2022; Woolley & Lowe, 2013). Regarding natural environments, an interesting finding from this review was that studies exploring the outdoor play of children with disabilities merely focused on the built environment, such as play equipment or surfacing, whereas studies that explored perspectives of children without disabilities elaborated to a much greater extent on the natural environment as well as other built structures (such as benches, fences, stairs) for play. Other scoping reviews that investigated playgrounds and outdoor play of populations with disabilities corroborate this finding (Moore et al., 2022b; Moore & Lynch, 2015). Yet natural environments provide potential affordances for sensory play for children with disabilities (Moore et al., 2023). This points to the need of future research to provide insights into how children with disabilities use natural environments for play on playgrounds (Cosco & Moore, 2019; Horton, 2017) and how playgrounds can

provide more nature access on playgrounds for all children, regardless of ability. Besides the lack of natural environments in the studies with populations of children with disabilities, the built environment, especially physical environmental qualities such as accessibility and usability in transaction with social environmental qualities such as attitudes, were strongly related to whether children with disabilities experienced a welcoming atmosphere. This finding is supported by previous research that only looked at children with disabilities and their caregivers' perspectives (Moore et al., 2022; Moore et al., 2023; A. Moore, Lynch, et al., 2022b; Moore & Lynch, 2015) and exemplified that social and physical environmental qualities relate to atmospheric affordances.

In this review, social affordances did not only relate to those with whom children played, like children, adults, or animals. Children, regardless of ability, emphasised their relationship to significant play partners such as children and adults they knew, like friends from school and proximate neighbourhood, known people from the community, and known peers with similar abilities and interest, or of the same sex. This concept of *knowing others* also transcended to the physical space, as if the playground was a friend as well. Children wanted to feel connected to their playground through positive play experiences either alone or with known people that were associated with the playground. These findings indicate that playgrounds have the potential to be spaces for social inclusion (Dunn & Moore, 2005; Wenger et al., 2023). Supporting social inclusion therefore needs to consider both built environments, such as inclusive design solutions, and involvement of the local community, including children, caregivers, and other stakeholders in respecting their needs and preference for the playground (Moore et al., 2022b; Sterman et al., 2019; Wenger et al., 2023). Including local community perspectives, such as those of local children, can build a foundation in getting to know the people and the community alongside building a connection with the playground. This has the potential to nurture children's sense of belonging to the space and their communities.

Further social affordances in this review related to *social rules and practices* such as having permission to use built environments flexibly, having uninterrupted moments to unfold own play, and having opportunities to play away from adults and solely with peers. Both children with and without disabilities valued opportunities to self-direct their play as well as expressing the wish for less adult interference and surveillance. However, such opportunities were identified differently by children with and without disabilities and depended on different physical and social environmental qualities in combination. For children with disabilities, adult permission needs to be discussed, since these children frequently reported needing adult assistance due to inaccessible and unusable physical environments (Birkner et al., 2021; Lynch et al., 2020; Prellwitz & Skär, 2007, 2016; Ripat & Becker, 2012). Other studies from children's, parents', and professionals' perspectives identify parent and caregiver support as a barrier to engaging with peers and self-directed play (Prellwitz & Skär, 2007; van Engelen et al., 2021; Woodgate et al., 2020), which further makes children with disabilities feel alienated and embarrassed (Lynch et al., 2020; Prellwitz & Skär, 2016; van Engelen et al., 2021), and this dependency on adults is not perceived as fun (Prellwitz & Skär, 2016). Depending on adults to overcome barriers in the physical environment limits children's social opportunities in engaging with other children on playgrounds (Moore et al., 2022b). For children without disabilities, such barriers in the physical environment were not an issue and therefore not represented in the literature reviewed. Consequently, to enable outdoor play for children regardless of ability, this scoping review's findings suggest two elementary considerations. First, playgrounds need to be physically accessible and consider usability by having diversely abled children in mind. Here, attention needs to be given to providing equal play opportunities to all children, especially opportunities to play with other children. Second, adults need to know when and how they influence children's play, and when they should step back and give children more permission to experience self-directed play.

5.7.2 Adult's Role in Outdoor Play Provision

The review findings provide synthesized evidence of children's perspectives on the outdoor play experiences they valued and preferred on community playgrounds, helping to identify environmental qualities that provided for such experiences. Aligning with other studies (Dunn & Moore, 2005; Jansson & Ramberg, 2012; Lynch et al., 2018; Moore et al., 2022b; Moore & Lynch, 2015; Sterman et al., 2019; Wenger et al., 2021), this scoping review showed that children with and without disabilities were knowledgeable users of playgrounds who need to inform playground provision, design, and evaluation. Considering children's perspectives reflects Article 12 of the UNCRC (United Nations, 1989) on the children's *rights to be heard* in matters that affect children under consideration of giving them "due weight in accordance with the age and maturity." As stated in the GC17, all children should have a central role in playground provision (UNCRC, 2013). So, navigating all children rights to be heard in matters such as playground provision needs a clear standpoint on the role of adults in playground provision. All children can form and express their views, but it is the adult's responsibility to facilitate this participatory process (Checkoway, 2011; Lundy, 2007, 2018). This role requires adults to be informed on children's perspectives and how to incorporate these perspectives into the design of physical and social environments that maximise play experiences. Therefore, an adult's role in play provision, design, and evaluation is to be an *adult ally of children* — meaning being informed about and supporting children's perspectives as well as serving as "bridging persons" (Checkoway, 2011, p. 342) between children and adult stakeholder perspectives. The scoping review findings inform adults about environmental qualities that enhance children's play experiences. Certainly, designing children's play spaces means an adult perspective should not overshadow what children value in their playgrounds and outdoor play (Rasmussen, 2004).

5.7.3 Strengths and Limitations

Findings need to be interpreted with the following considerations. First, parents' and caregivers' perspectives were not included. These would provide an additional viewpoint for understanding children's play experiences. Future research might investigate both the perspectives of parents and children to provide insight into how these differ. Second, included studies encompassed community and school playgrounds as the units of analysis. This inclusion criterion was set because, for some countries, school playgrounds are open to the public during non-school-hours. In this review, most studies of school playgrounds did not specifically state if a school playground was open to the public or not. However, some included study data were collected during school times. Third, a methodological quality assessment might strengthen the interpretation of the study findings. However, a methodological quality assessment was omitted due to the interdisciplinary area of research and the variety of methodologies and methods used. A scoping review was a suitable methodology in the interdisciplinary area of playground research, and the inclusion of publications from a diversity of disciplines strengthened the findings.

5.7.4 Future Research

This review was able to link play experiences to environmental qualities by synthesizing findings from peer-reviewed articles using qualitative, quantitative, and mixed methods. The most useful information regarding children's perspectives was collected through multiple methods, including verbal accounts (such as go-along interviews) and observations. Most of the studies relied on qualitative methodologies. This highlights the need for instruments to allow investigations into children's perspectives in a more systematic way and consider the conjunction between children's experiences and environments. Future research should investigate environmental qualities such as those found in this scoping review to elicit potential affordances for play experiences available to children with and without disabilities.

A further gap in research was identified in a divide of whose perspectives are considered in research. Only ten studies included children with disabilities; of these, only six studies included children with and without disabilities in combination. If playgrounds are places for inclusion, research and practice need to take a more diverse perspective into consideration in playground provision design, and evaluation.

5.8 Conclusion

This scoping review aimed to synthesise play experiences of children with and without disabilities and gain insight into what environmental qualities contribute most to enhance play experiences on community playgrounds. Gaps in research were identified in the limited number of papers that included both children with and without disabilities, in the lack of research about how community playgrounds can provide more access to nature for all children, regardless of ability, and the need for instruments that investigate the connection between children's experiences and environments. The main findings of this scoping review were, first, available evidence allowed an understanding of how social and physical environmental qualities of playgrounds combined enhance outdoor play experiences by providing diversity of experiences. Multifaceted play experiences were reported with the desire for fun, challenge, and intense play; the wish for self-directed play; opportunities to play alone and with known social partners; and a desire for welcoming, safe, and aesthetically pleasing playgrounds. Second, children regardless of ability were knowledgeable about the play value of their community playgrounds, and, therefore, their perspectives need to be more considered. Playground provision, design, and evaluation needs to move beyond merely providing dedicated space for play and consider instead, provisions for potential outdoor play experiences that allow playgrounds to become children’s places. This means that children’s preferences and what children want to experience on playgrounds need to be at the heart of playground provision, design, and evaluation.

5.9 Author Contributions

Conceptualisation, T.M., C.S., D.P. and H.L.; methodology, T.M., C.S., D.P. and H.L.; formal analysis, T.M., C.S., D.P. and H.L.; investigation, T.M., C.S., D.P. and H.L.; data curation, T.M.; writing—original draft preparation, T.M.; writing—review and editing, T.M., C.S., D.P. and H.L.; visualization, T.M; supervision, H.L., D.P. and C.S.; project administration, T.M.; All authors have read and agreed to the published version of the manuscript.

5.10 Funding

This research was funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 861257.

5.11 Acknowledgments

The authors would like to thank the medical librarian who assisted with the development of the search strategy. Special thanks are due to the reviewers for their valuable feedback during the review process.

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CHAPTER SIX — STUDY 2, PAPER II

Responding to the overall aim of this thesis, this secondary analysis (**Study 2, Paper II**) used a subset of 45 studies from the scoping review study (**Study 1, Paper I**) and aimed to support the development of the playground audit tool twofold: i) to synthesise the available empirical evidence by utilising the theory of affordances to describe the relationship between the physical environment and outdoor play affordances in playgrounds and ii) to support structure and terminology of the playground audit tool in development. Specifically, the aim of this study was investigating the relationship between the physical environmental characteristics of playgrounds and children's outdoor play and to develop an environmental taxonomy to support the analysis of play affordances within community play spaces.

I conceptualised the study while undergoing the analysis of Study 1 (Paper I). The supervisory team (Dr Helen Lynch, Dr Janet Loebach, Dr Duncan Pentland and Dr Christina Schulze) supported the refinements of the research design. Dr Janet Loebach was introduced to the supervisory team as an advisor and expert on the topic of outdoor play and environmental relationship. I conducted the data collection, data extraction and data analysis independently. Dr Janet Loebach supported data analysis through a confirmatory analysis of a subset of the included data to ensure consistency. The supervisory team oversaw data extraction and data analysis through weekly supervisory meetings. I wrote the paper with guidance and mentoring from his supervisory team. This study is published in *American Journal of Occupational Therapy* on the 28th of May 2024, in Volume 78, Issue 4, following one round of minor revisions in response to two peer reviewer's comments. The main revisions related to clarity of language and conceptual congruence specifically how the utilised theory of affordance relates to the concept of occupation. This was a relevant distinction to make as the main audience in this particular journal are occupational therapists who are not familiar with the theory of affordances. This study was accepted on 1st of

February 2024 and was published online on 28th of May 2024 in a special issue on Play and Occupational Therapy in Volume 78, Issue 4:

Morgenthaler, T., Lynch, H., Loebach, J., Pentland, D., & Schulze, C. (2024). Using the theory of affordance to understand environment–play transactions: Environmental taxonomy of outdoor play space features—A scoping review. *American Journal of Occupational Therapy*, 78(4).

The study is presented formatted aligned with this thesis but follows outline of headings as it appears in print. The literature used in this publication is partly the same in other sections of this thesis consequently, there is some overlap with the previous sections of this thesis. This publication's relevant appendices can be accessed in the appendix section of the thesis. A separate reference list was compiled specifically for this chapter.

6.1 Title: Using the theory of affordance to understand environment–play transactions: Environmental taxonomy of outdoor play space features—A scoping review

6.2 Abstract

Importance: The transactions between the physical environment and children's play have not been well studied. The theory of affordances provides a way to better understand how environmental characteristics offer opportunities for play occupation.

Objective: To investigate the relationship between environmental characteristics of outdoor play spaces and children's outdoor play and to develop an environmental taxonomy to support the analysis of play affordances in community play spaces.

Data Sources: Peer-reviewed literature (1974–2022) was sourced from a previously published scoping review (Morgenthaler et al., 2023). The Academic Search Complete, Avery Index to Architectural Periodicals, CINAHL, MEDLINE, PsycINFO, Scopus, and Web of Science databases were searched using the keywords and synonyms of playground, environmental qualities, and children with and without disabilities.

Study Selection and Data Collection: A secondary analysis of the previously published scoping review was conducted. Included studies were those that provided descriptions of physical environment–play activity transactions.

Findings: A qualitative content analysis of 45 articles was conducted and used to form an environmental taxonomy. This taxonomy consisted of 14 space and object categories defined by their functional qualities and linked to play affordances. An array of 284 play occupations were identified in different forms. Play affordances of spaces and object categories and their functional environmental qualities were subsequently identified.

Conclusions and Relevance: This study provides evidence to support the understanding of how the physical environment shapes children's outdoor play occupations.

Plain-Language Summary: The Environmental Taxonomy of Outdoor Play Space Features, grounded in the theory of affordances, offers occupational therapists a tool to evaluate the potential for play occupations and could be useful to justify environmental intervention in schools and public playgrounds to create spaces supporting more play for a diversity of children.

6.3 Keywords

Affordances, environment, outdoor play, playground, taxonomic classification

6.4 Introduction

In occupational therapy and occupational science, play is acknowledged as a significant occupation of childhood (American Occupational Therapy Association, 2020; Kuhaneck et al., 2013; Lynch et al., 2017). A play occupation is characterized as a subjective experience of joy arising from participating in freely chosen, intrinsically motivated, and self-directed meaningful occupation (Lynch & Moore, 2016). Play occurs in transaction between the child and the environment, with a focus on the engagement processes rather than the end result (Lynch & Moore, 2016).

Despite the emphasis placed by occupational therapists on the significance of play for children's health and well-being, a disconnect has been identified in practice contexts, where play is more frequently exploited as a tool to achieve adult-driven objectives for children, including skill improvement, ability assessment, or a reward for completing tasks (Kuhaneck et al., 2013; Lynch et al., 2017; Schlager-Jaschky, 2019). Brown and Lynch (2023) suggested that occupational therapy practice should shift from this extrinsically motivated and externally controlled play-based work occupation approach to an enabling intrinsically motivated and child-initiated play occupation approach. One solution to promote play occupation is to focus on the provision of play-enabling environments by creating or modifying environments to provide space for play (Brown & Lynch, 2023). This argument aligns with

scholarship advocating a practice shift away from concentrating solely on individual factors and attempting to fix impairments and, instead, emphasises context- and environmental-focused approaches of creating participation opportunities and experiences (Anaby et al., 2021; Magasi et al., 2015; Patten, 2022).

The environment has always played a fundamental role in understanding and researching occupations in occupational therapy and occupational science (Clark et al., 1991; Hocking, 2020; Yerxa, 1993). Environment can be conceptualised broadly "as having physical–spatial, ecological, sociocultural, historical, and spiritual dimensions, and being a source of symbolic meaning, affordances, novelty, attractors, and resources" (Hocking, 2020, p. 3). Environmental perspectives can range from the more immediate physical and social environment of spaces, objects, people, and attitudes to more distant environmental influences, such as legislation, policy, culture, institutions, and norms (Hocking, 2020). Occupational therapy and occupational science have emphasised the social, cultural, and political environmental aspects (Hocking, 2020; Pierce, 2012), leaving a gap in understanding the physical environment's influence on occupation (Hocking, 2020; Lynch & Stanley, 2018; Pierce, 2012).

Affordance theory has been proposed as a concept with great potential to support occupational science studies and occupational therapy practice (Lynch & Stanley, 2018; Pierce, 2012; Spitzer et al., 2023) and was used before to inform the creation of occupational therapy assessments (May-Benson & Cermak, 2007). Affordances are described as possibilities for action that someone perceives and may then actualize in their physical environment (Gibson, 1979). This perceptual concept is rooted in ecological psychology and provides a way of understanding the environment–person relationship as a transactional one in which affordances are potentially available, may be perceived, and may be actualized by individuals (Kyttä, 2002). Gibson (1979) posits that the environment and the person are an intertwined pair, implying that affordances are neither solely environmental (objective) nor personal (subjective). This relational understanding of affordances between

environment and person offers an alternative way to describe and theorize about physical environments. Affordances can be thought of as functional qualities of the environment that individuals perceive as supporting or enticing them to engage in an occupation. For example, a child might perceive a tree with low-hanging branches as climbable if it matches their ability and desire to climb. In contrast, a tree with thorny or high branches might not be perceived as climbable. From an analytical perspective, affordances offer a way to describe play spaces by the functional qualities that potentially invite children's play occupations (actualized affordances). For example, instead of naming the physical environment in terms of its items (e.g., seat, slide, bush), the functional qualities highlight the person–environment transaction afforded by the environment (e.g., sitting, climbing, hiding; Heft, 2001, 2003). For occupational therapists, this suggests that affordances offer a way to assess an environment's play value by identifying potential affordances as opposed to counting environmental features, such as play components in play spaces.

The theory of affordance has been used in research to analyse how functional qualities of outdoor play spaces can invite different forms of play among children. Previous research has demonstrated that play spaces that contain natural environments offer more diverse play opportunities through the affordances offered by natural features, varied landscapes, and loose natural parts (Brussoni et al., 2017; Dyment & O'Connell, 2013; Luchs & Fikus, 2013; Wishart et al., 2019). Play spaces with natural environments also cater to children of different ages and abilities, provide more risk-taking opportunities, and result in longer engagement in outdoor play (Herrington & Brussoni, 2015; Kuh et al., 2013; Luchs & Fikus, 2013; Sandseter, 2009). Similarly, loose parts have been found to offer a diverse range of play supported by the numerous and unscripted opportunities they provide (Sterman, Villeneuve, et al., 2020; Woolley & Lowe, 2013). Scholars have therefore argued that play spaces with natural features offer a greater variety of potential affordances for play and can be conceptualised as higher in play value (Herrington & Brussoni, 2015; Loebach & Cox, 2020; Woolley & Lowe, 2013).

The theory of affordances has been successfully applied to analyse outdoor play environments' meaningful functional qualities rather than name items, resulting in the development of empirically established environmental taxonomies in ecological and environmental psychology (Heft, 1988) and landscape architecture (Lerstrup & van den Bosch, 2017; see Appendix 15). Heft's (1988) taxonomy was formed by a secondary analysis of a small subset of studies and did not indicate any specific outdoor environment for which it was developed. Lerstrup and van den Bosch's (2017) taxonomy was formed after an observational study based on two preschool children's use of the outdoor environment. These taxonomies provide initial tools to understand what outdoor play is potentially afforded by which functional qualities. Yet, to date, no such taxonomy has been developed for community play spaces, which have become one of the main locations for children's play in many societies. Drawing on these existing environmental taxonomies and the growing body of literature on outdoor play spaces at schools and in public settings, the purpose of this study was to develop a robust, evidence-based taxonomy as a foundation for conducting future environmental analyses of existing outdoor play spaces for potential play affordances.

To sum up, the need to better understand the influence of the physical environment has become more urgent as occupational therapy in many countries has gradually moved from clinical settings in medical environments to real-life settings in schools, homes, and other community settings (Marshall et al., 2017). To harness the full potential of the physical environment in practice, it is essential to gain a deeper understanding of the environment–person transaction (Lynch & Stanley, 2018). In this article, we focus specifically on the physical environment–person transactions that support children's play in community play spaces. Our primary objective is to use the theory of affordances to investigate the relationship between functional qualities of community play spaces and children's outdoor play. By focusing on transactions between the person and the immediate physical environment, we seek to synthesize empirical evidence of the influence of physical environmental functional qualities on actualized play affordances to create an

Environmental Taxonomy of Outdoor Play Space Features. This new knowledge will be useful for evaluating potential affordances of outdoor play spaces in research and practice.

6.5 Method

This article is based on a secondary analysis of research articles identified in a published scoping review (see Morgenthaler et al., 2023). Whereas the original scoping review targeted children's lived experiences and the environmental qualities children themselves identified as enhancing outdoor play, this secondary analysis applies the theory of affordances to build the Environmental Taxonomy of Outdoor Play Space Features, focusing on play spaces located in communities (schools and public spaces) to illustrate how physical spaces and objects specifically support diverse forms of outdoor play.

6.5.1 Original Scoping Review Procedure

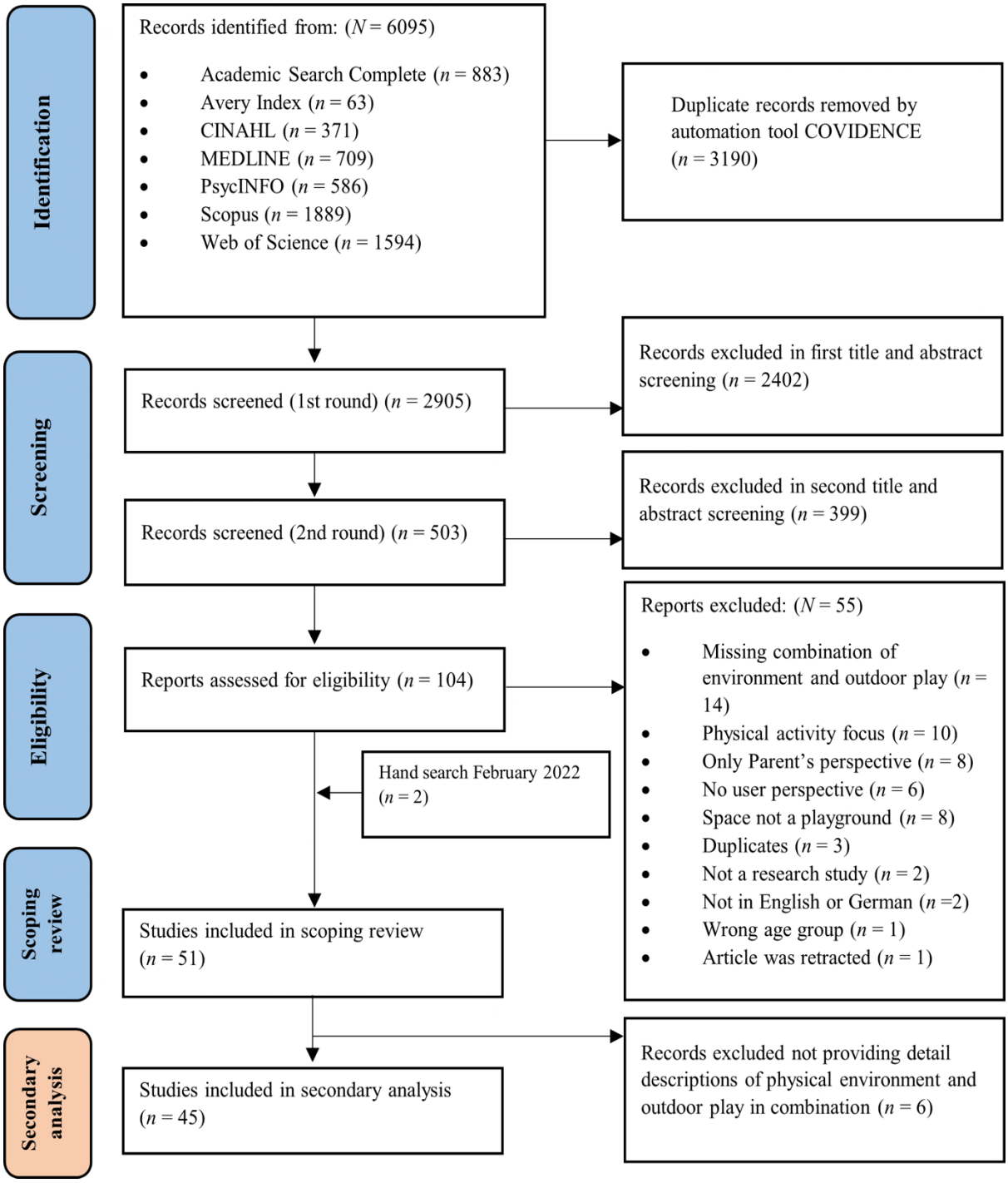
The original scoping review (Morgenthaler et al., 2023) followed steps proposed by Arksey and O'Malley (2005), using the research question "What is known about how environmental qualities of public playgrounds contribute to the user experience of outdoor play among children with and without disabilities?" (see the protocol in Morgenthaler et al., 2021). The systematic search, developed with a consulting librarian, was conducted across seven databases (Academic Search Complete, Avery Index to Architectural Periodicals, CINAHL, MEDLINE, PsycINFO, Scopus, and Web of Science) using keywords and synonyms of playground, environmental qualities, and children with and without disabilities (see Table 10). The initial systematic search was conducted in August 2021, with a follow-up search conducted in January 2023. A manual search was also performed of the Journal of Children and Youth Environments in February 2022. Inclusion criteria were as follows: (1) articles published in English or German; (2) peer-reviewed articles; (3) articles involving populations of children with and without disabilities ages 0 to 12 yr; (4) articles focused on investigating free outdoor play (e.g., not exercise, restoration, or learning); (5) articles about play in community outdoor play

spaces (i.e., at schools or in public spaces); and (6) articles that described both social and physical environmental qualities of outdoor play. Abstract and full-text screening was performed in Covidence and involved two independent reviewers, with conflicts resolved by a third independent reviewer. The initial searches yielded 6,095 references, which was reduced to 2,905 references after removal of duplicates. After title and abstract scans, 104 studies remained. Upon full-text review, 49 studies met all inclusion criteria. Two more studies were found through the manual search, resulting in a final sample of 51 studies.

6.5.2 Secondary Analysis: Scoping Review Procedures

The secondary analysis followed the three steps proposed by Johnston (2014): (1) forming a research question, (2) identifying an appropriate data set, and (3) performing a comprehensive evaluation of the collected data. The research question guiding this secondary analysis was "What is known about the functional physical environmental qualities of spaces and objects in community play spaces and their relation to affordances for children's outdoor play activities?" The main objective was to develop an environmental taxonomy of spaces and objects within community play spaces that connects characteristics of the physical environment to specific play occupations. For this secondary analysis, all 51 articles of the initial scoping review were reviewed for inclusion. To allow for an affordance-based analysis, included articles needed to describe physical environment–play activity transactions (how children actualized the affordances in the physical environment for play occupation). Forty-five studies met these inclusion criteria and were charted using study design, study aim, participants, play space location, and publication year.

Figure 7. *Adapted Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow of Study Selection Process (Study 2, Paper II)*



6.5.3 Forming the Environmental Taxonomy of Outdoor Play Space Features

First, data from the studies were transferred into Atlas.ti (Version 23 for Windows) for a structured qualitative content analysis (Elo & Kyngäs, 2008). Coding was performed in two rounds by Thomas Morgenthaler following Heft's approach (1988) to identifying child–environment transactions, in this case where a child's play activity was mentioned in combination with some aspect of the physical environment. These play–environment transactions were coded as applicable by play activity (what children play), the location or functional qualities of the space where play occurred (where children play), and the objects and materials or functional qualities of objects and materials used during play (with what children play). Where possible, extracts contained a combination of what, where, and with what codes. Extracts ranged from broad descriptions, such as "a tree stump," to detailed descriptions of functional qualities, such as "tree stump with soft-textured bark that children perceived as compelling to touch." Initial codes were developed using words manifested in the text and applied to a subset of studies (see Appendix 16 for examples). Subsequently, a refined code set was extended to the entire data set, involving the translation of codes from one study to another and adjusting the code names (either broadening or narrowing codes) to ensure consistency; otherwise, new codes were created (Thomas & Harden, 2008).

Second, broader categories of play activity codes, space codes, and object–material codes were formed by grouping together codes that conveyed similar meanings. For instance, codes related to various topographical features, such as hilly terrain, depressions, and sloped terrain, were clustered together to create a single were topographical features category.

Third, children's play activities (what codes) were categorized using the existing typology of outdoor play types (the Tool for Observing Play Outdoors [TOPO]–Collapsed Version) from Loebach and Cox (2020). The TOPO was originally developed to effectively capture and categorize children's outdoor play in an environment during observation. The collapsed version of the TOPO consists of nine different types of outdoor play: physical play, explorative play,

play with rules, imaginative play, restorative play, bio play, expressive play, digital play, and non-play (Loebach & Cox, 2020; see Appendix 17 for descriptions). All play activities identified were subsequently organized according to these types of outdoor play.

Step 4 aimed to identify and describe the space and object–material categories. This was done by reading the clustered codes and associated data for each space (where codes) and object–material (with what codes) category separately. In this step, attention was given to the following interconnected aspects: (1) spaces and objects–materials examined to determine potential category names, (2) functional qualities described, and (3) linked play activities (what codes). A distinct category for the taxonomy was achieved when enough data were found to link all three aspects. For example, the taxonomy category open space is supported by 24 articles referring to open yard, open areas, open space, fields or lawns, or open ground and describing functional qualities of open spaces as open, flat, more or less smooth and different surfaces such as grass, pavement, synthetic, or loose materials. Examples of linked play affordances include running, skating, picnicking, and playing soccer. This synthesis resulted in the Environmental Taxonomy of Outdoor Play Space Features presented in Table 16 (and the extended version presented in see Appendix 19). To further demonstrate the nature of the physical environment in shaping children's outdoor play occupation, examples of play affordances were summarised. In detail, for each TOPO play type, one play activity was chosen on the basis of the substantial evidence extracted for it. Substantial evidence refers to the amount of diverse information drawn from the included research articles for a specific play affordance (e.g., "running" is noted in 36 extracts from 18 articles). Descriptions illustrate specific functional qualities and environmental categories supporting this play occupation.

The main analysis, which underscored the formation of the environmental taxonomy, was performed by Morgenthaler. Codes and analyses were then reviewed by Janet Loebach, including independent coding of a subset of studies (12%) to identify common gaps or discrepancies and a review of all initial codes assigned by Morgenthaler. Afterward, both met

several times to discuss discrepancies in coding, categorization, terminology, and finalization of taxonomy categories. Morgenthaler then made necessary changes to the original data codes and categories. Finally, the other authors were asked to verify the accuracy and clarity of the final taxonomy.

6.6 Results

Included studies (N = 45) originated primarily from Europe (n = 25) and Australia or New Zealand (n = 10), followed by North America (n = 6) and Asia (n = 4). Studies used qualitative (n = 27), quantitative (n = 11), and mixed (n = 7) designs. Participants represented in the studies included children without disabilities (n = 35), children with disabilities (n = 5), or both (n = 5). Play spaces were located on school grounds (n = 18) or in public spaces (n = 27) and were distributed across inner city (n = 17), suburban (n = 8), or rural (n = 10) locations. Ten studies did not report location. Publication year of studies ranged from 1974 to 2022 with about 82% of the studies published in the past 10 yr (see Appendix 18).

6.6.1 Environmental Taxonomy of Outdoor Play Space Features

Fourteen environmental categories were formed, each with distinct environmental functional qualities and associated play occupations afforded by that environment. A compact version of the taxonomy is presented in Table 16. (An extended version of the taxonomy, including supporting references, is presented in Appendix 19)

Table 16. *Environmental Taxonomy of Outdoor Play Space Features (Compact Version)*

Physical Environment Category	Environmental Functional Qualities	Examples of Play Occupations Afforded by Environment[a]
Open spaces	• Primarily flat • Mostly open; offers space between play equipment, built structures, and natural features (not too cluttered) • Can have a variety of ground surfaces (solid, soft, or loose material; might have subcategories such as grassy open spaces, open spaces with hard surfaces)	• Running; riding, driving, or skating; pulling things; doing handstands, backflips, or jumping • Watching objects that roll or spin • Playing “floor is lava” • Playing soccer, playing tag • Sitting, standing • Picnicking
Designated sports areas	• Often clearly separated from other areas • Flat area intended for a particular sport activity • Can include rigid built elements (nets, goalposts) or visual floor markings • Can have a variety of ground surfaces depending on activity	• Playing soccer, playing basketball • Hanging on basketball basket
Paths and walkways	• A designated change of surface to adjacent surfaces, clearly bounded • Can have many types of ground surfaces, sometimes described as solid surface and accessible • Connects and links to other zones • May loop around (circular stand-alone routes) • Can incorporate features such as bumps and dips	• Riding, driving, or skating using bike, scooter, trike, skates, wheelchair; running • Playing ball • Sitting down on and observing • Walking on
Topographic features	• Features such as hills, slopes, depressions, or cliffs in the terrain	• Sliding, sledding, gliding, running, climbing up, rolling down, jumping down

	• Surfaces can vary in degree of smoothness; varying surfaces provide different textures • Varying degree of steepness or inclination • Varying sizes and heights or depths • Weather conditions may change functional qualities (e.g., more slippery because of snow or rain)	• Rolling things down and watching, building bridges over puddle • Enjoying outlook from high up
Enclosed and bounded spaces	• Can be a fully to partly enclosed space that offers shielding and hiding qualities • Bounded spaces may include some change in surface pattern or material (e.g., a picnic blanket, a dry patch of grass, floor painting, low raised hedges), providing a nested space within a space • Scaled for a small group of children • Affords private to semiprivate spaces that seclude and separate child or children from other spaces or people • Can be provided through both human-constructed environments (e.g., low raised boundaries, walls, coverage by a roof such as tree houses or huts, nooks, crannies) and natural environments (e.g., willow domes, circle of shrubs, high grass, low-hanging canopies)	• Exploring “being inside something,” making a nest • Diverse imaginative playing such as playing house, caged animal, shopping, monster, witch, cops and robbers • Withdrawing, resting, looking out from, hiding • Sitting, social opportunity such as sitting with peers
Spaces on the edges	• Spaces adjacent to or on the edge of more busy zones, although they may have no distinct boundaries • May wrap around other spaces (e.g., corners, nooks, staircases, walls) • May have natural fixed features such as trees or shrubs • Offers a space that is less hectic, and quieter, for slower play affordances; a space that is safe from interruptions by others	• Having a conversation with peers • Watching others from a distance • Daydreaming, relaxing • Getting together with peers

	• Might be overlooked by supervising adults	
Play equipment	• Always human constructed, with fixed or moving fixtures • Sometimes stand-alone components, sometimes bigger more complex structures • Can be made from different materials (e.g., metal, plastic, wood or natural materials) • Some could be described as hybrid play structures, where play features are constructed but using natural materials such as wood logs or creating a circle of tree stumps, intentionally positioned boulders with climbing grips • Often constructed for certain play activity, may be repurposed for other play affordances (e.g., using swings to jump off)	• Balancing, climbing, crossing, crawling under, doing gymnastics, jumping, pulling themselves up, rocking, running, sliding, spinning, turning, rotating, swinging • Making sounds, digging under • Imaginative playing such as “crocodile pulls me down the slide” • Hide and seek, creating own play routes • Sitting and chatting with peers • Laying in, enjoying an outlook from high up, watching other children, getting closer to peers
Themed and suggestive play features	• Always human constructed but can span from highly themed to less suggestive features • Can inspire children to initiate play activities suggested by the themed feature (e.g., playing fire brigade on a fire truck structure, playing captain on a ship structure with a steering wheel) • Also allows children to repurposing the themed play feature for their own play idea (e.g., climbing on themed and suggestive play structures)	• Climbing on top • Exploring of twisting, opening, closing, sliding, and turning things • Diverse imaginative playing such as driving a truck; being a pilot; playing princess in a castle; playing family or post office, jail, or shopping • Performing and singing on a stage play • Hiding in, looking out from
Features not purpose-built for play	• Available features not explicitly included for play interactions, such as fences, seating, stairs, or weather shelters that may be repurposed for play	• Climbing, jumping over, balancing on • Chasing games, playing hide and seek • Sitting on and having a conversation, hanging out with peers • Resting, recovering, sitting, and observing • Eating, picnicking

Manufactured tools and toys	• Graspable, detached, and portable human-made objects such as balls, sleds, and funnels • Might be provided in a play space or brought by visiting children • Can be manufactured loose parts (e.g., tires, ropes, crates, cardboard boxes) • Can be digital or electronic objects • Can be used in conjunction with other environmental features (e.g., riding a bike on sufficiently solid-surface hill, kicking a soccer ball on a grassed open space) • Can be used in conjunction with available loose materials (e.g., pails and spoons for mud and water play, a wheelbarrow to transport sand)	• Jumping and skipping, using hula hoops or rubber bands, driving and riding, sledding, pulling and pushing, playing ball • Building and constructing, manipulating materials (e.g., stirring, hammering, transporting) • Imaginative playing such as playing captain with a steering wheel • Kicking balls, throwing frisbees • Arranging and sorting • Playing on cell phone
Fixed natural features	• Can be large-scale vegetation (e.g., trees), small-scale vegetation (e.g., shrubs, bushes, long grass), or hardscape features (e.g., boulders) • Integrated within or surrounding the play space; available to play in, on, and with and not just for decorative purposes • May be used in combination with loose natural parts, materials, or wildlife	• Climbing, running, jumping off • Constructing and building, ripping off, touching, exploring features, walking barefoot, hiding things • Imaginative playing such as making food, being an animal, or playing house • Playing tag and chasing games, playing hide and seek • Chatting with peers, leaving marks, playing with shadow • Observing, looking for, and caring for wildlife; touching, smelling, or tasting plant material • Laying in shadow or sun, reading, resting, picnicking, gathering with peers
Loose natural parts	• Graspable, portable, collectable (countable) natural objects such as sticks, rocks, bark	• Play fighting with sticks, pushing, carrying, or transporting heavy objects

	• Can have different sizes, weights, and textures • May be first sourced and gathered from the play space • May be shaped or repurposed for new or alternate affordances • Weather and seasonal changes offer new loose natural parts (e.g., flowers, fruits, ice) • May be used in combination with human-made materials or objects, fixed natural features, and manufactured tools and toys	• Picking up, throwing leaves in air; constructing and building dens, forts, dams, or nests; hitting ice with a stick; searching and sourcing; hiding something; ripping off; tearing apart • Smelling, tasting, touching or feeling • Imaginative playing, such as Harry Potter with stick-wand, playing stick fight, making monster traps, play-making food • Competing to find biggest object • Arranging, sorting, drawing, observing, and enjoying flowers and plants
Wildlife- friendly habitats	• Natural green or blue features or spaces (e.g., shrubs, grass, flowers, forest, ponds, creeks) close to or integrated into the play space that attract wildlife, including insects (e.g., butterflies, snails), birds (e.g., songbirds, ducks) or pets (dogs) • Wildlife may also be kept in cages or fenced-in spaces close to or in play spaces • Wildlife's unique functional qualities, such as how animals move (e.g., crawl, jump, swim, or fly, which affords following or catching) and make sounds (e.g., bird singing affords observing) • Wildlife often described as "smaller" animals	• Playing fetch • Searching for and finding, touching, following around • Closely observing, watching, listening to • Catching, collecting, picking up • Caring for, feeding
Malleable materials	• Substances that are shapable, malleable, portable, or mixable • May be purposefully provided in the play space, such as water, sand, or mud play areas	• Clambering up a slippery slope, skiing, sledding, sliding, throwing, transporting • Scooping up, picking up, walking barefoot, building, moulding, damming water, floating, filling, burying, making tracks or

	• May involve surface materials or those provided by the natural environment (e.g., dirt, mud, soil, clay, sand, gravel, water, snow, frost, tree sap) • May be ground-surface malleable materials (e.g., mulch, wood chips, sand, gravel) • Properties might change depending on weather and temperature (e.g., water turning to ice, moist sand) • Can provide different textures to explore • May be used in combination with loose natural parts and manufactured tools and toys	footprints, stirring, pouring, splashing, sieving, touching, smearing • Imaginative play—making food, playing house, making sand cakes • Shaping snow figures • Watering plants

[a]Items in this column represent example play occupations. The full list can be found in Appendix 19.

6.6.2 Examples of Play Occupations Afforded by the Physical Environment

An array of 284 distinct play occupations afforded by the environment were identified (see Appendix 20) that were associated with space and object categories in the taxonomy. Play occupations take on many different forms depending on the functional environmental qualities of the spaces and objects. These functional qualities of the physical environment significantly shape children's outdoor play occupations, as illustrated by the following two examples, selected because of their prominence in outdoor play: "running as play" and "chatting and talking with peers as play."

"Running as play" is part of the TOPO outdoor play type Physical Play (Loebach & Cox, 2020) and was primarily evident in four of 14 environmental categories. Running play took on various forms, including running up and down topographic features (Fahy et al., 2021; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Refshauge et al., 2015; Veitch et al., 2020), running with play equipment (e.g., running up slides or running across bridges; Fahy et al., 2021; Refshauge et al., 2015), and running in loops in open spaces or along paths and walkways, often following a specific route (Aminpour, 2021; Fahy et al., 2021). Additionally, running frequently involved other play, such as running while engaged in a game such as tag (Fahy et al., 2021) or jumping off swings and running down slopes (Refshauge et al., 2015), or it was interwoven with other play activities, such as running, climbing, and jumping over features (Caro et al., 2016; Pitsikali & Parnell, 2019). Running also often involved following peers' lead, running in groups, being fast, and competing with peers in races (Aminpour, 2021; Caro et al., 2016; Fahy et al., 2021), highlighting the social environmental dimensions of play. Altogether, play occupations for running were often perceived by children on the basis of a combination of several environmental functional qualities, such as a relatively firm surface that could be flat or have various degrees of inclination (Aminpour, 2021; Fahy et al., 2021; Goodenough et al., 2021; Lerstrup & van den Bosch, 2017; Refshauge et al., 2015), along with enough room to run afforded by spaces between or around natural features or built structures

(Aminpour et al., 2020; Cetken-Aktas & Sevimli-Celik, 2023; Fahy et al., 2021; Jansson, 2010; Refshauge et al., 2015; Veitch et al., 2020) and a running route with no ground surface obstacles, such as roots that cause tripping or low-hanging branches that might hit children's faces (Aminpour, 2021; Caro et al., 2016).

"Chatting and talking with peers as play" is part of the TOPO's Expressive Play type (Loebach & Cox, 2020) and took on diverse forms, such as chatting with peers, joking and giggling, telling secrets, venting, making plans about what to do, getting in contact with other children, or simply talking (Aminpour, 2021; Birkner et al., 2021; Burke, 2012; Caro et al., 2016; Hayward et al., 1974; Horton & Kraftl, 2018; Jansson, 2008; Jansson et al., 2016; Jeanes & Magee, 2012; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Prellwitz & Skär, 2007; Ripat & Becker, 2012; Stettler et al., 2022). Studies have reported that conversational play happens everywhere in the play space (Horton & Kraftl, 2018; Loebach & Cox, 2022); however, analyses of studies in this scoping review suggest that chatting and talking were most supported by five environmental categories: play equipment, features not purpose-built for play (such as seating), enclosed and bounded spaces, spaces on the edge, and fixed natural features. Environmental functional qualities that support chatting and talking with peers included areas to sit down and mingle, such as features that afforded sitting on benches, logs, rocks, walls, and so forth, as well as play equipment such as larger swings or roundabouts that offered space for several children (Caro et al., 2016; Horton & Kraftl, 2018; Jansson, 2008; Jansson et al., 2016; Loebach & Cox, 2022; Prellwitz & Skär, 2007; Veitch et al., 2020). Furthermore, these functional qualities offered privacy via some form of controlled view or outlook that afforded a way to control social interaction in moments when someone approached the space (e.g., corners and edges of the playground, inside of a hut, on top of a climbing structure, in a tree house, or in a climbing tree hidden by branches; Bourke & Sargisson, 2014; Hayward et al., 1974; Jansson et al., 2016; Nunma & Kanki, 2022, 2022; Prellwitz & Skär, 2007; Veitch et al., 2020). Talking and chatting as play was most often undertaken with peers whom

children identified as friends, with no adults present (Aminpour, 2021; Birkner et al., 2021; Jansson et al., 2016; Prellwitz & Skär, 2007). Talking and chatting as play often appeared to be intertwined with other activities such as sitting and resting, eating, swinging, spinning, walking somewhere, perching on elevated structures, enjoying nature, or relaxing in the shade or sun (Aminpour, 2021; Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2023; Jeanes & Magee, 2012; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Prellwitz & Skär, 2007; Ripat & Becker, 2012; Truong & Mahon, 2012).

Similar to “running as play” and “chatting and talking with peers as play,” the forms and supporting functional qualities of other play occupations are described in Appendix 20.

6.7 Discussion

The main result of this secondary analysis is the development of the Environmental Taxonomy of Outdoor Play Space Features, based on evidence for actualized affordances (play occupations) but synthesized into a taxonomy of potential play affordances as an outcome. This taxonomy describes connections between environmental characteristics of spaces and objects and their potential play affordances in shaping play occupations. It encompasses 14 distinct environmental categories, their functional qualities, and links to play occupations that they afforded. Notably, our findings highlight that children’s play is afforded by various combinations of functional qualities. Consequently, identifying these functional qualities, their combinations, and how children use them in their play is an invaluable initial step to further the understanding of how the physical environment can potentially provide play affordances and can, therefore, strengthen understanding of how to design outdoor play spaces for enhanced play value.

The theory of affordances (Gibson, 1979) that underlies this taxonomy deepens the understanding of how the physical environment actively shapes play occupations. Each environmental category, with its associated functional qualities, becomes an influential agent guiding children’s play. This recognition of the environment’s active role adds a new dimension to the understanding of

child–environment transactions in play occupations, highlighting that the physical environment is not a passive backdrop to play but an active component of it; it continuously presents affordances that invite children to play and therefore has agency.

The analysis revealed a diverse array of play occupations afforded by different environmental categories. In comparing the play occupations that are afforded by categories of the taxonomy, it becomes evident that play occupations are often not restricted to a single category but rather are supported across different categories and take on various forms. This underscores the idea that play spaces that provide a range of different space and object categories have the potential to support a wider variety of play. This finding aligns with prior research that has shown that play spaces promote diverse play when they offer not only play equipment (play equipment and themed and suggestive play features) but also other categories, such as open spaces, enclosed and bounded spaces, topographical features, fixed natural features, loose natural parts, and malleable materials, among other space and object categories (Brussoni et al., 2017; Dyment & O'Connell, 2013; Herrington & Brussoni, 2015; Loebach & Cox, 2020; Luchs & Fikus, 2013; Wishart et al., 2019; Woolley & Lowe, 2013).

We propose that the Environmental Taxonomy of Outdoor Play Space Features offers advantages for occupational therapy practice. First, it can serve as a shared environmental terminology, which is crucial for effective communication within the occupational therapy profession, as discussed by Kirschner et al. (2023). A shared terminology also plays an essential role in facilitating interdisciplinary collaborations (Wagenfeld et al., 2017). Because occupational therapy is concerned with goals that aim to enable children to play by modifying the environment, this taxonomy can serve as a common terminology for community practice in schools and public spaces to communicate ideas more effectively among interdisciplinary stakeholders, including designers, providers, policymakers, and researchers.

Second, using this taxonomy offers a shift from an adult-centered viewpoint of "what does this play space contain?" to a child's viewpoint of "what

can I potentially do there?" (Heft, 1988). For occupational therapists, this shift of describing what the environment potentially affords is valuable and closer to an occupational perspective of describing environments, rather than just describing and counting objects and features.

Third, this taxonomy could be used by occupational therapists to evaluate play spaces for potential play affordances and inform better playground design and modifications. An evaluation of supporting features of the environment is one of five facets of how play occupations can be assessed (Bundy, 2011). Using the play affordance taxonomy in the evaluation of a play space would involve several steps. First, it is important to get an overview of what environmental categories are evident in a play space. Second, a description of functional qualities supports the identification of potential play affordances of this play space. Conducting this environmental audit using the taxonomy is then followed by observations of children's actualized play occupations within the play space. In this step, observational tools such as the TOPO (Loebach & Cox, 2020) might be used.

This article contributes to the growing body of evidence emphasising the significance of the physical environment in understanding outdoor play occupations. Occupational therapy scholars have stressed the importance of practitioners possessing knowledge about play space users, environments, and play occupations (Moore et al., 2022; Prellwitz & Skär, 2007; Ripat & Becker, 2012). They advocate for practitioners to extend their practice beyond clinical settings; engage with communities (Moore & Lynch, 2015); support policy changes to enable play for marginalized populations (Gately et al., 2023; Lynch et al., 2020; Moore & Lynch, 2015; Sterman et al., 2019); and empower families, children, and communities to advocate for themselves (Prellwitz & Skär, 2016; Sterman, Naughton, et al., 2020). This article aims to equip practitioners with a taxonomy to facilitate context-focused interventions that create play occupation-enabling environments for diverse user groups. Although the theory of affordances enhances understanding of the physical environment and children's play interactions, it is crucial for environmental and contextual interventions to also consider local policies, play space standards,

country-specific legislation, sociocultural factors, and adult beliefs and attitudes that influence children's outdoor play (Grady-Dominguez et al., 2021; Ramsden et al., 2022). To comprehensively advance the environmental and contextual approach in occupational therapy practice, changes are needed both in the immediate physical environments that support play and in the broader environmental dimensions that affect children's outdoor play in community play spaces.

6.7.1 Limitations and Future Research

In secondary data analyses, the existing data were originally collected for a different research question (Johnston, 2014). The data and search terms used were tailored to the original research question, not the one being explored. This means that that some relevant articles might have been missed because no new search was conducted.

It is essential to recognize that taxonomies are dynamic and will continue to evolve (Heft, 1988) as the evidence base for children's play and specific physical environments grows. To ensure its accuracy and continued relevance, further empirical testing and refinements are needed. For example, we anticipate that categories may be further divided into distinct subcategories or that new categories may emerge. Also, categories in this taxonomy are overlapping and nested within each other, which means that future refinements should investigate whether common patterns of play affordances coexist in these categories.

Ongoing development should be supported by empirical testing of the taxonomy combined with other tools such as the TOPO's behaviour mapping protocol (Loebach & Cox, 2020). Furthermore, this taxonomy provides part of the evidence base for an audit tool investigating children's play opportunities in play spaces (The Playground Play Value and Usability Audit Tool; Morgenthaler et al., 2023).

A notable finding of this study pertains to the limited research on children with disabilities and play spaces, beyond issues such as play space accessibility and human-constructed play equipment. Although these are

fundamental issues in addressing inclusion, this narrow emphasis provides limited insights into how other environmental play space features support play for these children. A play space that affords a diversity of play can also potentially cater to a more diverse population and therefore has potential to enhance inclusion. Previous research has demonstrated that play spaces that support a wide array of affordances benefit children with varying abilities (Barbour, 1999; Sterman, Villeneuve, et al., 2020), different age groups, and different genders (Loebach & Cox, 2022) and provide children with options to explore new affordances (Fjørtoft, 2001) and the freedom to choose play activities that align with their individual abilities (Prieske et al., 2015). To address this research gap effectively, future studies should investigate the role of categories such as loose natural parts, fixed natural features, topographic features, malleable materials, and wildlife-friendly habitats in supporting inclusive play environments. Future studies need to provide detailed descriptions of children's play occupations in environmental contexts and the functional qualities of the environment that support and shape their play.

6.8 Implications for Occupational Therapy Practice

The findings of this scoping review have following implications for occupational therapy practice:

- The theory of affordances is useful for exploring and describing environment–child transactions in outdoor play.
- The Environmental Taxonomy of Outdoor Play Space Features could be used in practice to evaluate existing play spaces, identify missing features and their functional qualities, and justify environmental interventions aiming to create space for play.
- To enable more time and space for play, practitioners should collaborate with communities and partner with other professionals, such as landscape architects, play advocacy working groups, and stakeholders responsible for play space provision. The taxonomy can be used as a common terminology.

6.9 Conclusion

This scoping review provides a deeper understanding of the transactions between the physical environment and children in outdoor play. By drawing on the theory of affordances, this study emphasises the significant role the physical environment plays in shaping children's outdoor play occupations. Although affordances remain underexplored in occupational science and occupational therapy, they align seamlessly with occupational therapy's core values of the transactional person–environment relationship and are, therefore, well suited to support the understanding of what people do in the physical environment.

The Environmental Taxonomy of Outdoor Play Space Features introduced in this article provides a valuable tool to describe and analyse play spaces and could be used to justify environmental intervention in schools and public playgrounds to creating spaces that enable diverse play occupations in order to maximize play value.

6.10 Acknowledgments

This research was funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 861257

6.11 References Study 2 (Paper II)

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CHAPTER SEVEN — CONSTRUCTING THE INITIAL VERSION OF THE PLAYGROUND PLAY VALUE AND USABILITY AUDIT TOOL

7.1 Introduction to Chapter Seven

This chapter briefly portrays how the initial version of the Playground Play Value and Usability Audit tool (PVUA) is constructed. Specifically, it focuses on the two steps of 'Generating an Item Pool' and 'Audit Tool Construction' (see also Figure 4 in Chapter Four). As a reminder, these two steps outlined here focus only on the initial PVUA tool development as preparation for Study 3 (Paper III, see Chapter Eight). Afterwards, Study 3 (Paper III) aims to evaluate this initial version of the PVUA tool and further extend and refine its content, including reconstructing and revisiting these steps. Chapter Seven provides a brief description of the following aspects, which are discussed subsequently: forming an item pool, forming content areas, subdomains, and domains, developing the screening mechanism, assigning items to underlying constructs of play value and usability, developing the response format, and developing instructions. These aspects are described individually but are interlinked and should be read as such. For example, the item format is linked to the response format, and the instructions or generated items are linked to a domain.

7.1.1 Forming an Item Pool

As described by AERA et al. (2014) a large pool of items is typically gathered, often exceeding the number required to develop the initial audit tool. For the PVUA tool, which aims to evaluate the physical environment of a playground, the following two aspects were considered when the initial item pool was gathered. First, items needed to evaluate the physical environment from an auditor's perception. Therefore, items must be somehow manifested and observable in the physical environment. Second, items should not just

identify the presence of environmental features, such as counting the number of seating opportunities. Instead, they should assess environmental characteristics related to the play value, such as if seating opportunities are also afforded forms of play, like multifunctional use or purposeful circular arrangement and related to usability, such as seating opportunities that accommodate diverse users with backrests or are provided on solid surfaces.

Items are drawn entirely from Studies 1 and 2 (Paper I and II). Findings from Study 1 (Paper I) provided insights into valued play experiences from the children's perspectives. This informed how items were gathered, such as socio-spatial characteristics that afford children opportunities to play next to each other, alone, in smaller and bigger groups. Another example is that children noted a preference for more intense play opportunities. Study 1 (Paper I) identified how these intense play experiences were manifested in the physical environment in characteristics of bigger, taller, higher, wavier, and longer play equipment landscape features and objects (see Table 15 in Study 1, Paper I). Thus, the gathered item pool represented these environmental characteristics. The gathered item pool also represents evolving play complexities. For example, as identified in Study 1 (Paper I), children desire choices and challenging play opportunities from simple to complex, including if a playground provides several climbing opportunities with varied difficulty levels. Other valued play experiences identified by children and how these relate to the physical environment are described in Study 1 (Paper I). Furthermore, the item pool considered diverse play affordances (including more physically active, exploratory, restorative play affordances and others) identified in Study 2 (Paper II). The PVUA tool approached the environmental auditing procedure from the physical environment standpoint, and it is assumed that a playground which considers these environmental characteristics potentially supports diverse play affordances. This also means that the auditor must know how the environment relates to the potential play affordances, indicating the need for a well-informed adult when conducting the PVUA tool.

7.1.2 Forming Content Areas, Subdomains and Domains

This step was about finding a meaningful way to link items together and build the underlying structure of the PVUA tool. This underlying structure starts with *items* (*n* = 211)*,* the smallest unit; *content areas* (*n* = 26) clustering several items together; *subdomains* (*n* = 5) clustering content areas and *domains* (*n* = 2) clustering subdomains (see Table 17 for an overview; The full PVUA tool version one is presented in Appendix 4). The next part outlines how content areas, domains and subdomains are formed.

Forming content areas. The *Environmental Taxonomy of Outdoor Play Space Features* (ETOPF), developed in Study 2 (Paper II), supported the creation of content areas for the initial version of the PVUA tool. The ETOPF consisted of 14 identified environmental features and their environmental functional qualities. While the 14 identified features formed the basis of clustering the items, the environmental functional qualities formed the basis of item-generating as described above. When the initial PVUA tool was created, only a preliminary version of the ETOPF was available. Therefore, the preliminary taxonomy supported the underlying structure and forming of content areas of the audit tool version 1, while the final taxonomy supported the terminology used in version 3. Again, this shows how iterative and connected these different steps in instrument development are. Not every generated item fits into the content areas formed from the ETOPF structure; therefore, additional content areas were formed. These included items related to the playground's location in the community, aesthetics and maintenance, and climate and weather. The initial version of the PVUA tool consists of 211 items clustered into 26 content areas (see Table 17 for item examples).

Table 17. *Structure of the Playground Play Value and Usability Audit tool with Example Items (Version 1)*

PVUA tool (Version 1)				
Domain	**Subdomain**	**Content Area**	**Number of Items**	**Example item (allocated to concept play value or usability)**
Domain 1: Supporting Ecological Setting	Context for play	Playground location in the community	7	… this playground is located in 15-minute walking distance to where children live (are houses/apartment buildings close) (**usability**)
		Aesthetics and maintenance of the playground	12	… this playground is clean (look for graffiti, cigarette butts, trash or other dangerous litter) (**usability**)
		Climate and weather	12	… this playground has both shaded and sunny areas (**usability**)
	Supporting features	Seating	12	… some seating allows for children's buggies or wheelchairs to sit up close alongside the other seating (**usability**)
		Fencing, boundaries, and entrances	11	… natural fencing as boundaries is considered such as bushes, trees or shrubs (**play value**)
		Amenities	3	… provided restrooms are accessible, are big enough to fit two people and have a changing table (**usability**)
Domain 2: Immediate Physical Environment Affording Play Opportunities	Spaces for play	Open space characteristics	5	… partly the open space is sufficiently solid surfaced (e.g., pavement) to allow wheeled devices such as scooters or wheelchairs to be used (**usability**)
		Path and walkway characteristics	11	… paths have a clearly defined edge (e.g. colour contrast) allowing discern the location of the pathway more easily (**usability**)
		Topography (includes hills and slopes for play)	10	… Hills include a variety of heights (**play value**)
		Natural environments	10	… natural environments provide some areas with more dense bushes affording hiding (disappearing from others) (**play value**)

		Enclosed and smaller spaces	8	… small spaces include different sizes meaning they have capacities in space from only one child to a group of children (**play value**)
		Sport fields	5	… sport fields provide needed qualities or equipment for the activity such as markings on the floor, goal posts, basketball baskets (**play value**)
	Play equipment	Swinging	13	… swings are hung up different heights (higher and lower seating height for transitions in and out) (**usability**)
		Spinning	9	… spinning opportunities allow to be used alone and in a small group of children (**play value**)
		Sliding	12	… sliding opportunities provide different inclinations (even to steeper) (**play value**)
		Climbing	15	…climbing opportunities provide different handrails hand grips, ropes are provided for different size hands and different abilities (**usability**)
		Jumping on/off	4	… jumping off points from variety of heights are provided (ground level to more elevated) (**play value**)
		Balancing and crossing	9	… balancing opportunities provide different elevated heights (on ground level to elevated levels) (**play value**)
		Rocking	5	… rocking opportunities provide different sorts of body support for children with different needs (e.g. seat with full body support seat) (**usability**)
		Zipline	4	… zipline opportunities go linear and allow to swing at the same time (**play value**)
		Recognizable play structures and objects	4	… play equipment that is intuitive, non-prescribed easy to use (**usability**)
		Flow and arrangement of play equipment	3	… are play components arranged to invite children following a play route (intuitive flow) (**usability**)
	Objects for play	Manufactured play objects and tools	3	… tools to manipulate materials and objects are provided such as shovels, funnels, buckets, hammers (**play value**)
		Musical and visual play opportunities	4	… visual play with contrasting colours are provided (e.g. things to spin, push, or other mechanisms) (**usability**)

		Provided loose materials for play	11	… water controlling features are easy to understand and positioned in a low hight reachable to children (**usability**)
		Natural loose materials and objects	9	…possibilities to explore/observe/collect and take care of wild animals including insects, snails, frogs, fish, birds are available (**play value**)

Forming and defining subdomains and domains. The five subdomains offer a more condensed overview and clustered content areas (See Table 17). Two overarching domains are formed. Domain 1 (*supporting ecological setting*) includes subdomains, content areas and items that influence play value and usability on a more general level. These items indirectly support play value and usability, which contribute to making a playground experience meaningful for children and include characteristics such as playground location, season and weather, playground maintenance, seating, amenities, and fencing. Domain 1 is represented by two subdomains: *context for play* and *supporting features*. The subdomain *context for play* is about manifested and observable characteristics supporting play value and usability represented in constant areas, playground location, aesthetics and maintenance and climate and weather. Subdomain *supporting features for play* consist of built environmental features often considered on playgrounds, such as seating, fencing boundaries, entrances, and amenities.

Domain 2 (*immediate physical environment that potentially affords play opportunities*) includes items related to observable physical and physical-social environmental characteristics of playground features that support a variety of play affordances. The immediate physical environment affording play opportunities consists of three subdomains: *spaces for play, play equipment*, and *objects for play*. These subdomains are most closely related to the ETOPF formed in Study 1 (Paper I).

7.1.3 Developing the Screening Mechanism

As described in Chapter Three, playgrounds can look very different. Some of these attributes are the presence of more or less play equipment or nature, different types of ground cover, and a diversity of playground sizes (smaller to larger). Therefore, having a one-size-fits-all playground audit tool is challenging, and another solution must be introduced. Some previously identified and reviewed playground audit tools (for example; Play Space Quality Assessment Tool; INSPIRE Consultancy Ltd. & Play England, 2009) dealt with this problem by forming three different playground audit tools for different types of playgrounds such as for door-step playgrounds, local playgrounds, and neighbourhood playgrounds. Their rationale was that

different types of playgrounds serve different functions and, therefore, look different or offer different play opportunities (INSPIRE Consultancy Ltd. & Play England, 2009). All other reviewed playground audit tools used the same audit tool for all types of playgrounds. The PVUA tool also acknowledges the different types of playgrounds, but it uses a screening mechanism to consider those. The screening mechanism is based on the content areas formed above, which clustered the items. The idea is that an auditor will first identify the main playground features by the content areas, and then the PVUA tool will be automatically configured to fit the playground. Automatically refers to a future electronic version of a final PVUA tool; in this development phase, the PVUA is a paper pencil audit tool. A generic playground infographic containing most content areas (see Figure 8), and a checklist (see Table 18) were created for the screening. Importantly, the infographic is not a design template for playgrounds. Its purpose is to support an auditor in quickly identifying relevant features in a playground, which will then be audited in detail with the items. A justification for this approach is discussed in Chapter Ten (see Relationship between environment and play value from an affordance perspective: Theoretical implications, Section 10.2). Another aspect is that some content areas under the subdomain ‘Context for play’ (see Table 17) were identified to be relevant to be evaluated for every playground and, therefore, are not included in the screening mechanism.

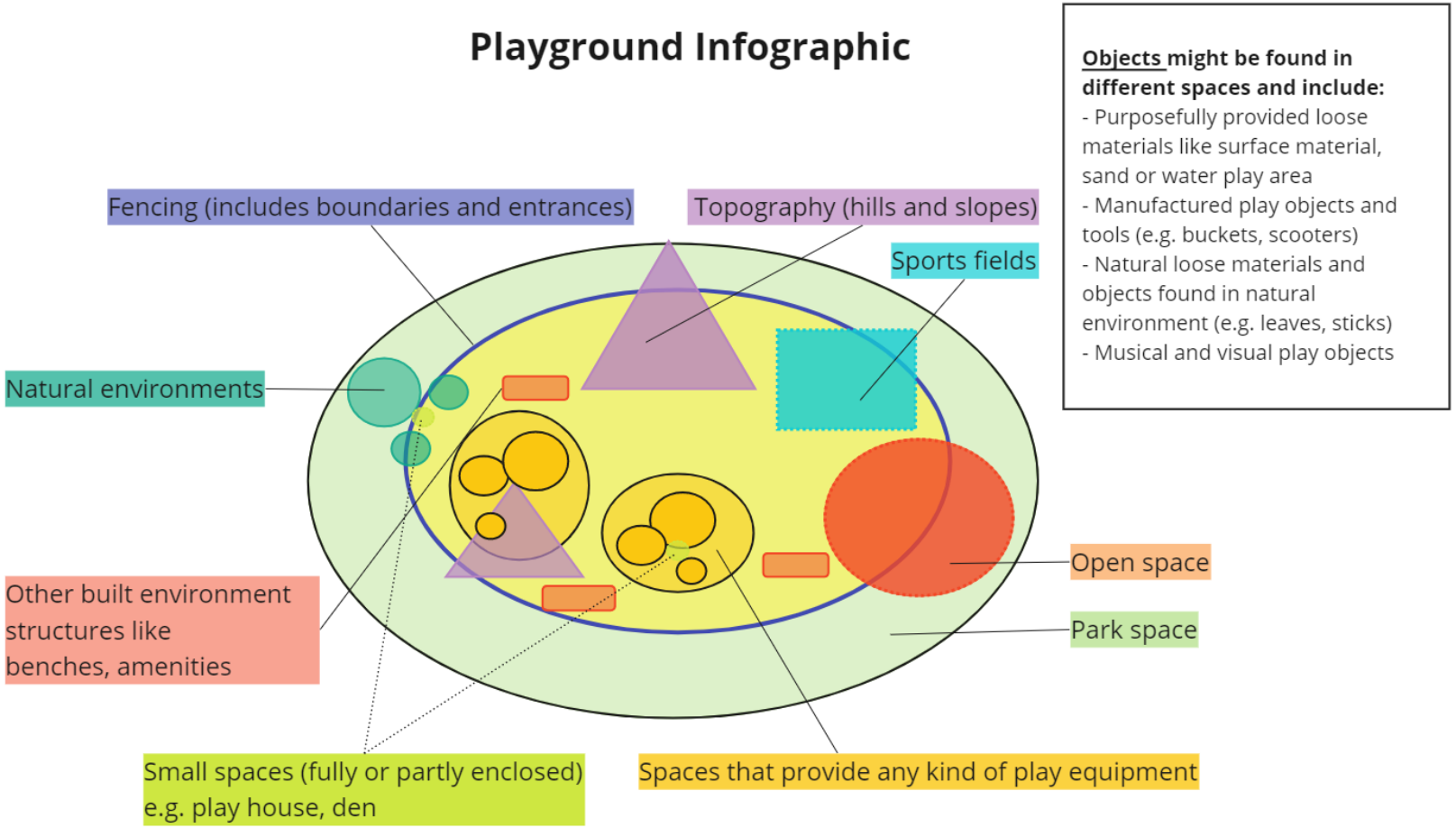
Table 18. *Screening Checklist Playground Features PVUA tool Version 1*

Categories of spaces include	
□	Spaces that provide any kind of play equipment
□	Open Spaces
□	Paths and walkways
□	Topography (includes hills and slopes)
□	Small spaces (in the natural and built environment, fully or partly enclosed, have clear boundaries e. g. playhouse, den)
□	Natural environments (includes vegetation, high grass, spaces with trees and bushes, woodlands and forest close to the playground or integrated into playground design)
□	Sport fields (designated specific sport e.g. basketball court, soccer field)
□	Spaces that provide seating and tables
□	Fencing (includes boundaries and entrances)
□	Amenities (toilets, water fountains)

Categories of objects include	
□	Purposefully provided loose parts (includes sand or water, mud, surface material, ...)
□	Manufactured play objects and tools (e. g. scooters, funnels, buckets, building blocks, ...)
□	Natural loose materials and objects (found in natural environment e. g. flowers, leaves, stones, sticks, small animals, ...)
□	Musical and visual play opportunities

Notes. Instructions: Check what potential spaces and objects are provided on the playground you want to evaluate. (It is planned that a digital version of the tool will automatically generate the audit tool fitting to this playground)

Figure 8. *Screening Infographic Playground Features PVUA tool Version 1*



Notes. Instructions: This infographic represents a schematic playground visualising potential space and object categories. Get familiar with the playground you want to evaluate. Walk around the playground and compare it to the playground infographic. The audit evaluates the playground using the categories of spaces and objects. Screen the playground you want to evaluate by identifying what categories of spaces and objects are provided on this playground. Not every playground provides all kinds of spaces and objects. The screening helps to narrow down the categories of space and objects that will be included in the evaluation.

7.1.4 Assigning Items with Underlying Constructs of Play Value and Usability

While generated items, content areas, subdomains and domains offer a helpful way to present the structure of the audit tool, they do not describe the underlying concepts of play value and usability. To support the operationalisation of play value and usability, each item is assigned to contribute to play value or usability construct (See Table 17 for examples in bolt format).

Wilson (2005) stated that the generated items do not inherently define the construct being measured, nor do they capture every possible aspect of the concept. Moreover, the set of chosen items should “represent the construct in a reasonable way” (Wilson, 2005, p. 44). Therefore, the items' assignment to play value and usability concepts was based on initial play value and usability definitions unpacked in Chapter Two. However, the understanding of the play value concept has further evolved and is described in Chapter Ten of this thesis discussion. The assignment of play value and usability to items was not further validated through the expert panel in Study 3 (Paper III) and should be investigated in future studies when data is collected. A relevant question to answer would be about the internal structure of the PVUA tool and would investigate if the pre-assigned items to the play value and usability construct are also statistically identifiable (AERA et al., 2014). Answering such a question would support the construct validity of the PVUA tool.

7.1.5 Developing a Response Format

A response format considers aspects of how a future user of the PVUA tool responds to individual items on a scale. Wilson (2005) noted the importance of alignment between item and response formats. Developing an appropriate response format included finding potential scales and aligning the item format to the scale. Response formats from reviewed playground audit tools included checklists (for example, dichotomous scales such as Yes or No), counting the amount of a feature such as the number of sliding opportunities present, and ordinal scales ranging from three to six Likert scale. A three-point ordinal response format with an additional non-applicable

response option was chosen. Table 19 provides an overview of the response options.

Table 19. *Response Format PVUA Version 1*

Response option	Score assigned to the	Description and justification
YES—All characteristics met the score	2	Playground considers the characteristics to great extent
PARTIAL—Some characteristics met the score	1	Playground considers the characteristics to some extent
NO —No characteristics met the score	0	Playground does not consider the characteristics
Not Applicable	No score	Option when the auditor is not sure if the item is applicable to the playground

The reason for choosing a fixed response format across all items is that a person using the PVUA tool learns the response options with the first set of items and does not have to read the item response format continuously. Other reviewed playground audit tools, such as Woolley and Lowe's (2013) Play Value tool, used for each item a different scale, which made the time burden of using the tool higher as the auditor needed to read each item's response options for every new item. Further considerations included colour-coding the item responses with a standard traffic light colour green, yellow and red for the response option and blue for the not applicable option (see Table 19). The chosen colour followed accessibility recommendations for colour blindness (Wong, 2011).

Additional response formats were considered next to the chosen item response format. For example, an open-ended comment and reflection section was considered for each item. For the front page, filled out before starting the auditing procedure, both open-ended and closed-ended response formats were included (see Appendix 4). These aimed to obtain information from the person conducting the audit, the playground to be evaluated, the time of the audit and current season and weather conditions.

Data obtained from the PVUA tool can be interpreted at four levels: single-item scores, scores by content areas, scores by dimensions, or scores

by the constructs of play value and usability. Each level offers distinct insights and depends on the specific purpose for which the PVUA tool is employed. For example, interpreting the scores of single items is more detailed and provides information about missing and available specific environmental characteristics. On the contrary, interpreting the scores on content area, domain, or construct levels will result in a sum score and, therefore, become more abstract.

7.1.6 Developing Instructions

The last aspect is developing instructions that support test use and score interpretation, which should align with the item and scoring formats (AERA et al., 2014). The instructions guide the person using the PVUA tool, aim to be highlighted with the term “Instructions,” and are purposefully short and precisely formulated. Instructions were formulated for the screening mechanism (see Table 18 and Figure 8; Note sections) and for each content area (for example, “To what extent does this playground consider the following characteristics?”).

7.2 Summary of Chapter Seven

This chapter detailed the preparatory work for Study 3 (Paper III) and how the initial version of the Playground Play Value and Usability Audit tool was constructed. It described how items were generated and clustered into content areas, subdomains and domains. The chapter specified the assignment of items to the underlying constructs of play value and usability that the PVUA tool aimed to operationalise. Furthermore, it explained alignment in item format, response format and instructions. The PVUA tool version 1 can be found in Appendix 4. All of these aspects were evaluated and refined in Study 3 (Paper III), as detailed in Chapter Eight.

CHAPTER EIGHT — STUDY 3, PAPER III

Following the phase of constructing the initial version of the Playground Play Value and Usability Audit (PVUA) tool outlined in chapter seven, and responding to the overall aim of this thesis, this expert panel study (**Study 3, Paper III**) aimed to explore the preliminary evidence of validity in relation to test content of the PVUA tool. Specifically, the aim was to improve, refine and extend the initially drafted audit tool content by eliciting the perspectives from an international and interdisciplinary expert panel.

The study was conceptualised solely by me. The supervisory team Dr Helen Lynch, Dr Duncan Pentland and Dr Christina Schulze approved and supported refinements of the study design and two advisors supported with methodological guidance (Dr Janet Loebach and Dr Anders Kottorp). For this study, I was responsible for recruitment, data collection and data analysis. The supervisory team oversaw all steps through regular supervision meetings. I drafted the manuscript independently, and the supervisory team supported the revisions of sections of the manuscript. This paper was submitted to the Journal *Child, Youth and Environments* on 29.02.2024, the first feedback was received by the editors on 27.09.2024 (see Appendix 21) and included two minor revisions including the need of reviewing two included references and change of wording when refereeing to the right to play. This manuscript was accepted and is awaiting publication.

Morgenthaler, T., Loebach, J., Lynch, H., Pentland, D., Kottorp, A., & Schulze, C. (accepted). Developing the Playground Play Value and Usability Audit Tool (PVUA): An Evaluation of Content Validity via an Expert Panel. *Children, Youth and Environments*.

The study is presented formatted aligned with this thesis but follows the outline of headings as it is planned to appear in print. The literature used in this publication is partly the same in other sections of this thesis consequently, there is some overlap with the previous sections of this thesis. This

publication’s relevant appendices can be accessed in the appendix section of the thesis. A separate reference list was compiled specifically for this chapter.

8.1 Title: Developing the Playground Play Value and Usability Audit Tool (PVUA): An Evaluation of Content Validity via an Expert Panel

8.2 Abstract

This study describes procedures for developing and exploring the content validity of a tool to audit playgrounds for play value and usability for diverse populations. Development included reviewing existing tools, creating an initial draft from evidence literature, followed by iterative rounds with an international, interdisciplinary expert panel (N=22). Panellists' comments and ratings of relevance and clarity supported refinements of items, content areas, scoring, instructions, and interpretations of the PVUA content. The preliminary tool consists of 203 items divided across 28 content areas and two domains. Future research should examine PVUA's reliability and construct validity using a diverse sample of playgrounds.

8.3 Keywords

content validity, inclusion, playground, play value, usability, vulnerable populations

8.4 Introduction

Play is a fundamental right for all children, as recognised by Article 31 of the United Nations Convention on the Rights of the Child (United Nations, 1989) and has been found to be important for children's health, development, and wellbeing (Brussoni et al., 2015; Gill, 2014).

Public playgrounds are specifically designed for children's outdoor play, usually located in diverse public settings such as parks and schools (Burke, 2013; Woolley & Lowe, 2013). While public playgrounds are not the only outdoor environment where children play (Helleman et al., 2023; Martin et al., 2023), they are consistently identified by children as an important space for play (Prellwitz & Skär, 2007; van Heel et al., 2023) and are frequently visited by children and families (Jansson, 2010; Nicholson et al., 2015). While play equipment is a common feature of playgrounds, this study conceptualizes playgrounds as a space encompassing a broader range of features and

materials, all of which can contribute to the play value of the environment (Brussoni et al., 2017; Martin et al., 2023; Morgenthaler et al., 2024; Woolley & Lowe, 2013). Such features may include manufactured play equipment, open spaces, natural features such as vegetation or boulders, wildlife-friendly habitats, malleable materials and loose parts, topographical features such as hills or depressions, as well as key supporting features like fencing and boundaries, seating, and amenities like restrooms (Morgenthaler et al., 2024).

For the purpose of this study, the construct play value was defined as the value for play that an environment, object, or piece of equipment brings to children's experience of play (Casey & Harbottle, 2018; Children's Play Policy Forum & UK Play Safety Forum, 2022; Playright, 2016; Woolley & Lowe, 2013). "Something may be described as having high play value if children are able to play with it in many different ways, integrate it into their own play or use it to expand or elaborate on their own ideas and actions" (Casey & Harbottle, 2018, p. 9). Previous research conceptualised play value in relation to playgrounds as supporting diverse and potential play opportunities (play types or play affordances) (Moore et al., 2023; Parker & Al-Maiyah, 2022; Wenger, et al., 2024; Woolley & Lowe, 2013). In this study, play value of a playground was conceptualize by the diverse, multiple, and potential play affordances supported by diverse, varied and combined environmental features.

The concept of usability goes beyond accessibility and is concerned about equitable use of an environment to all children, coming closer to the overall goal of inclusion (Iwarsson & Ståhl, 2003). Usability, in this study, is understood as environmental qualities identified in the literature that enable children with diverse abilities to play on playgrounds (Moore, Boyle, et al., 2022; Moore & Lynch, 2015; Prellwitz & Skär, 2007; Ripat & Becker, 2012). While accessibility is understood as getting to the playground or to the play equipment, usability prioritises play so what children want to do on the playground (Moore, Boyle, et al., 2022). Considering environmental qualities that contribute to usability is therefore closer to the overarching goal of creating playgrounds that enhance play value for diverse ages and abilities (Iwarsson & Ståhl, 2003; Moore, Boyle, et al., 2022).

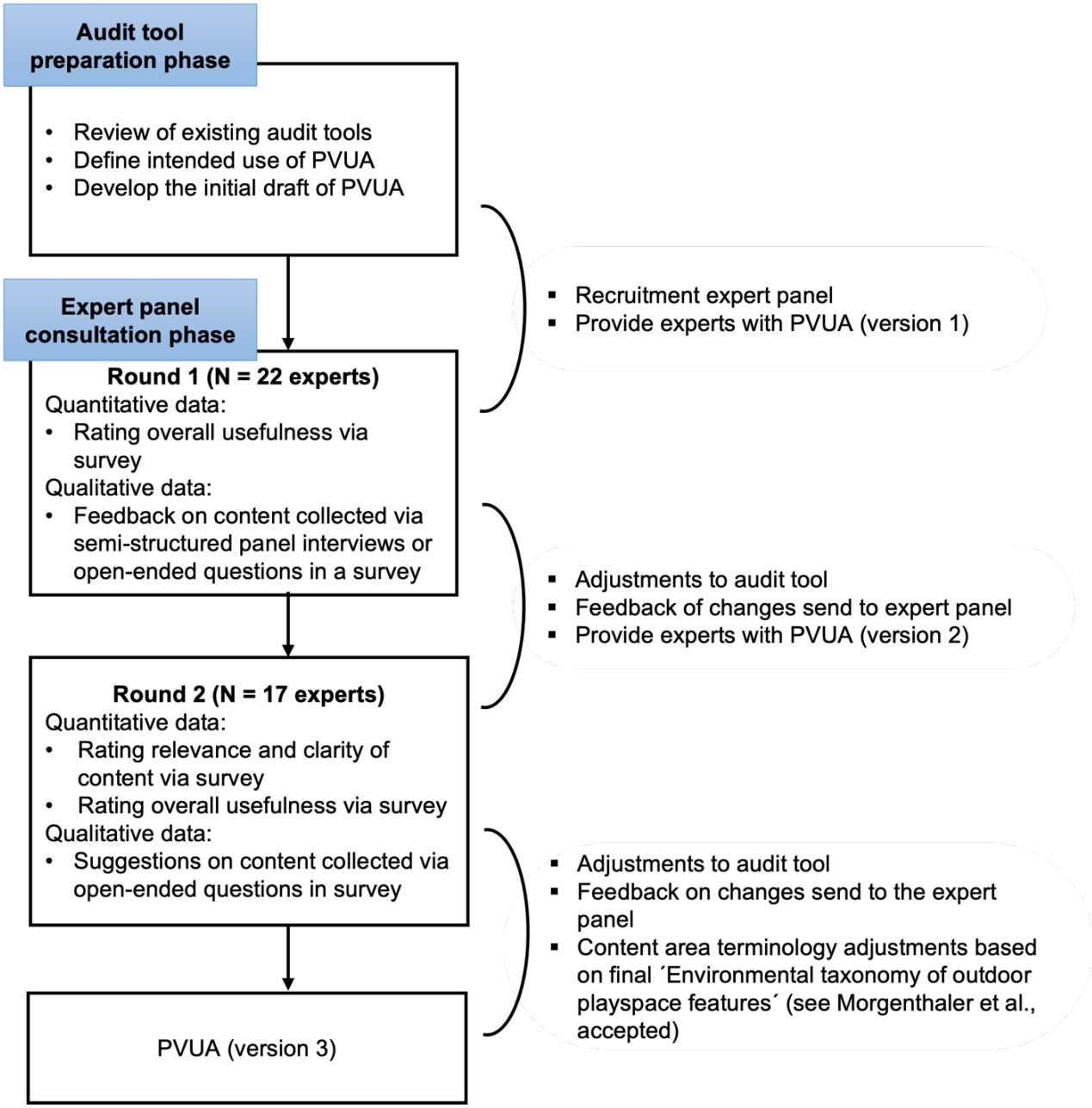
Designing playgrounds high in play value and usability is challenging, and evidence from children suggests there are substantial discrepancies between typically designed playgrounds and children's own preferences and desires. Studies soliciting children's experiences of playgrounds have emphasised a lack of diversity in play opportunities (Horton & Kraftl, 2018; Jansson, 2008), a lack of novel opportunities within a playground over time (Caro et al., 2016; Jansson et al., 2016), limited choices that do not align with children's abilities (Burke, 2012; Lynch et al., 2020), few challenging play opportunities available, especially for older children and those with disabilities (Caro et al., 2016; Jansson et al., 2016; Lynch et al., 2020), and an absence of diverse features that afford interaction between children (Burke, 2012; Prellwitz & Skär, 2007). Another substantial challenge is that professionals responsible for playground provision often lack knowledge and experience necessary to cater to a diverse population, including children with disabilities (Moore, Lynch, et al., 2022; Sterman et al., 2019; Van Melik & Althuizen, 2022; Wenger et al., 2024). National reports from Germany, the United Kingdom (Wales and Scotland), and Ireland have described a lack of playgrounds suitable for children with disabilities and recommended improvement to cater better to this population (Dallimore, 2023; FitzGibbon & Dodd, 2023; Moloney et al., 2021; Weber et al., 2023). Thus, it is essential to enhance the provision for diverse populations while also considering high play value.

Playgrounds should aim to do more than just meet safety or accessibility standards; they should prioritize high play value and dynamic play opportunities that will cater to diverse users, including children with and without disabilities. This study addresses the need for an audit tool that can effectively assess the play value and usability of public playgrounds through the development and validation of the Playground Play Value and Usability Audit tool (PVUA). Using such an audit tool supports an evidence-informed approach in managing and ensuring the provision of high-quality playgrounds that consider play value and usability.

8.5 Methods

The objective of this study was to develop and explore the preliminary evidence of validity in relation to test content of the *Playground Play Value and Usability Audit tool* (PVUA). Content validity refers to the representativeness of the test content (items and domains) and the construct it is intended to measure (AERA et al., 2014). Consequently, validity evidence based on test content supports how the test scores are interpreted (AERA et al., 2014). Protocols for developing a new research instrument place significant importance on the examination of content validity and require collection of existing evidence from literature, accompanied by empirical evidence solicited through expert evaluation (AERA et al. 2014; Sireci & Benítez, 2023). To develop and assess the content validity of the PVUA tool, this study was designed in two phases: (1) audit preparation and (2) expert consultation (see Figure 9). The study was approved by the University College Cork Social Research Ethics Committee [Log 2022-190].

Figure 9. *Flowchart of the Study Design (Study 3, Paper III)*



8.5.1 Audit Tool Preparation Phase

Review of Existing Audit Tools

The process of instrument development started with a review of existing playground audit tools that capture play value, usability, and similar constructs, as well as an investigation into the content validity evidence of these tools.

From a preliminary review of seven existing audit tools, test content differed significantly (for references, see Table 20). For example, four focus on play value or a related construct (playability) but lack emphasis on children with disabilities; two concentrated on children with disabilities but lack details on play value; and only one tool claimed to consider both aspects but focused mainly on play equipment rather than features such as topography or loose parts. While the authors of these tools provide evidence of content validity (e.g., non-systematic literature reviews, expert consultations, and playground user feedback), none detailed how these sources influenced their formation or any adjustments made based on the collected evidence. In summary, available audit tools did not capture play value as an overall construct for diverse users, and, consequently, the need to develop a new audit tool that describes test content development and adjustment in detail was identified.

Table 20. *Summary of Reviewed Audit Tools and Their Content (Study 3, Paper III)*

Name of Tool (Reference)	**Intended Use**	**Test Content in Domains** (Number of Items)	**Evidence Base of Test Content**	**Strengths (+) and Limitations (-)**
Playability Tool Kit (PTK) (Ontario Park Association, 2001)	Evaluate playground playability	8 domains: arrival point (5), pathways (17), entrance to play space (5), play events (15), play space layout (7), surfacing (4), amenities (5), signage (6)	Expert opinions, children's and parent's perspectives	+ Is a grey literature tool but a modified version was used in one research study (Yantzi et al., 2010) - No information on content validity provided - Mostly focused on accessibility but not usability and play value
Tool to Assess Play Value and Design of Play Spaces	Assess the relationship between play value and design of play space	3 domains: play types (5), physical characteristics (13), environmental characteristics (5)	Literature review	+ Used in several research projects: (Bao et al., 2021, 2022; Lynch et al., 2018) + Describes theoretical argument that

(Woolley & Lowe, 2013)				underscores content validity - Only one item focused on diverse user groups
Play Space Quality Assessment Tool (PSQAT) (INSPIRE Consultancy Ltd. & Play England, 2009)	Measure the quality of dedicated play areas created by local authorities and others	3 domains: locations (7), play value (1), care and maintenance (7)	No information provided	+ Is a grey literature tool but was used in several research projects: (Jenkins et al., 2015; Taylor et al., 2008) + Intra-class correlation above 0.85 (excellent inter-rater reliability) (Jenkins et al., 2015) + Internal consistency reliability Cronbach alpha 0.8-0,9 (good to excellent) (Jenkins et al., 2015) - No information on content validity provided - Only one item focused on diverse user groups
PARC - Evaluation tool for assessing the accessibility and usability of community parks and playgrounds (Perry et al., 2018)	Assess accessibility and usability of parks and playgrounds across ages	6 domains: approachability to park parking and bus routes (10), path surfaces (10), play areas and equipment usability (65), rest areas (7), restrooms (13), drinking fountain (7)	Literature review, expert opinions, consultation with advocacy groups and city council members, pilot testing	+ Inter-rater reliability: Cohen's Kappa (k=0.9) indicated near perfect agreement (Perry et al., 2018) - Test content comprehensively developed but no information on content validity provided - Mostly focused on accessibility aspects

				- Does not evaluate play value; focused on presence and absence of features and accessibility characteristics Mostly focused on accessibility - Does not evaluate play value; focused on presence and absence of features
Brief Play Space Audit Tool (PSAT) (Gustat et al., 2020)	Assess playability based on presence and condition of playground features	5 domains: general playground overview (15), surface, terrain, vegetation (5) pathways and path segments (10) play equipment and structure (18)	Interview with caregiver on playground, revisions	+ Inter-rater reliability acceptable reliability with high kappa values between .79 and .90 for all items in domains (Gustat et al., 2020) - No information on content validity provided - Not looking at play value characteristics; focused on presence and absence of features - Not focused on diverse user groups
Play Park Evaluation Tool (PPET) (Parker & Al-Maiyah, 2022)	One aspect of the tool evaluates play value based on play types	Access, entrance(s) to play park, internal access, non-play equipment, play equipment, play value (19)	Literature review	+ Infographic makes it easy to identify what play opportunities are provided - No test criteria available - No information on content validity provided - Focuses on provided play equipment, not

				other features of playgrounds - Does not investigate environmental qualities; focused on presence and absence of features
Playground Rating System (FPRS) (Frost et al., 2001; cited in Olgan & Kahriman-Öztürk, 2011)	Not defined	3 domains what does the playground contain? (20), is the playground in good repair and relatively safe? (20), what should the playground do? (20)	No information provided	- No test criteria available - No information on content validity provided - Not focused on diverse user groups - Strong focus on safety

Defining the Intended Use of PVUA

The PVUA was developed as an observer-rated evaluation of the environmental qualities of public playgrounds. The aim of PVUA is to evaluate a playground's potential play value and usability by assessing the qualities and characteristics of the public playground and their potential for supporting diverse play affordances and high-quality play experiences instead of simply providing an inventory of various playground features. The results of the audit can then be used to justify improvements or changes during a retrofitting or expansion process. The PVUA could potentially be used by various professionals, including outdoor play researchers, municipality leaders responsible for playground provision/management, landscape architects, health professionals such as occupational therapists, and play advocates.

Developing the Initial Draft of PVUA

Conceptually, the PVUA draws on the perceptual theory of affordances, which explains how the environment may be perceived and used by children (Gibson, 1979; Heft, 1988). The theory of affordances underscores the relationship between the child and the environment and allows one to evaluate

the physical environment for potential play affordances children may perceive and actualize (Gibson, 1979; Kyttä, 2002).

Two literature reviews (Morgenthaler et al., 2023, Morgenthaler et al., 2024) supported the generation of an audit item pool. Both reviews focused on synthesizing the available evidence on how the physical environment relates to or supports children's outdoor play on community playgrounds. First, a scoping review investigated the environmental qualities that enhance outdoor play experiences on playgrounds from the perspective of children, both with and without disabilities, aged between zero and 12 years (Morgenthaler et al., 2023). This review revealed that children want to experience diverse play experiences, expressing a desire for fun, challenging, and intense motor and sensory play opportunities. Children also wish to direct their own play and want opportunities to play alone along small and big groups. Furthermore, children want to feel secure and welcome in public playgrounds and feel that they belong in their community and the play space (Morgenthaler et al., 2023). The second review was a secondary analysis of a subset of research papers from the scoping review and established a taxonomy of playground features and their environmental characteristics that related to play affordances (Morgenthaler et al., 2024). While the preliminary taxonomy supported the underlying structure of the audit tool version 1, the final taxonomy supported terminology used in version 3.

The original 211 audit items generated from these reviews and the developed taxonomy and were initially clustered by the primary author into two domains, five subdomains, and 26 content areas (see Table 21). Domain 1 (supporting ecological setting) includes items that influence play value and usability on a more general level. These items indirectly support play value and usability, which potentially contribute to making a playground experience meaningful for children and include characteristics such as playground location, season and weather, playground maintenance, seating, amenities, and fencing. Domain 1 is represented by two subdomains: context for play and supporting features. Domain 2 (immediate physical environment that potentially affords play opportunities) includes items related to observable

physical and physical-social environmental characteristics of playground features that support a variety of play affordances. Domain 2 is represented in three subdomains: spaces for play, play equipment, and objects for play.

Table 21. *PVUA Tool Domain, Subdomains and Content Areas (Version 1)*

PVUA (Version 1)			
Domain	**Sub-domain**	**Content Area**	**Number of Items**
Domain 1: Supporting Ecological Setting	Context for play	Playground location in the community	7
		Aesthetics and maintenance of the playground	12
		Climate and weather	12
	Supporting features	Seating	12
		Fencing, boundaries, and entrances	11
		Amenities	3
Domain 2: Immediate Physical Environment Affording Play Opportunities	Spaces for play	Open space characteristics	5
		Path and walkway characteristics	11
		Topography (includes hills and slopes for play)	10
		Natural environments	10
		Enclosed and smaller spaces	8
		Sport fields	5
	Play equipment	Swinging	13
		Spinning	9
		Sliding	12
		Climbing	15
		Jumping on/off	4
		Balancing and crossing	9
		Rocking	5
		Zipline	4
		Recognizable play structures and objects	4
		Flow and arrangement of play equipment	3
	Objects for play	Manufactured play objects and tools	3
		Musical and visual play opportunities	4
		Provided loose materials for play	11
		Natural loose materials and objects	9

8.5.2 Expert Panel Consultation Phase

Recruiting an International and Interdisciplinary Expert Panel

To effectively assess the content validity of the PVUA domains, content areas, and items, a panel of experts was convened. All panellists were purposefully recruited to provide the necessary depth and diversity of experience and knowledge to comprehensively assess and help refine the audit tool (AERA et al., 2014; Keeney et al., 2011; Nasa et al., 2021). For this study, eligible experts needed to have professional experience related to playground design or evaluation in children's outdoor play; experience with children and families with and/or without disabilities; and sufficient time to participate. Experts were identified through the research team consortium or are known experts in the field such as published authors. Recruitment aimed to target a diverse sample of professionals, including play researchers, play advocates, and expert practitioners, such as those working with families and children.

Forty-two experts were invited via email and informed about the study through a leaflet and a pre-recorded video. Of the 34 experts who replied, ten experts declined participation because of the time commitment; however, 24 agreed to participate. Before starting the first round, two of experts retracted their participation. The final review panel was comprised of 22 experts.

8.5.3 Data Collection

In **round 1** of the expert panel consultation, both quantitative and qualitative data was collected via three mechanisms. First, demographic information was collected in a short survey. Second, to collect feedback on PVUA (version 1), experts could opt to either complete an online survey with open-ended questions or participate in semi-structured online interviews with the primary author. Twenty-one experts participated in semi-structured interviews, and one chose the survey. For the semi-structured interviews, a piloted interview guide was used that included guiding questions and brief presentations on the audit tool. Interviews were loosely structured and allowed experts to provide feedback related to their areas of expertise. Where the

content of audit items was unclear or missing, experts were prompted to suggest possible adjustments, such as rephrasing, or to elaborate on what they felt should change. Clarifications were made through discussions between the first author and the panellist. This approach supported a shared understanding of why items were generated while helping solicit more detailed insights from experts on new or revised content. Semi-structured interviews were carried out using Microsoft Teams video and audio functions; transcripts were automatically produced via Teams. Third, following the interview, each expert was asked to comment on the overall usefulness the PVUA tool (version 1) via a one-question survey using a four-point scale from very useful to not useful at all.

In **round 2,** all panellists were provided with the revised PVUA tool (version 2) and a summary of the changes. Seventeen experts evaluated content relevance and clarity of the revised PVUA (version 2) via an online survey. Both quantitative and qualitative (open-ended) data responses were collected. First, experts rated all content areas for both relevance and clarity using a three-point scale (Relevance: 1 = *very relevant*; 2 = *somewhat relevant*; 3 = *not relevant at all*; Clarity: 1 = yes, very easy to understand, 2 = *no, could be clearer*, 3 = *no, not clear at all*). Qualitative data was collected through open-ended questions prompting experts to suggest missing content, indicate redundant content, or suggest revisions to make content clearer. After rating all content areas, experts were asked to rate the overall usefulness of the revised audit tool (using the same question and response options as the first round).

Before disseminating the survey questions for both rounds, pilot cognitive interviews were conducted with nine individuals, including topic experts and non-experts, to ensure the questions were appropriate and clear.

8.5.4 Data Analysis

Quantitative data analysis was performed on the relevance and clarity ratings from round 2 as well as overall usefulness ratings from both rounds 1 and 2 with the goal of assessing the levels of agreement among all experts.

The level of agreement was quantified by percentage, following the recommendations of von der Gracht (2012). In this study, a sufficient level of agreement was set to a threshold of 70% or higher in relevance and clarity ratings (Diamond et al., 2014). In case of lower than 70% relevance and clarity ratings, the experts' suggestions from open-ended questions guided content revisions. Removal of single items or entire content areas occurred for low agreement ratings and when no improvements based on experts' suggestions was feasible.

In rounds 1 and 2, one question was administered to assess the stability in agreement regarding the overall usefulness of the audit tool, analysed using the Wilcoxon Signed-Rank test (von der Gracht, 2012). Stability was considered achieved when no statistically significant differences in overall usefulness ratings between rounds 1 and 2 were found, which supported the decision to conclude the consultation phase (von der Gracht, 2012). Data analysis was performed using the Statistical Package for the Social Sciences version 28 (IBM Corp, 2021). The significant level was set to 0.05 for all statistical tests.

Qualitative data analysis was conducted via directed content analysis (Hsieh & Shannon, 2005). This method was chosen because the aim was to further extend and clarify an already existing framework or theory, in this case, the revision of the PVUA tool (Hsieh & Shannon, 2005). Content analysis was conducted for each round separately and used the transcriptions of semi-structured interviews in round 1 and open-ended survey questions in round 2. Content analysis in both rounds started with reading the transcripts or the answers to open-ended questions, followed by extracting relevant information and open coding (Hsieh & Shannon, 2005). The codes were grouped according to experts' suggestions regarding the same content of the audit tool (e.g., all suggestions for one specific item or content area). The next step involved reading the grouped codes to identify levels of expert agreement and proposed suggestions for change. This information was used to rephrase items, content areas, and domains, make changes in the proposed audit scale and instructions, and delete or generate new items. Adjustments were made

based on suggestions from one or several experts. In the case of conflicting suggestions, the research team decided on the most suitable adjustment through discussions.

Some experts' suggestions did not refer to specific item content but noted how a global and interdisciplinary group of experts might interpret PVUA test content. These experts' suggestions were extracted from both rounds and clustered into three topic summaries as guidance for potential interpretation of test content and further development considerations of the PVUA tool.

8.6 Results

Based on the two expert panel rounds, the results of this study are twofold. Firstly, panellist feedback supported refinements in the test content of the PVUA. Secondly, the panellists provided valuable insights into how future users may potentially interpret the test content. The presentation of the results begins with a description of the expert panel, followed by an outline of the refinements made to the test content using both quantitative and qualitative data, and concludes with a summary of three key insights into the test content interpretation.

8.6.1 Expert Panel Description

The study involved 22 experts; their mean age was 56 years and 64% were female (see Table 22). More than half (59%) of the participating experts were from Europe, followed by North America (27%) and Australia (14%).

Panellists' expertise on the study topic ranged from eight to 37 years with a mean of 22.9 years. They gained their knowledge through research (*n* = 19), consultation (*n* = 16), and practice (*n* = 14). Research topics included playground provision, inclusive play, and child-friendly urban planning. Consultation involved working with equipment providers and policy stakeholders and promoting inclusive design solutions. Practical experience was gained by working with children, parents, and communities.

Experts reported on their expertise in instrument use and development. Three experts regularly use environmental instruments such as play-

sufficiency audits, risk-benefit audits, or playground-safety audits; six experts supported developments of environmental audits/assessments; four experts developed clinical assessments and had experience in test statistics; and two experts developed instruments eliciting user perspectives. Five experts had no expertise in instrument development/use.

Table 22. *Characteristics of Expert Panellists*

Panellist characteristics	N = 22 n (%)
Age	
Mean [SD]	55.6 [9.3]
Range min - max	38 - 74
Sex	
Female	14 (64)
Male	8 (36)
Country of Residence	
Australia and New Zealand	3 (14)
Europe	13 (59)
North America	6 (27)
Native Language	
English	15 (68)
German	2 (9)
Dutch	2 (9)
Swedish	1 (4)
Danish	1 (4)
French	1 (4)
Bilingual	10 (45)
Professional Background (Multiple Answers)	
Research and/or academia	16 (73)
Occupational therapy	6 (27)
Physical therapy	1 (5)
Landscape architecture or interior design	3 (14)
Playwork	3 (14)
Education	2 (9)
Independent play consulting	3 (14)
Nongovernmental organization work	1 (5)
Not specified (practitioner)	2 (9)
Years of Experience with Outdoor Play	
Mean [SD]	22.9 [8.1]
Range min - max	8 - 37

8.6.2 Refinements of PVUA Content in Rounds 1 and 2

In **round 1,** 22 experts evaluated the test content of PVUA (version 1)**.** Experts provided 396 suggestions, which, in turn, supported a revised item pool of 221 items divided into 30 content areas (see Table 23 PVUA version 2). Major adjustments included an adoption of descriptions for each content area. Experts argued that descriptions provide users with an understanding of the content area and directs them to the play value and usability characteristics within each content area. For example, the description for content area "climate, weather, and season adaptability" would read: "climate, weather, and seasons provide new play opportunities and are linked to environmental qualities that support an enjoyable playground visit (e. g., shade provision)." For "Management and Maintenance" the description would read: "considerations that cater to secure and playable environments that not only focus on safety management, but also create play opportunities through management activities (e.g., not cutting vegetation too extensively)." Furthermore, experts suggested renaming 13 content areas to better capture the item content (e.g., "spinning" was broadened to "turning, spinning, and rotation"). Four new content areas were formed: "character of the playground," "sensory space-related qualities," "signage (orientation and rules)," and "auditory play opportunities" either because experts proposed relocating items or suggested new items.

Most of the 44 new items proposed by experts were for "Domain 1: Supporting ecological setting" (*n* = 29) compared to "Domain 2: Immediate physical environment affording play opportunities" (*n* = 15). This led to the extensive development of Domain 1. A total of 34 items were deleted due to redundancy (*n* = 22) or merged with another item (*n* = 12). All items were minimally revised based on new instructional questions and response options proposed by the experts. Additionally, 40 items underwent rephrasing to clarify meaning. This was done when proposed items were questioned by experts, such as items related to colour: "I don't think colour contributes to play value" (inclusive play researcher) or items related to walkability to the playground location: "…depends on who is walking" (landscape architect).

Table 23. *Version History of PVUA Domains, Sub-Domains, Content Areas, and Number of Items*

	PVUA (Version 2)		
	Subdomain	**Content area**	**Items**
Domain 1: **Supporting ecological setting**	Contextual features of playground	Character of the playground+	8
		Playground location in the community	9
		Management and maintenance*	5
		Sensory space-related qualities+	9
		Climate/weather and season adaptability*	10
	Physical supporting features of the playground	Signage (orientation and rules) +	9
		Seating (formal and informal) *	9
		Fencing, boundaries, and entrances	11
		Amenities (toilets, water fountains) *	3
Domain 2.	Spaces for play	Open space characteristics	4
		Path and walkway characteristics	8

PVUA (Version 3)		
Subdomain	**Content area**	**Items**
Contextual supporting considerations of the playground	Development and character of the playground*	7
	Playground location*	10
	Management and maintenance	7
	Sensory space-related qualities	4
	Climate, weather, and season adaptability	10
Physical supporting features of the playground	Signage (orientation and rules)	9
	Seating (formal and informal)	6
	Fencing, boundaries, and entrances	11
	Amenities (toilets, water fountains)	3
Play opportunities by space	Open space characteristics for play*	3
	Path and walkway characteristics for play*	8

		Topography (includes hills, slopes, and depressions for play)	9
		Natural environment	10
		Enclosed and smaller spaces	9
		Designated sport areas*	5
	Play opportunities provided by play equipment	Swinging	12
		Turning, spinning, and rotating*	9
		Sliding	10
		Climbing (and hanging) *	15
		Jumping on/off	4
		Balancing and crossing	7
		Rocking	5
		Cable ways*	4
		Recognizable and less recognizable play structures and fixed objects*	3
		Flow and arrangement of play opportunities	6
	Loose parts and objects for play	Manufactured loose parts and tools*	3
		Visual play opportunities*	2
		Auditory play opportunities+	6
		Loose materials provided for play*	9

	Topographic features for play (includes hills, slopes, and depressions)*	5
	Natural features for play*	10
	Enclosed and bounded spaces for play*	8
	Designated sport areas	5
Play opportunities by play equipment	Swinging	12
	Turning, spinning, and rotating	9
	Sliding	10
	Climbing (and hanging)	14
	Jumping on/off	4
	Balancing and crossing	7
	Rocking	5
	Cable ways	6
	Themed and suggestive play features	2
	DELETED	
Play opportunities by loose parts and materials	Manufactured loose parts, tools, toys, and ride-on play opportunities*	4
	DELETED	
	Auditory play opportunities	6
	Malleable materials provided for play*	10

		Natural loose materials and parts*	8			Loose natural parts and wildlife*	8

Notes: **+** indicates new content area formed in round 1 and 2. ***** indicates name adjustment of content area in round 1 and 2.

In **round 2,** 17 experts provided relevance and clarity ratings. Overall, experts found content areas relevant to include (*very relevant* and *somewhat relevant*) while rarely suggesting excluding content (*not relevant*) (see Table 24). Similarly, most experts found the content *very clear* or *somewhat clear.* Very seldom did experts rate content areas as *not* clear at all. When comparing relevance or clarity, agreement ratings consistently surpassed disagreement ratings across all content areas, indicating a convincing agreement among experts.

Out of 316 proposed experts' suggestions from open-ended questions, 196 were used, resulting in 158 content adjustments and a final of 203 items divided into 28 content areas in version 3 of PVUA (see Table 23 Version 3). Adjustments aimed to enhance the clarity of 36 items, condense six items, provide more details to 11 items, and make minor adjustments to 40 items while preserving the original meaning. Suggestions from experts were omitted when they were too general, failed to provide enough detail for refinement, or conflicted with suggestions from other experts.

Ten out of 30 proposed content areas fell below the 70% cutoff agreement threshold (see Table 24). Two content areas were deleted due to very low relevancy and clarity ratings: "flow and arrangement of play opportunities" (relevancy: 52.9%, clarity: 47.1%) and "visual play opportunities" (relevancy: 47.1%, clarity: 52.9%). Both were said by several experts to be redundant and difficult to audit. The other seven content areas with low agreement ratings were adjusted based on experts' suggestions, or other explanations of low ratings were found. For example, "open space characteristics for play" (relevance: 52.9%, clarity: 41.2%) received low ratings because experts prioritized varied topography (relevance: 82.3%, clarity 76.4%) as more important for play than open spaces. Four experts were unsure if open space characteristics such as "mostly flat" should be considered a "good thing or a bad thing" (play researcher), were perceived as "a bit boring*"* (landscape architect), or emphasised that "hills and inclinations are important features for play" (occupational therapist, play equipment provider). Similarly, "recognizable and less recognizable play structures and fixed objects"

(relevance: 52.9%, clarity: 70.5%) received low relevance ratings. This was critiqued by experts as something that "takes away the imagination" (occupational therapist), "should not just be decoration" (inclusive play advocate), or "tries to teach children things" (landscape architect). This suggested that items should be removed; however, these items were kept in because experts pointed out they might still be relevant for some children. One expert expressed: "[for] quite a few children with intellectual disabilities, it is good if there are very recognizable elements in a playground. …That helps them get into the game" (inclusive play advocate). Similar, the content area of "fencing, boundaries, and entrances" (relevance: 64.7%, clarity 64.7%) fell below the 70% threshold, and experts emphasised that, for some user groups, enclosures were more relevant than for others (e.g., children who tend to run away; families with several children with different abilities/ages). For the fencing and boundaries items, experts asked to consider whether fencing is suitable for a playground based on its location.

8.6.3 Overall Usefulness Rating: Rounds 1 and 2

In both rounds, one question was administered to examine the overall usefulness of the PVUA content. In round 1, 20 of 22 experts rated the overall usefulness with a median of 2 (somewhat useful) ranging from 1 (very useful) to 4 (not useful at all) (for descriptive statistics see Appendix 10). In round 2, 16 of 17 experts provided a rating of the overall usefulness with a median of 1 (very useful) ranging from 1 (very useful) to 3 (a little bit useful). The Wilcoxon signed rank test was used to evaluate the stability of responses; no statistical significance was found in the difference of the overall usefulness ratings from round 1 to 2 ($z = 1.134$, N-Ties = 7, $p = 0.257$). A non-statistically significant difference indicated a stable response and a justification for stopping with the second round.

Table 24. *Frequency and Percentage of Relevance and Clarity of Content Areas: Round 2 (N =17)*

	Content Areas Version 2	Relevance Ratings				Clarity Ratings			
		Very relevant	Somewhat relevant	Not relevant	Missing	Very clear	Could be clearer	Not clear	Missing
Domain 1: Supporting ecological setting	**Subdomain: Contextual: Supporting Considerations of the Playground**								
	Character of the playground	11 (64.7)	5 (29.4)	1 (5.9)	0	10 (58.8)	6 (35.3)	0	1 (5.9)
	Playground location in the community	13 (76.5)	4 (23.5)	0	0	11 (64.7)	5 (29.4)	0	1 (5.9)
	Management and maintenance	15 (88.2)	2 (11.8)	0	0	11 (64.7)	6 (35.3)	0	0
	Sensory space-related qualities	12 (70.6)	4 (23.5)	1 (5.9)	0	11 (64.7)	5 (29.4)	0	1 (5.9)
	Climate, weather, and season adaptability	13 (76.5)	2 (11.8)	1 (5.9)	1 (5.9)	8 (47.1)	8 (47.1)	0	1 (5.8)
	Subdomain: Physical: Supporting Features of the Playground								
	Signage (orientation and rules)	12 (70.6)	3 (17.6)	2 (11.8)	0	12 (70.6)	4 (23.5)	0	1 (5.9)
	Seating (formal and informal seating)	13 (76.5)	3 (17.6)	1 (5.9)	0	11 (64.7)	5 (29.4)	0	1 (5.9)
	Fencing, boundaries, and entrances	11 (64.7)	6 (35.3)	0	0	11 (64.7)	4 (23.5)	1 (5.9)	1 (5.9)
	Amenities (toilets, water fountains)	13 (76.5)	3 (17.6)	1 (5.9)	0	12 (70.6)	3 (17.6)	0	2 (11.8)
Domain 2: **Immediate physical**	**Subdomain: Play Opportunities by Spaces**								
	Open space characteristics for play	9 (52.9)	5 (29.4)	2 (11.8)	1 (5.9)	7 (41.2)	7 (41.2)	0	3 (17.6)
	Path and walkway characteristics for play	11 (64.7)	3 (17.6)	2 (11.8)	1 (5.9)	12 (70.6)	3 (17.6)	0	2 (11.8)
	Topography for play (includes hills, slopes, and depressions for play)	14 (82.3)	1 (5.9)	1 (5.9)	1 (5.9)	13 (76.4)	2 (11.8)	0	2 (11.8)
	Natural environment for play	15 (88.2)	1 (5.9)	0	1 (5.9)	8 (47.1)	7 (41.2)	0	2 (11.7)
	Enclosed and smaller spaces for play	13 (76.5)	2 (11.8)	1 (5.9)	1 (5.9)	11 (64.7)	4 (23.5)	0	2 (11.8)

	Designated sport areas	13 (76.4)	2 (11.8)	1 (5.9)	1 (5.9)	12 (70.6)	3 (17.6)	0	2 (11.8)
	Subdomain: Play Opportunities by Play Equipment								
	Swinging opportunities	11 (64.7)	4 (23.5)	0	2 (11.8)	12 (70.6)	3 (17.6)	0	2 (11.8)
	Turning, spinning, and rotating opportunities	12 (70.6)	3 (17.6)	1 (5.9)	1 (5.9)	13 (76.4)	2 (11.8)	0	2 (11.8)
	Sliding opportunities	11 (64.7)	4 (23.5)	1 (5.9)	1 (5.9)	14 (82.3)	1 (5.9)	0	2 (11.8)
	Climbing (and hanging on) opportunities	13 (76.4)	2 (11.8)	1 (5.9)	1 (5.9)	14 (82.3)	1 (5.9)	0	2 (11.8)
	Jumping on/off opportunities	12 (70.6)	3 (17.6)	1 (5.9)	1 (5.9)	15 (88.2)	0	0	2 (11.8)
	Balancing and crossing opportunities	13 (76.4)	2 (11.8)	1 (5.9)	1 (5.9)	14 (82.3)	1 (5.9)	0	2 (11.8)
	Rocking opportunities	12 (70.6)	3 (17.6)	1 (5.9)	1 (5.9)	14 (82.3)	1 (5.9)	0	2 (11.8)
	Cable ways opportunities	10 (58.8)	5 (29.4)	1 (5.9)	1 (5.9)	11 (64.7)	3 (17.6)	1 (5.9)	2 (11.8)
	Recognizable and less recognizable play structures and fixed objects	9 (52.9)	5 (29.4)	2 (11.8)	1 (5.9)	12 (70.5)	2 (11.8)	1 (5.9)	2 (11.8)
	Flow and arrangement of play opportunities	9 (52.9)	6 (35.3)	1 (5.9)	1 (5.9)	8 (47.1)	6 (35.3)	1 (5.9)	2 (11.8)
	Subdomain: Play Opportunities by Loose Parts and Materials								
	Manufactured loose parts and tools	12 (70.6)	3 (17.6)	1 (5.9)	1 (5.9)	12 (70.6)	3 (17.6)	0	2 (11.8)
	Visual play opportunities	8 (47.1)	6 (35.5)	2 (11.8)	1 (5.9)	9 (52.9)	6 (35.3)	0	2 (11.8)
	Auditory play opportunities	13 (76.4)	1 (5.9)	2 (11.8)	1 (5.9)	12 (70.6)	3 (17.6)	0	2 (11.8)
	Loose materials provided for play	15 (88.2)	0	1 (5.9)	1 (5.9)	10 (58.8)	5 (29.4)	0	2 (11.8)
	Natural loose parts and wildlife	14 (82.3)	1 (5.9)	1 (5.9)	1 (5.9)	12 (70.6)	3 (17.6)	0	2 (11.8)

8.6.4 Experts' Insights into Test Content Interpretation

This study compiled insights from an international, interdisciplinary expert panel. These insights revealed varying perspectives among experts but enhanced potential interpretation of the test content. Below, we summarise three key insights gathered from both rounds.

Country-Specific Policies and Playground Standards Influence Play Value Perspectives

The international expert panel's recommendations were based on country-specific contexts, which differed for each expert. Experts noted that potential users of the PVUA will also have specific frames of reference, such as country-specific common practice of playground provision or country-specific policies and playground standards guiding playground provision. For example, experts from the Netherlands, Sweden, Germany, and Switzerland indicated that provision of nature, natural loose parts, and malleable materials for play is common practice in their countries and relevant for play value. However, in the USA and Australia, similar provisions would be considered potential tripping hazards, prone to accidental ingestion by children, or sources of disease:

> *"In the United States … loose parts are not permitted on playgrounds due to safety concerns. Sand, water, and mud play are also not permitted on playgrounds due to their potential for various health hazards for example hand, foot, and mouth disease; animal faces" (inclusive playground researcher)*

Similarly, experts from the USA and UK noted that smaller, house-like spaces might be prohibited for safety reasons. Such restrictions based on country or city policies were described as grounded in the rationale that children might get trapped when facing potential bullies/predators, or that those spaces are misused by drug users or homeless persons. Users of the

PVUA need to be aware of country-specific frames of references that may influence how they will score items.

Geographic Location Influences Playground Provision

Experts also elaborated on geography-specific content related to climate, weather, and season. Depending on an expert's geographic location, the relevance of provisions to protect against weather conditions such as rain and wind or sun and shade differed substantially. For instance, while some experts emphasised the importance of shade in all playgrounds, others argued that provisions should be appropriate for local weather conditions:

> *"… dominant winds coming from the northeast, then you want a shelter with the back on it first in northeast, it's all of those kinds of things that you know nobody seems to care about." (independent play consultant)*

Similar to weather and climate, light conditions based on time of day and season were noted as dependent on geographic location. Experts noted adequate lighting as important in locations with long winters, as it affects children's outdoor playtime and the usability of playgrounds as meeting places for older children. Other experts argued lightning "leads to an artificial environment" (play researcher) and is unnecessary because children use playgrounds during daytime. Therefore, the relative importance of content regarding weather, climate, and season-related items may vary by location.

Usable for Some, but Not for All

The panel emphasised the need for playgrounds to cater to users of all ages, abilities, and genders, including families as well as children visiting the playground independently. Experts recognised the challenge of accommodating diverse users with varying needs but acknowledged that not all features need to be provided in all playgrounds. For instance, restrooms are significant for families, children with disabilities, pregnant or breastfeeding

women, younger children, and teenage girls, which were described as a substantial portion of potential playground users. Accessible, clean restrooms with adult-sized changing tables would accommodate these users. Similarly, seven experts highlighted fences, enclosures, and lockable gates as beneficial for families with young children or children who tend to wander off:

> *"If there is no fence around the playground, these caregivers cannot sit quietly for a moment. They must watch constantly. The children do not get to play, and the caregivers do not get to rest." (inclusive play advocate)*

Restrooms or fencing were described by some experts as non-essential features of playgrounds. For example, a playground located in a neighbourhood close to where users live might not need restrooms. Similarly, experts were concerned about the overuse of fences due to societal fears of children running away or getting bitten by dogs. Experts understood that fencing is useful for some users and that examining playground provisions from a neighbourhood perspective might be more appropriate:

> *"…it comes back to a sort of neighbourhood perspective that you don't want to then say okay ...every playground in a neighbourhood has to be bounded ...there should be some spaces within a neighbourhood that provide that level of enclosure."* (independent play consultant)

Other features might be useful for some users, including sufficient and diverse seating, playground location within a community, or how playgrounds are accessed (walking, biking, or driving). In using this audit tool, it is crucial to interpret the results in relation to the needs of the specific community where the playground is located. Additionally, while the unit of analysis of the PVUA is a single playground, all playgrounds in one community can be evaluated, as different playgrounds can serve different users.

8.7 Discussion

The objective of this study was to first develop and second to explore the preliminary evidence of validity in relation to test content of the PVUA tool using quantitative and qualitative expert judgement of appropriateness, relevance, and comprehensiveness of the test content. The main results include the preliminary content validity evidence of the PVUA (version 3) item pool of 203 items, spread over 28 content areas, five sub-domains, and two domains attempting to capture environmental qualities describing play value and usability of playgrounds.

Through a two-rounds iterative process of feedback and revisions experts evaluated PVUA content validity. The strength of this study lies in using quantitative and qualitative data to refine content, including adding missing content, rephrasing existing content, aligning instructions, and scoring text. Standards for test development described evaluating content validity of new instruments as an invaluable first step, supporting the interpretation of test scores for their intended use (AERA et al., 2014). Almanasreh et al. (2019) note that content-based validity is frequently not documented, potentially compromising the quality of instruments and their use. Taylor et al. (2023) commented on this lack of validity evidence in the development of existing playground audit tools. While our study provided preliminary evidence on content validity, future research on the PVUA needs to examine other facets of validity, including response processes, internal structure, relation to other variables, and testing of consequences (AERA et al., 2014).

Evaluating the content of a new tool is a delicate process of balancing diverse expert perspectives while maintaining the tool's intended purpose (Schulze et al., 2013). A panel of 22 international experts from various professions participated in our study, and agreement on audit adjustments was rarely unanimous. Two possible reasons explain this divergence. First, experts from different disciplines prioritized different topics. For example, those specialized in inclusive play tended to prioritize accessibility and usability; those with expertise in child-friendly city planning emphasised access to playgrounds; and those with landscaping or horticulture expertise prioritized

nature and biodiversity. Second, experts considered context-specific knowledge from the perspective of their own countries, including common playground practices (e.g., critique of contemporary or endorsement of naturalized playgrounds), playground standards (e.g., policies for accessible playgrounds or safety regulations), or social discourses on outdoor play and playgrounds (e.g., children running away). Both reasons explain, in part, why experts did not always agree on the relevance of individual items. Other research on the topic of playgrounds reinforces the fact that finding common ground among a diverse panel of experts is difficult (Lynch et al., 2020; Sterman et al., 2019) but valuable to achieve, potentially enhancing playground provision for diverse users (Karaba Bäckström et al., 2024). For example, Wenger et al.'s (2023) study on inclusive playground provision revealed that experts emphasised necessity of drawing insights from diverse disciplines, recognizing the value of knowledge of a consortium of different disciplines. Playgrounds and outdoor play represent an interdisciplinary topic in practice and research (Martin et al., 2023); thus, tools like this one serve as valuable starting points for cross-disciplinary collaboration.

Gathering validity evidence based on test content supports the interpretation of test scores, and subsequently guides how a tool will be utilised (AERA et al., 2014; Sireci, 2016). Experts expressed concerns about potential misinterpretations, such as how a playground's size might influence scores, with smaller playgrounds potentially scoring lower than larger ones. While play value and size appears to be a problem identified before by Woolley and Lowe (2013), the experts in this study provided insights on why careful interpretation is necessary. Experts suggested that if smaller playgrounds scored poorly, they may be replaced with fewer, larger playgrounds. This would be an undesirable outcome of using the PVUA tool. Such trends could be explained by the lower maintenance costs and time associated with fewer but larger playgrounds and the need for municipalities to optimize fund allocation (Randrup et al., 2021; Schneider & Jansson, 2023). Smaller playgrounds may be valued for different aspects beyond just variety of play affordances. Factors such as easy access due to proximity to residential areas, less crowding, and

less sensory overstimulation are all values expressed by parents in previous research (Refshauge et al., 2012; Sterman et al., 2019). These aspects are considered in the PVUA items that capture more ecological factors. Future validity testing of the PVUA tool should consider test interpretations related to ecological factors that might moderate a playground's play value.

While the PVUA evaluates potential play value and usability based on a visual inspection of characteristics in the physical environment, it lacks the subjective and experiential components of the play value construct. Supplemental to PVUA, qualitative approaches such as interviewing children about their play preferences or systematic play observations of children might be useful for capturing the more experiential aspects of play value. Zallio and Clarkson (2021) recommend such holistic, mixed approaches to evaluate the physical environment with audits and subjective measures of user experience. Using additional subjective measures provides a better understanding of actualized play affordances and high-quality play experiences of the playground, whether they meet children's play preferences, and whether environmental qualities are usable for a particular user group. Previous case studies have used mixed methods in their evaluation of playgrounds (Lynch et al., 2018; Refshauge et al., 2015); however, no validated audit tools were used in these studies. Therefore, future research should utilise a set of validated tools that support evaluation of play value and usability of public playgrounds.

8.7.1 Limitations

This study had some limitations based on the complexity of developing a new instrument and exploring content validity. First, no experts from geographical locations of Africa, South America, and Asia participated in the panel, regardless of the efforts to recruit from those regions. Second, most experts indicated their expertise from play research, with a limited number of experts with practical experience. Future research should focus on including practitioner perspectives on the audit tool to gain a better insight into its practicability. Third, ratings of relevance and clarity (round 2) were given to content areas but not individual items. This led to leaving out calculations such as the Content Validity Index for individual items, which would provide more

nuanced agreement ratings (e.g., Almanasreh et al., 2019). Rating the large number of individual items was considered too time-consuming for participants. Instead, the use of additional open-ended questions allowed experts to suggest adjustments for specific items. Finally, a third round of expert was dismissed. Despite high agreement within the second expert review, a third round could have solidified adjustments and resolved ambiguities.

8.7.2 Conclusions

This study evaluated preliminary content validity based on the test content of the PVUA tool, a new audit tool designed to measure both the potential play value and usability of playgrounds. The content validity was developed from evidence literature and the preliminary content validity was further explored through an iterative consultation with an expert panel. To our knowledge, this is the first audit that integrates both aspects of play value and usability in one tool. However, this tool is still in its preliminary stage and requires further validation and refinement. Future studies should utilise the PVUA with a larger and diverse sample of playgrounds and examine its reliability and construct validity.

8.8 Acknowledgement

We want to thank all the experts who provided valuable feedback: Anita Bundy, Ann Kennedy-Behr, Ben Tawil, Carlo Fabian, Eric Schmidt, Harry Harbottle, Heather Kuhaneck, Ilse van der Put, Ingrid M. Kanics, Jenene Burke, Jeanette Fich Jespersen, Joanne Coughlan, Julia Sterman, Justin Wilson, Manon Bloemen, Märit Jansson, Peter Höfflin, Ted Brown, Theresa Casey, Tim Gill, Tina Stanton-Chapman and as well as other experts who wished to be anonymous. Furthermore, we would like to thank the project partner Stichting voor het Gehandicapte Kind in the Netherlands, Elena Malcov, Sophie Ulbrich-Ford, Rianne Jansens, Karin Morgenthaler, Ulrike Muggi, Lena Sauerzopf, Maggie Ruth Morton, Beate Domänig, Allison Mula, and second-year students UCC fall 2022 for supporting this work.

8.9 Data Availability Statement

The data supporting this study's findings are openly available in Zenodo at https://doi.org/10.5281/zenodo.13861628.

8.10 Funding

This research was funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 861257.

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CHAPTER NINE — SYNTHESIS OF FINDINGS

"The physical environment is more than background. It shifts and changes, and its many forms provide constraints, challenges, and opportunities for participants"
(Werner et al., 2002, p. 204).

9.1 Introduction to Chapter Nine

Chapter Nine aims to synthesise the knowledge gained, presented separately in Chapters Five, Six, and Eight (Studies 1, 2, and 3, Paper I, II, III). This chapter presents a synthesis of findings from the individual studies and compares them to other research. The synthesised findings are presented as environmental characteristics clustered under three environmental dimensions: the physical, social, and atmospheric environment (see Figure 10). This synthesis provides, on the one hand, an answer to the first research question posed in Chapter One (What environmental characteristics contribute to successful outdoor play on public playgrounds?) and, on the other hand, a rationale for the content that was included in the development of the preliminary Playground Play Value and Usability Audit tool (see Appendix 22).

Figure 10. *Transactional Processes of the Physical, Social and Atmospheric Environment*



Theoretically a transactional perspective (Altman & Rogoff, 1987; Werner et al., 2002) supports this synthesis. Researching from a transactional perspective strengthens capacity to examine co-influencing entities, and for this thesis, these include aspects from three environmental dimensions (see Figure 10). The physical environment is the most central environment explored in this thesis and is represented as the most prominent circle in Figure 10. The social environment is nested within the physical, and the atmospheric environment is embedded within the physical and social environment. Over time in a transactional process, these three environmental dimensions either support or hinder play. Under each environmental dimension, clusters of characteristics are placed as informed by the new expanded insights from Studies 1, 2, and 3 (Paper I, II, III). However, even when each cluster is placed in one of their environmental dimensions from a transactional perspective, these clusters commonly relate to other environmental dimensions and cannot be understood in isolation. These relationships become more apparent when individually examining each identified cluster of environmental characteristics and their relationships, as shown below.

9.2 Physical Environment

The central topic of this thesis is the physical environment, including the built and natural environment. The physical environment represents the most extensive circle in Figure 10, providing an anchor for the social and atmospheric dimensions. This highlights the importance of the physical environment as an influencing agent contributing to and shaping children's outdoor play. At the same time, the physical space, objects, and materials are affected by the social and atmospheric dimensions. The following six environmental characteristics are chosen to explain the combined insights gained from all: accessibility and usability, variety of play choices, sociability, location of the playground, safety characteristics, sensory-space characteristics and climate, weather and season characteristics (see Figure 10). While presenting these six environmental characteristics under the

physical environment, their relationship with social and atmospheric characteristics is also portrayed.

9.2.1 Characteristics of the Physical Environment

The **accessibility and usability** of a playground are environmental characteristics of particular relevance for playground user groups with diverse abilities (Brown et al., 2021; Moore et al., 2020; Moore & Lynch, 2015; Stanton-Chapman & Schmidt, 2019). To recap in Chapter One, accessibility and usability were defined as separate concepts. While accessibility was understood as getting to the playground or play equipment, usability was defined as prioritised play and what children want to do on the playground. As has been noted for this thesis a focus is therefore given mainly to usability characteristics as those are identified to be closer to play and the play value construct. Focusing on usability is needed and allows for a more distinct consideration of environmental characteristics relevant for children with diverse abilities.

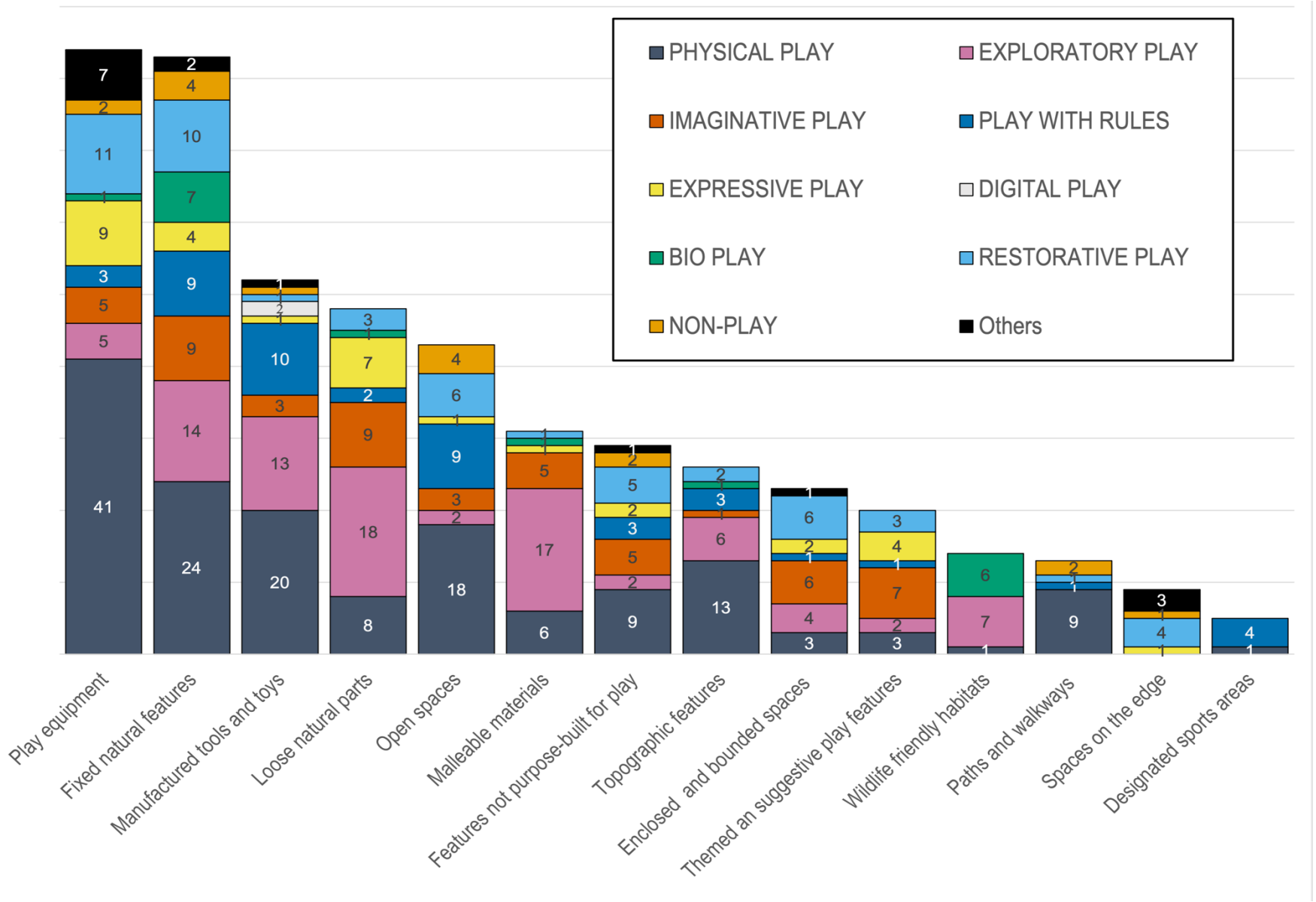
Both Studies 1 and 3 (Paper I, Paper III) provided relevant details about environmental characteristics in relation to these two concepts. Some accessibility characteristics suggested by the experts (Study 3, Paper III) included accessible bikes and car parks, considerations of colour contrast, for example, in signage or accessible wayfinding and signalling dangerous situations. Furthermore, in Study 3 (Paper III), experts suggested extending usability aspects throughout the playground audit tool's item content. For example, opportunities to; use play equipment with mobility devices, withdraw and retreat, choose routes to elevated opportunities, spend time in shade and sun, usable natural spaces and natural loose parts affording touch, see, taste, and smell and opportunities that suggest play ideas to children, were just some recommendations from experts. Additionally, some usability suggestions included supporting features such as available and accessible amenities like toilets, drinking fountains, signage, fencing, boundaries, and seating opportunities. All these aspects extended the operationalisation of usability in the tool, highlighting their relevance in evaluating usability of playgrounds.

Study 1 (Paper I), which was about children's perspectives, highlighted the notion that children with disabilities felt more welcome on playgrounds which considered usability and accessibility characteristics. Children emphasised that inaccessibility and an unusable environment led to reliance on others, such as parents, and hindered self-directed play. These findings pointed to the relationship between the relevance of usability and accessibility with a welcoming atmosphere.

In general, these usability characteristics often reflect equitability in provision in the physical environment, that is closely related to making the playground more usable for the diversity of users. This includes providing them with choices for playing and being on a playground.

The cluster **variety for play choices** foregrounds a physical environment that supports a wide range of diverse, multiple, and potential play affordances. By synthesising the evidence on children's usage of playground physical environments, the main finding of Study 2 (Paper II) formed the *Environmental Taxonomy of Outdoor Space Features,* consisting of 14 identified features for play, their functional qualities and how they relate to these diverse, multiple and potential play affordances. Guided by the theoretical perspective of affordances Study 2 (Paper II) revealed that children transacted with the space, the objects, and materials of a playground depending on their functional qualities and how those qualities work in combination. Subsequently, these findings suggest that a greater diversity of different play types and play is afforded when playgrounds consider various diverse environmental features and their environmental functional qualities. Figure 11 is a graphical representation of the main evidence table in Study 2 (Paper II) (See Appendix 19; Figure 11 was not part of the published paper). Figure 11 provides an overview of available evidence connecting the formed environmental categories from the ETOP to the nine play types from the Tool for Observing Play Outdoors (TOPO)–Collapsed Version) from Loebach and Cox (2020).

Figure 11. *Relationship Between Environmental Categories and TOPO Play Types Ordered by Most to Least Available Evidence*



Note. Total number of papers included N = 45. The numbers in the bar charts indicate the number of papers supporting at least one relationship between play type and environmental category. For example, 41 papers supported physical play is afforded by the play equipment category.

Figure 11 depicts the number of identified studies which support the type of play by environmental categories, showing that certain environmental categories support a high or lower degree of certain types of play. For example, exploratory play is amplified in environments that contain loose natural parts, malleable materials and fixed natural features. Another example is restorative play is amplified in environments that have features like play equipment, fixed natural features, enclosed and bounded spaces and open spaces. Therefore, playgrounds that include various environmental features potentially support diverse play affordances to choose from. While previous research has confirmed that certain types of playgrounds like naturalised, manufactured or hybrid, support certain types of play (Brussoni et al., 2017; Cetken-Aktas & Sevimli-Celik, 2023; Dankiw et al., 2023; Dyment & O'Connell, 2013; Kuh et al., 2013; Luchs & Fikus, 2013; Squires et al., 2024; Zamani, 2016) or certain playground features and their characteristics support certain play such as the steepness in topography as noted by Loebach and Cox (2022), or the type of surface as documented by Storli et al. (2024); no other research has considered these relationships between environmental features, qualities and diversity of play affordances in this depth.

Additionally, the cluster of variety of play choices includes a subjective component as it depends on whether the options provided on a playground meet the user's play preferences. Findings from Study 1 (Paper I), which focused on the experiences of children with and without disabilities, demonstrated these play preferences included opportunities ranging from simple to complex play, supporting physical challenges and intensive motor and sensory play (such being fast or high, going intentionally slow, or touching different textures), to be with or close to other children, or to be alone. Other characteristics included a flexible environment allowing children to make their own choices, direct their play, and exploit any play opportunities afforded. These identified characteristics are important to children and can be corroborated by other research. For example, Wenger, Lynch et al. (2024) discovered opportunities for creating and shaping the environment as well as integrating loose parts or natural elements like leaves, sticks, and stones into

children's play were crucial aspects. They also found that incorporating built elements of the playground into self-invented games, constructing their own spaces like dens or hiding places, and using their imagination during play were equally important (Wenger, Lynch et al., 2024). Notably, while Study 1 (Paper I) provided an overview of various relevant characteristics concerning children's play preferences, it was not meant to identify all play preferences as this is impossible. However, Study 1 (Paper I) did provide a synthesised and informed foundation about what children seek and prefer to play and the supporting relation to the physical environment, which can further guide playground provision and design.

The **sociability of a playground** can be thought of as different physical characteristics that support social interaction, such as being close to other children and playing alongside or with other children in various sizes of groups. Children value getting away from adults and other children and opportunities to be alone, as identified in studies 1 and 2 (Paper I, Paper II). A valuable differentiation is that playing with other children does not always mean playing together actively (direct social interaction); sometimes, it is about being close to other children or being in social proximity. This differentiation is crucial as the current discourse on inclusive play opportunities on playgrounds tries to convey the message that playing together only happens when children with and without disabilities actively interact as noted by Weber et al. (2023) and Yang et al. (2023). However, Burke and Stafford (2023) suggested it is more about being engaged in a social setting on the playground finding that children with disabilities actively sought spaces to be alone and rest away from adults and other children next to seeking social opportunities. In other words, sociability characteristics of the physical space should be thought of as a variety of sociable play choices, affording children choices to either be alone, be actively engaged and interact with other children, or just be close to other children. Variety of sociable play choices also provides a link to variety of play choices (see cluster above).

Studies 1 and 2 (Paper I, Paper II) provided an understanding of physical environment characteristics that support diverse sociability, including the size of spaces for bigger and smaller groups to gather, more or less enclosed, or room-like, spaces, placement and arrangement of built and natural fixed features, such as circular arranged seating, swinging next to each other. Multi-user play equipment or play opportunities that need more than one child to be operated like flowing water features, big and heavy loose parts for carrying, also promotes sociability. The number of the same or similar objects provided can also encourage sociability. For example, one soccer ball may be used in a group, one small animal can attract the attention of several children, one especially long icicle may be valued for its unique shape in socio-dramatic play scenarios, or several similar sticks can be used to play sword fighting or den building in a group. Therefore, identifying these sociable characteristics in the physical environment is relevant for creating environments that offer diverse choices for play that foster playing with or alongside of other children. Such insights allow the design to go beyond active social interaction solely.

The **location of the playground** concerns not only where a playground is situated but also how people might access it and the infrastructure that connects it with other community spaces. Previous research has referred to such environmental characteristics as ‘access to the playground’ (Chatterjee, 2023; Gemmell et al., 2023; Jansson et al., 2022). Experts in Study 3 (Paper III) noted the importance of a playground’s location concerning how easy it is to get to the playground independently or with caregivers and how embedded it is with other spaces relevant for users, such as schools and other public spaces like libraries or parks or commercial opportunities such as shops or cafeterias. Location also relates to how users might access this playground, meaning how connected the space is to walkable and bikeable route options. Study 1 (Paper I) showed that such characteristics are relevant, as children visit playgrounds more often when located near where children live, where friends live, or where their school is in relation to the playground.

Safety characteristics identified in this study are linked to the physical and social environment, which positively or negatively influence the perception of security (see also atmospheric environment). Safety characteristics have also been identified in existing research (Gemmell et al., 2023; Jansson et al., 2022; Visser & van Aalst, 2022). Visser and van Aalst (2022) noted aspects of traffic safety under the physical environment and social safety under the social environment, including the perception of crime and stranger danger, bullying, drug dealing, and older children. Jansson's et al. (2022) review of studies on child-friendly cities found several safety characteristics from the physical environment, including safe materials, environmental cleanliness, traffic safety and others, and the social environment, like adults' attitudes about danger. Findings from Studies 1 and 3 (Paper I, Paper III) supported this cluster of characteristics. For children (Study 1, Paper I), positive influences on the perception of security were knowing the users of the space, knowing the space itself, and having supportive adults around. Negative influences were bullying, gang activity, the degree of litter, hazardous litter, broken or damaged play opportunities, and too much graffiti. Environmental characteristics of the physical environment included boundaries and fencing, gates, or lighting conditions. In Study 3 (Paper III), boundaries and fencing were pointed out to protect against dangerous situations such as traffic and deep or flowing water. Some experts in this study noted the need to look at playground users, emphasising that for some users, a degree of bounded spaces is especially relevant (for example, younger children, children who tend to run away, and families with children of different ages and abilities). Not every expert had the same opinion on the topic of fencing. Some noted that fencing is generally overused, while others described that boundaries make the parents feel that their child is safe, allowing parents to rest and the child to play more freely. Regarding gates, experts emphasised the importance of a self-closing mechanism and the availability of multiple gates to allow escape in potentially dangerous situations. Adequate lighting was pointed out as an aspect that contributes to safety, but it depends on the time of the day and season the playgrounds are used, and sometimes it is about the adequate lighting of the

paths to the playground. However, these aspects regarding fencing and lightning do not always make a playground safer. For example, some children in Study 1 (Paper I) found that too much fencing could give them a feeling of being caged and hinder the freedom to access adjacent spaces relevant to play (for example if natural features are not accessible because they are located outside of the fenced playground). Similarly, experts in Study 3 (Paper III) explained that electronic light could provide an artificial feeling and was not adequate in a natural space, indicating the relevance of lightning type, when lightning is necessary such as time of the year and day when less natural sunlight is available.

The **sensory-space characteristics** include the sounds, smells, tastes, visual representation, and textures in the space that make a playground appealing or unpleasant to play in. Some sensory-space characteristics were already mentioned in the safety characteristics considered above, indicating a relationship between the two clusters. Findings from studies 1 and 3 (Paper I, Paper III) support the relevance of sensory-space characteristics. For example, study 1 (Paper I) showed that children perceived a playground as unappealing because of high noise levels (for instance, overcrowding, traffic, incidental sounds), unpleasant smells (urine or faeces), unappealing visuals (litter, broken features, graffiti, poorly cared for natural environment, greyish and boring appearance) and rough textures (surfaces like gravel, chopped wood, peeling paint). In contrast, children found a playground appealing when sounds were more natural with wildlife sounds and weather chimes as examples, when smells and tastes comes from flowers or fruits, when textures were softer and smooth, when the playground was perceived as mostly clean, and when the vegetation was not too overgrown, indicating it to be unusable. While children (Study 1, Paper I) expressed a desire for colour on the playground, experts in Study 3 (Paper III) viewed this characteristic as unnecessary or difficult to assess. However, children noted that colour did not only come from elements of the built environment like play equipment, buildings and other structures. Rather they perceived colour in the natural

environment, indicating colourfulness in vegetation such as spring flowers, autumn leaves, shades of green, as well as natural materials like rocks and wood. Other research highlighting children's perspectives had discovered a similar understanding of colour and colourfulne^ss (Jansson & Lerstrup, 2020; Wenger, Lynch et al., 2024).

Sensory-space characteristics are about perceiving the space and sensory atmosphere that either hinders or facilitates whether a child wants to use the space or not. For example, experts in Study 3 (Paper III) highlighted the importance of spaces that intentionally consider opportunities for children to withdraw such as crannies and nooks in the built and natural environment. Finnigan (2024) has recently explored relationships between the outdoor built environment and adult users on the spectrum of hypo- and hyper sensory sensitivity. While Finnigan's (2024) study did not focus on playgrounds and children, her findings were similar to the sensory environmental characteristics identified in Studies 1 and 3 (Paper I, Paper III). Finnigan (2024) revealed characteristics in relation to sound, touch, and visuals as either comforting or stressful for adult users. These adult participants pointed to the importance of using more natural materials, sounds and smells as being more comforting (Finnigan, 2024). Consequently, identifying these sensory-space characteristics in the physical environment is valuable because these may be tacit and not perceived by everyone. This means that it is especially relevant to gather evidence from users who experience them and what subsequently informs others who do not. Considering such sensory-space characteristics in playground provision enhances usability, especially since users of different ages recognise them as relevant.

The **climate, weather and season characteristics** partly overlap with sensory-space characteristics as they also contribute to the sensory atmosphere of a playground. Climate, weather and season characteristics can be thought of as changing over time depending on the geographical playground location for example throughout the days and years. As shown in Studies 1 and 2 (Paper I, Paper II), from a child's perspective, playgrounds

that adapt to local weather and seasons might afford new play opportunities. These include loose parts such as blooming vegetation, fruits, rain, snow and ice, leaves, sticks and growing vegetation. In addition, Study 2 (Paper II) identification functional qualities of certain playground features, such as hills for sledging and sliding depending on the weather, steepness, inclination, and changing surface conditions. Another example relates to materials like water or sand that became shapable because of temperature and moisture levels within the materials, such as moist sand or snow. As discussed in Study 3 (Paper III), experts describe various considerations that enhance experiencing seasonal changes. These considerations include vegetation that visually transforms with the seasons, intentionally designed puddles that fill after rainfall, and weather chimes that respond to natural elements by either creating sounds in the wind or producing colourful displays when sunlight passes through tinted glass.

Combined, these identified characteristics from all three studies are relevant and add to an underexplored topic of how weather and season positively or negatively contribute to play affordances. Studies that research children's outdoor play on playgrounds tend to collect data in warmer seasons. However, some research was identified that specifically explored how playground spaces transformed after the snowfall or season changes (Kaplan, 2023; Kuh et al., 2013; Sanderud et al., 2020). Kaplan (2023) found that snow created new and novel but temporally bounded play affordances. Other research found that children started actualising new affordances as new materials, such as tree leaves and needles, became available in autumn (Kuh et al., 2013) and that play transformed corresponding to changing functional qualities of the snow depending on the local temperature (Sanderud et al., 2020). Other than this, weather changes such as snowfall acted as a barrier to outdoor play for children using mobility devices (Sterman et al., 2016). This suggests the significance of how weather and season changes are managed to positively contribute to play opportunities. These are relevant but underrated characteristics which relate to management practices further explored in the social environment below.

In addition to these evolving and new play affordances over time the cluster season, weather, and climate can also be understood in terms of how well a playground adapts to local conditions. Research to date tends to focus on the temperature increase of a playground's adaptability. For example, tree canopies serve as a buffer against sun's ultraviolet exposure and extreme heat (Lanza et al., 2021; Pfautsch et al., 2022) and natural landscaping protect against extreme weather conditions such as wind, rain, snow and others (Karaba Bäckström et al., 2024). As was discussed in Study 3 (Paper III), experts indicated regional differences regarding weather and climate adaptability. These differences included shade provision throughout the day, ensuring drainage for inclement weather, installing lighting for areas with long winter days, incorporating shelters adapted to local weather conditions and using materials that do not overheat when exposed to the sun. This novel finding is particularly relevant to climate change, highlighting the need to understand how playgrounds can help mitigate its effects and support preventative measures alongside catering to play value.

Overall, climate, weather and season characteristics need to be understood twofold: first, considerations that afford new play opportunities, and second, considerations for local climate and weather adaptability. In the best case, these two aspects might support each other.

9.3 Social Environment

After describing and discussing the seven characteristics of the physical environment, the interconnectedness between the physical, social, and atmosphere becomes clear. Figure 10 illustrates the social environment nested within the physical, foregrounding the relevance of having a physical environment with which the social environment can transact. Some environmental characteristics outlined in the physical environment already suggest this relationship with the sociability or safety characteristics of a playground as examples. The five clustered characteristics under social environment focus on the users, including children and adults, as well as societal attitudes and contextual aspects such as how playgrounds are

managed. Specifically, the following clusters are reviewed: relatable peers, supportive adults, rules of a playground, societal attitudes, management and maintenance of playgrounds.

9.3.1 Characteristics of the Social Environment

Children highlighted the characteristic of **relatable peers** as a significant aspect of play. As Study 1's (Paper I) findings indicated, children noted they preferred to play with other children they relate to, often reported as peers or friends they know from school, the neighbourhood, or from home like family members such as siblings or cousins. These relatable qualities can also be extended to aspects of similar interests, similar age or abilities. For example, a child with disabilities may not enjoy racing with a much more abled-bodied child. The same relatability aspects can also be said about same-sex and gender. Children also noted that they valued playing with wildlife, for example by taking care of them, observing, and following their movements. Further, children expressed relating to animals, such as the ducks that they feed every time they visit the playground, or when they bring their pet dog to the playground. Therefore, based on the findings of Study 1 (Paper I), it can be argued that children value the opportunities to play with or close to other children much more than playing with adults, which points to the importance of supporting this preference. These relatability qualities can be confirmed by other systematic reviews that focus on children's perspectives (Wenger, Lynch et al., 2024) and empirical studies that pointed to forming of friendships between children over time (Bergin et al., 2024).

Supportive adults include those who accompany children to the playground, such as caregivers, parents and teachers but also adults from the community who care for playgrounds. As children noted in Study 1 (Paper I), these adults provide support in many ways often adopting a reflective approach regarding when and how to offer support. This support includes understanding children's play preferences, knowing when to step in and assist, recognizing when to observe from a distance, and knowing when to refrain

from interfering with play. Adults are most supportive when they give children the permission, time, and space for their play to naturally unfold—sometimes by simply watching from afar. Experts in Study 3 (Paper III) recommended including an item about whether a playground is staffed, if staff are knowledgeable about children's play preferences and if they provide new play opportunities. Experts clarified that staff should do more than keep children physically safe and ensure rule adherence. However, experts also acknowledged that staffed playgrounds might be country-specific, and many playgrounds are unstaffed. Another aspect that experts in Study 3 (Paper III) indicated relates to the intersection of physical environment and supervision practices by caregivers and parents, such as the safety considerations mentioned earlier, and opportunities for parental supervision through carefully placed seating. Such considerations contribute to an atmosphere that puts caregivers at ease to be a supportive adult.

While research from this thesis uncovered what a supportive adult might encompass and influence, it is clear from other studies that this is not a simple task for adults and is entangled with personal and societal expectations. For example, parents and professionals, such as play experts and health care professionals, found emotional barriers from parents such as underrating a child's capabilities, being overprotective and focusing heavily on keeping the children safe (van Engelen et al., 2021; Visser & van Aalst, 2022). Similarly, Sterman et al. (2016) noted that caregivers did not always know their child's play preferences and the relevant neighbourhood spaces that could support these play preferences. Furthermore, societal attitudes impact adults in allowing time, space and permission for play, as explored below (Jerebine et al., 2022; Sterman et al., 2016; Visser & van Aalst, 2022).

Societal attitudes are part of the social environment and include views on outdoor play in general, such as having time and permission for play, attitudes towards specific playground users such as children with disabilities, and opinions about certain playground features, such as being pro or against nature or fencing. In Study 1 (Paper I), children expressed the need for

sufficient time and space for play. This was described as having uninterrupted moments to play in a suitable space, often in combination with other children and adults granting permission for diverse play preferences, demonstrating a connection with characteristics considered earlier, including variety of play choices and supportive adults. Additionally, children with disabilities described attitudinal barriers, reporting experiences of exclusion where children did not want to play with them, as well as negative behaviours from others such as name-calling, bullying or staring.

Findings from Study 3 (Paper III) contribute to a discourse on societal perspectives regarding what a playground should provide, especially features like fencing and boundaries, which are also discussed in the section on safety considerations. Experts from some regions noted that features like small, enclosed spaces and natural elements are often not permitted in playgrounds due to concerns about misuse, for instance small spaces being used by the homeless, or potential hazards like materials that could carry diseases or pose tripping risks. These opinions are based on country or city-specific regulations and inclusive playground guidelines, which may explain why certain features are not allowed in these contexts. However, Studies 1 and 2 (Paper I, Paper II) identified some of these features as enhancing play value by offering specific play affordances. This suggests that such regulations heavily influence how playgrounds are assessed and may reduce their play value. Therefore, a critical perspective is needed to untangle these influences and foreground play value before other considerations.

These findings align with previous research, which identified adults' attitudes as either a barrier or a facilitator for play. Such attitudes are intertwined and shaped by personal, societal, political, and cultural contexts as well as the physical environment. For examples, barriers were found in teachers' attitudes toward valuing free play in schoolyards (Grady-Dominguez et al., 2021), and in parents' and teachers' attitudes towards risk-taking and adventurous play (Jerebine et al., 2024; Niehues et al., 2013; Oliver et al., 2023). Additionally, rules and policies that govern free play opportunities were also seen as barriers (Ramsden et al., 2022). These findings highlight the need

for reflexivity in understanding how one's context shapes attitudes, and how to overcome these barriers when the aim is to audit for play value.

Characteristics in the cluster **rules of the space** are linked to characteristics described in supportive adults and societal attitudes. Children in Study 1 (Paper I) noted that rules they did not understand could restrict their play, were often created by adults. This indicates the importance of involving children in rule creation to make them understandable and appropriate for children.

Engaging children in rule-making can be considered a way for children to support how a playground is managed and maintained on a social dimension (Jansson & Lerstrup, 2020). These practices go beyond just asking children's opinions in the initial design period of a new playground (Schoeppich et al., 2021) rather, they consider their participation more on a long-term basis (Jansens et al., 2023; Jansson & Lerstrup, 2020). Additionally, as presented in Study 1 (Paper I) children find breaking adult-created rules as something that adds value to their play because of its secretive character, suggesting a need for a balanced approach to rule enforcement.

Experts in Study 3 (Paper III) expressed that the rules of a space are sometimes enforced through signage on a playground. Rules such as no ball games, no running, or no noise, restrict certain play as do rules about upper or lower age limits or the requirement to have caregivers present. Why such rules exist can be difficult to untangle and vary by country. Some rules might be governed by playground standards of a city or county to ensure appropriate and safe use of the playground (Ball et al., 2019; Spiegal et al., 2014). Involving the community in decision-making about appropriate rules, while reflecting on not hindering play, could be a way to address this issue.

Management and maintenance practices are found to be relevant in two ways. First, children in Study 1 (Paper I) and experts in Study 3 (Paper III) emphasised the relevance of keeping a playground mostly clean and hazard-free. While children in Study 1 (Paper I) wanted playgrounds they felt were

taken care of, experts in Study 3 (Paper III) provided some insights into what this might look like. Some experts described the relevance of differentiating between controlling relevant hazards but by doing so not limiting important play opportunities. These experts clarified that management and maintenance practices should contribute to or enhance play, representing a novel finding in this thesis. Experts explained that management practices should, in the best case, actively be managed to create play opportunities. This might be done via regular maintenance tasks such as loose parts like autumn leaves or sticks being intentionally left on the playground for children to use, or vegetation being intentionally cut to create smaller bounded spaces for children to play in. This suggests that playgrounds, which are often highly controlled environments that follow standards and guidelines (Ball et al., 2019; Spiegal et al., 2014), seem to miss a more nuanced approach to management and management practices that fully contribute to successful play. For the second aspect experts portrayed the value of participatory management practices which give children a way to contribute to their playground space to strengthen their connection with the space (Jansson & Lerstrup, 2020).

Overall, management and maintenance practices are linked to other characteristics described in both the physical environment, including sensory space characteristics and climate, weather, and season characteristics, and the social environment such as supportive adults, rules of a space and societal attitudes.

9.4 Atmospheric Environment

The atmospheric environment is about the ongoing evolution of the atmosphere of spaces over time that either fosters or hinders users' experiences of feelings of security, welcoming, happiness, and belonging. At the same time the atmosphere influences children's perceptions and use of playgrounds. Therefore, the atmosphere is in continuous reciprocal transaction with the social and physical environment.

To date, describing the atmosphere as a dimension of the environment is not common in research on the topic of outdoor play on playgrounds, as

most research noted the physical and social environment (Brown et al., 2021; Gemmell et al., 2023; Jerebine et al., 2022; Moore et al., 2020; Moore & Lynch, 2015). However, including the atmosphere as an environmental dimension helps to bridge the transactional relationships between the physical and the social environment. Some systematic reviews point to some characteristics that would fall under the dimension of atmosphere. For example, Gemmell et al. (2023) found a perception of safety and sensory, and Jerebine et al. (2022) noted interpersonal characteristics such as friendship and belonging and parental safety perception. Wenger, Lynch et al. (2024), which also focused on the children's perception of the playground, confirmed the relevance of creating a welcoming atmosphere. Similar to Study 1 (Paper I) findings, Wenger, Lynch et al. (2024) described a combination of the physical and social environment contributing to a welcoming atmosphere and an overall feeling of belonging. In this section, a brief review of these atmospheric characteristics will be reviewed in relation to the previously described physical and social environmental characteristics. This section helps to explain how the physical and social environment combined contribute to a playground that supports the feelings of security, the creation of a place where children feel welcome and happy as well as feeling they belong to their community and spaces.

9.4.1 Characteristics of the Atmospheric Environment

Feeling secure is a combination of physical and social environmental characteristics. Physical characteristics might be the location of the playground and specific features present or needed like fencing and lighting to make a child and caregiver feel secure. The sensory environment, including the visuals, sounds, smells, and textures, all of which could support or hinder the feeling of security. Furthermore, the perception of how well a playground is cared for—including the degree of litter, the need for more or less maintenance, and the care of natural features and wildlife—can influence its overall feeling of security. Social characteristics might be related to who is there to play, if a child knows these people, if the child experiences positive or

negative social interactions with other users over time, and how familiar a child is with the space.

Feeling welcomed was especially foregrounded by children with diverse abilities who described the importance of an accessible and usable playground where they can play and have choices from a wide range of preferred play opportunities. This also resonates with parents' perspectives of children with disabilities, as previous qualitative research has demonstrated (Luna-Lupercio et al., 2024; Prellwitz & Skär, 2016). This relevance of usable space with choices to play links what children prefer to play in a playground with an evolving welcoming atmosphere. In contrast, a child who experiences limited play choices that match their ability on a playground is limited in feeling welcome. However, this experiencing of feeling welcoming needs to be extended or consider several groups that are at risk of play deprivation, including users already identified by GC17, such as girls, children living in poverty, children with disabilities, Indigenous children, children from cultural minorities (UNCRC, 2013), as well as children identifying as queer, another group not yet acknowledged in the GC17.

Feeling happy is about the overall and core experience of having fun, as identified by children in Study 1 (Paper I). The importance of experiencing fun is continuously highlighted by children and supported by previous research (Haq et al., 2023; Miller & Kuhaneck, 2008; Moore & Lynch, 2018b; Nicholson et al., 2014; Wenger, Lynch et al., 2024). As was outlined in Study 1 (Paper I), fun is evolving through the playground's diverse play affordances and potential opportunities to relate with other children in this space. Nevertheless, what is fun is not always expressed through observable excitement, laughter, or cheerfulness (Besio et al., 2016). For example, play is experienced as fun for the child, but from an outsider's perspective, it might be interpreted as something else, such as being fully absorbed in an activity (Bundy, 1993) or a situation where the child challenges themselves (Besio et al., 2016; Fahy et al., 2021; Wenger, Schulze, et al., 2021). Therefore, fun experiences in play

might take on different shapes and nuances and is determined by the users. This indicates the relevance of finding ways how their viewpoints can be incorporated when playgrounds are audited for play value, what will be further discussed in the next chapter.

Feeling of belonging is about both belonging to the people and animals, to the relatable peers and supportive adults and belonging to the place, so also the connection to the physical space. This idea of belonging to the playground as an atmosphere might be captured by other research through concepts such as place friendship, placemaking, place identity, place attachment, and production of space or third places, to name some concepts (Aldrich et al., 2023; Altman & Low, 1992; Chatterjee, 2005; Delaisse et al., 2021; Derr et al., 2018; Wenger, Kantartzis, et al., 2024). All three studies support the aspects that might contribute to developing an atmosphere of belonging. Accordingly to children in Studies 1 and 2 (Paper I, Paper II), they feel they belong to a playground when i) they visit them more often, an indication of a temporal aspect, ii) the range of play affordances available match the children's preferences and abilities, iii) they encounter social opportunities in this space, and iv) they have opportunities to participate, including making changes to the environment during their play, through other processes like managing practices or contributions to design of the playground. These insights from the children's perspectives can be corroborated by research (Jansens et al., 2023; Jansson & Lerstrup, 2020; Jansson & Ramberg, 2012; Wenger, Lynch, et al., 2024). Findings in Study 3 (Paper III), which elicited experts' opinions, widened the characteristics contributing to a belonging atmosphere suggesting the following might be evaluated: i) if a playground is designed participatory, ii) if certain user groups' needs are considered when a playground was designed, iii) if a playground caters to community needs, for instance a neighbourhood with an inclusive school, and iv) if a playground also represents other characteristics that users connect with such as nature, heritage, culture, history, and art. Based on experts' insights these aspects might not be necessarily relevant for children

but are important for their caregivers, who connect with the space through culture, history, and art, and who subsequently act as gatekeepers to play.

9.5 Summary: Environmental Characteristics Contributing to Outdoor Play on Playgrounds

By synthesising findings from all three studies this chapter aimed to answer the research question; "*What environmental characteristics contribute to successful outdoor play on public playgrounds*?" Throughout all three studies, different environmental characteristics from the physical, social, and atmospheric environments were discovered and described. These environmental characteristics, from both the physical and the social environment, influence how users feel about a playground through a transactional relationship. The physical and social environment can foster or hinder a welcoming, secure atmosphere where all users can experience fun and belonging. Previous research primarily focuses on the social and physical environmental dimensions, with Brown et al. (2021), Gemmell et al. (2023), Jerebine et al. (2022), Moore et al. (2020) and Moore and Lynch (2015) providing good examples. However, the atmospheric dimension of the environment is not commonly made explicit. In this synthesis under a transactional perspective, some identified characteristics from this thesis were found to relate to previous research and highlight new characteristics. This added valuable new insight to foreground the relational physical, social and atmospheric dimensions of the environment that contribute to successful outdoor play.

These identified environmental characteristics support an evaluation of the immediate social, physical and atmospheric environment that supports or hinders the experiences a child or group of users make on the playground. Approaching such environmental analysis from an immediate environment perspective, such as the identified physical, social and subsequently atmospheric characteristics, is appropriate from a child right to play perspective as, as highlighted in the GC17 in aspects of an optimum environment for play (UNCRC, 2013). Such immediate environment analysis

would value the here-and-now, seeing play relevant for its own sake in the moment when the environmental conditions for play are met. However, transforming these environmental characteristics into a playground audit tool will require theoretical support to supplement the interpretation of what the tool aims to capture. To do this, research questions two, three and four are answered in the next chapter, shifting the discussion to the theoretical perspective of affordances.

CHAPTER TEN — DISCUSSION

"Occupational scientists tend to devote time to the mundane, everyday aspects of life. They do so because complexity often lurks below the surface of ordinary occupations. Occupational scientists recognise that it is in the doing of taken-for-granted occupations that life unfolds"
(Bailey & Jackson, 2005, p. 57).

10.1 Introduction to Chapter Ten

Overall, this thesis aimed to develop an evidence-informed audit tool. The conceptual approaches adopted for this thesis underpinned the research process. They shaped the three studies, supporting the adoption of an analytical approach to what is often overlooked in social sciences, as has been argued throughout the course of this thesis, which is the physical environment and how it influences occupations that take place within it. Using a transactional perspective and an affordance approach provided the lens for analysing the public playgrounds. However, from an occupational perspective, the centrality of what was happening there, the play itself, was maintained throughout. The outcome is evident across the three studies that have been presented in this thesis, which answers the four questions set from the outset relating to environmental characteristics, their relationship to play value, identification of how an affordance perspective can be utilised effectively for playground analysis, and insights for the transactional perspective on play occupations. By synthesising evidence literature (Study 1, Paper I & Study 2, Paper II) and by further gaining insights via an expert panel (Study 3, Paper III), this thesis presents the journey in developing the preliminary content of a new playground audit tool aiming to support an evaluation of playgrounds' play value. In this chapter, the emerging findings will be discussed in relation to new insights and what added value this work brings to advance knowledge and practice in playground evaluation and, consequently, design for play value. While the first research question was explored in Chapter Nine, the three remaining research questions will be discussed in the next sections below. Afterwards, the trackable impact of this research so far is outlined, and

the chapter ends with future research directions in the development of the Playground Play Value and Usability Audit tool.

10.2 Relationship between Environment and Play Value from an Affordance Perspective: Theoretical Implications for the PVUA Tool

This section answers the second research question, “Can the relationship between the environment and play value be analysed from an affordance perspective to inform a playground audit tool?” The findings gathered in Study 2 (Paper II) demonstrate that an affordance perspective can be effectively adopted based on an in-depth analysis of occupation-environment transaction data from play research. However, it is necessary to explain why affordances are suitable for evaluating a playground’s play value from a theoretical perspective. Such explanations are relevant because grounding the development of the new playground audit tool in a well-established theoretical framework, such as affordances, is necessary to aid the interpretation of the content and, subsequently, validate this new playground audit tool (AERA et al., 2014; Sireci & Benítez, 2023). Therefore, such an elaboration supports the overall purpose of this thesis, which is to develop an evidence-informed playground audit tool such as the PVUA tool. This section elaborates on three key principles from affordance theory, expands on them, and explains how they support interpreting the new playground audit tool. While these principles are not new insights into affordances (see Chapter Two), this thesis' findings provided additional support to expand on these principles and specifically apply them to the playground audit tool in development. To date, there have been no significant studies using this methodology, nor has one previously grounded the following key principles in evidence and used them to justify the theoretical basis for a playground audit tool.

Before diving into these three theoretical insights, the relevant findings of this thesis that support this interpretation are outlined. The main findings of Study 2 (Paper II) were the formation of the *Environmental Taxonomy of Outdoor Play Space Features* (ETOPF), which consists of categories of

spaces, objects and materials, a description of functional qualities and an array of potential play affordances associated with the categories and functional qualities. The theory of affordances underpins the ETOPF. It empirically supports the theory's usefulness in describing the environment by its functional qualities and relationship to play affordance. This provides the foundation to audit the environment with anticipation of the diverse, multiple and potential play affordances of a playground. The three key principles used and extended are:

- Affordances are relational between the environment and the child, BUT *for an audit tool, they should be approached from a group and population perspective.*
- Affordances are dynamic and changing over time, BUT *for an audit tool, the focus is on utilising the more stable relationships.*
- Affordances challenge the conventional categorisation of environments, BUT *for an audit tool, categorisation is helpful and needed.*

The discussion will consider each of these key principles, drawing on both Gibson's (1979) original work and contributions from other scholars to establish a comprehensive theoretical framework for the new playground audit tool. While these three theoretical insights are presented separately, they are built on one another and should be interpreted in this way. Table 25 provides an overview of how the theoretical principles were expanded to support the interpretation of the audit tool.

Table 25. *Affordance Theory Insights Supporting the Playground Audit Tool*

Theoretical key principle of affordances and expansion on these principles	Description of key principles from previous authors	Expansion of key principles, justification why relevant for the audit tool and supporting findings
Affordances are relational between the environment and the child, BUT *for an audit tool, they should be approached from a group and population perspective*	The relational understanding of affordances offers a way to describe environment-person transactions as a reference point for individuals (Gibson, 1979; Heft, 1988).	Public playgrounds are spaces that are utilised by a diversity of users with various characteristics and preferences. A playground audit tool that counts for evaluating the physical settings offers a way to consider diverse user groups with different and similar characteristics (age, ability, gender, size, play preferences, past experiences, …). Thus, affordances support a theoretical understanding of how the environment might be used by its user groups or populations. **Findings that support expansion:** The ETOPF represents relationships between children and their playground environment. The sample of children in this thesis represents various populations with diverse characteristics. Therefore, ETOPF builds the foundation for a group and population perspective.
Affordances are dynamic and changing over time, BUT *for an audit tool, the focus is on utilising the more stable relationships.*	Affordances are dynamic and non-static, evolving relationally between the environment and the individual. Over time, the individual and/or the environment change; consequently, new affordances are perceived and actualised. However, potential affordances also exist independently from a perceiver-	Potential affordances exist independently of the users and represent more stable relationships. The audit tool uses these stable relationships represented in items manifested in functional environmental qualities. Thus, an evaluation of this functional qualities gives an avenue to audit the person-environment transaction of a particular setting, such as for a playground's potential play affordances.

	environment relationship and, therefore, are stable (Gibson, 1979; Kyttä, 2003).	**Findings that support expansion:** In the ETOPF, actualised play affordances from various populations with diverse characteristics and diverse playground environments are synthesised in a taxonomy of potential affordances. These potential play affordances represent stable relationships needed for an audit tool. From a transactional perspective, dynamic and changing qualities are represented in the most varied potential affordances.
Affordances challenge the conventional categorisation of environments, *BUT for an audit tool, categorisation is helpful and needed*	An affordance perspective describes the environment for its potential possibilities for actions. This is different from just naming features of the environment like, counting features and inventory-style auditing (Heft, 1988).	For an audit that aims to assess a playground's play value, naming concepts or categories of the environment is not enough. To get to an affordance perspective, an evaluation of the environment and its multiple functional environmental qualities that support perceiving and actualising affordances is necessary. However, concepts such as environmental features are easier to identify than more subtle functional qualities, and therefore, both are needed categories and functional qualities. **Findings that support expansion:** The ETOPF consists of categories and multiple functional qualities. The PVUA tool approaches the auditing procedure the same way.

10.2.1 Affordances are Relational Between the Environment and the Child, BUT for an Audit Tool, They Should be Approached from a Group and Population Perspective

As playgrounds are used by diverse users with varied characteristics, such as play preferences, age, heights, capabilities, and past experiences, a playground audit tool must also approach an evaluation from such a diverse group and population perspective. The findings from Study 2 (Paper II) formed the ETOPF, which synthesised available evidence from various populations, including children with and without disabilities from various age groups, play preferences and past experiences. Therefore, the ETOPF builds the evidence base for such a group and population perspective but still approaches its interpretation from a relational affordance perspective. Because the ETOPF connects play affordances with environmental characteristics in a transactional relationship, it allows for an evaluation of the physical environment to determine potential play affordances. This has the advantage that users do not necessarily have to be present and use the space during an auditing process when the playground audit aims to assess for potential play affordances.

While the relational principle of affordances is not a new insight (see Chapter Two; Gibson, 1979; Heft, 1988) no other research before has used the relational principle to strengthen interpretations gained for an audit tool for a group and population perspective and supported this argument by a robust taxonomy as presented in Study 2 (Paper II). While this is a novel interpretation specifically for this taxonomy and the PVUA tool, this interpretation might also be valid for the predecessor taxonomies (Heft, 1988; Lerstrup & van den Bosch, 2017). However, these authors have not made this argument explicitly.

10.2.2 Affordances are Dynamic and Changing Over Time, BUT for an Audit Tool, the Focus is on Utilising Stable Relationships

To generate the solid content of the audit tool that allows evaluation of an existing playground's play value based on play affordances, it is essential to identify more stable relationships. In this thesis, the focus is on understanding these stable relationships, which refer to the play transactions

between mutually influencing agents—namely, children and their environment, as identified and outlined in the ETOPF (Study 2, Paper II). These relationships are referred to as more stable as they are based on an in-depth analysis of how diverse users—of different ages, abilities, and preferences—engage with various playground environments, providing evidence of consistent play affordances. The data sets from previous research analysed in Study 2 (Paper II) originated from cross-sectional studies which collected data in various contexts, including countries, playground types and playground locations. However, as argued in Study 2 (Paper II), there were similarities across the whole data set, therefore adding to the stable relational characteristics. Diverse user characteristics and diverse environments can be thought of as an avenue to foreground change because individual user-environment configurations would perceive and actualise different affordances over time. However, stable relationships were established by the synthesised results identified across the reviewed evidence for group/population user-environment configurations. In other words, this synthesis in Study 2 (Paper II) identified the common patterns of children-environment relationships and how these support play affordances in their most varied ways. From a theoretical affordance perspective, these stable relationships use the affordance principle of multiple and potential affordances (Kyttä, 2003), or as Gibson (1979) explained them, as being invariant, always there and ready to be perceived (see Chapter Two).

To sum up the key insights explored in (a) and (b), the changing nature of affordances relates to the individual-environment relationship, which evolves over time. However, when one considers this from a group or population approach, this accounts for all potential or possible ways a playground can be used. An evaluation via a playground audit considers these elements of change at a single point in time. To put it simply, the audit tool captures a playground's potential play value for diverse users via a snapshot. However, in this snapshot, the most varied potential possibilities are captured. Such an analysis aligns well with a transactional worldview, where the unit of analysis would be on identifying stable and changing relationships between

entities of children within their environment (see Chapter Two: Altman & Rogoff, 1987; Werner et al., 2002).

10.2.3 Affordances Challenge the Conventional Categorisation of Environments, BUT for an Audit Tool, Categorisation is Helpful and Needed

As noted in Chapter Two, affordances challenge how environments are described by arguing the need to go beyond naming concepts such as slides, boulders or benches and instead describe them by what they afford, like climbing up, sitting on top or hiding under (Gibson, 1979; Heft, 1988). To recap, conceptual and perceptual descriptions of environments were introduced in Chapter Two. Conceptual meaning refers to naming concepts and categories; perceptual meaning represents affordances (Heft, 2001, 2003). For outdoor play environments, specifically, two affordance taxonomies were already available (Heft, 1988; Lerstrup & van den Bosch, 2017). In this research, the ETOPF can be added to this affordance taxonomy as a new and updated version specifically for playgrounds. However, the ETOPF looks different than the preceding taxonomies because it makes use of both the conceptual and perceptual descriptions by having three parts: (1) the environmental category (environmental feature), (2) the potential functional qualities and (3) the linked affordances. This is much different than the originally proposed taxonomies from Heft (1988) and Lerstrup and van den Bosch (2017) which also looked at outdoor environments.

It was necessary to approach the construction of the ETOPF from this new angle, and it can be justified when examining the existing taxonomies. A critique of Heft (1988) and Lerstrup and van den Bosch's (2017) taxonomies is the lack of consent terminology (see Table 2 in Chapter Two). Sometimes categories are paired with certain adjectives describing the environment or an environmental concept, for example, the categories of *mouldable material* or *sloping terrain*, and sometimes only nouns are presented, such as the categories of *shelter* or *water*. Particularly when nouns are described without accompanying adjectives, the affordance perspective may not be adequately

clear, allowing room for interpretation and representing conceptual meaning but not perceptual meaning. This misalignment with Heft's (2001, 2003) conceptual and perceptual meaning, as mentioned earlier, becomes evident, for example, in Lerstrup and van den Bosch's (2017) proposed category of *shielded places* which is more explicit in the perceptual interpretation than Heft's (1988) category of *shelter*. The description of the *shielded place* provides the reader with more intuitive information about the potential affordances available because the quality of being shielded suggests a perceptual functional quality.

As previous taxonomies struggle to consistently name their categories, it is evident that language has a limited capacity to convey affordance taxonomies. One aspect learned from these existing taxonomies is that their category names consistently relate to potential affordances and must always be interpreted together. The key to interpreting a category lies in the description of its functionality. The ETOPF makes use of those descriptions, but a more detailed description of the multiple functional qualities for each category are presented. This has the purpose of improving the understanding of affordances that the children relate to in the environment and potentially actualise in an affordance. For example, Heft (1988) used the word shelter and Lerstrup and van den Bosch (2017) used the shielded place, but both did not further provide the functional qualities. While in the ETOPF, the category was named *Enclosed and bounded spaces* and multiple functional qualities were identified and described:

- Can be a fully to partly enclosed space that offers shielding and hiding qualities
- Bounded spaces may include some change in surface pattern or material (e.g., a picnic blanket, a dry patch of grass, floor painting, low raised hedges), providing a nested space within a space
- Scaled for a small group of children
- Affords private to semiprivate spaces that seclude and separate child or children from other spaces or people

- Can be provided through both human-constructed environments (e.g., low raised boundaries, walls, coverage by a roof such as tree houses or huts, nooks, crannies) and natural environments (e.g., willow domes, circle of shrubs, high grass, low-hanging canopies)

According to Heft (1988), the key points are the physical environment's functional qualities or properties that entice the potential action. Gibson (1979) also noted the importance of these functional qualities; for example, he documented characteristics of hardness, viscosity, density cohesiveness, elasticity and plasticity for surfaces and materials. He explained that such functional qualities are perceived in relation to affordances (Gibson, 1979). In Heft's (1988) and Lerstrup and van den Bosch's (2017) taxonomies, only a limited description of these functional qualities is represented, limiting their use. These taxonomies limit an affordance perspective to only one specific functional quality, which is inadequate from a transactional perspective, which always acknowledges multiple influencing and relational entities (see Chapter Two). As argued in Study 2 (Paper II), play affordances are actualised by various combinations of multiple functional qualities. Therefore, the ETOPF suggests that a functional taxonomy should consist of three sections (see Table 26 for a description and an example): first, the environmental category; second, a description of multiple possible environmental functional qualities of that environmental category; and third, the potential affordances within this environmental category.

Table 26. *Proposed Aspects of New Environmental Taxonomy (Study 2, Paper II)*

Explanation of aspects	Environmental category (environmental feature)	Environmental functional qualities	Potential affordances
Description and why is this important	Describes the conceptual meaning. A conceptual meaning is as described by Heft (2001) as an already abstraction of the environment. Using such abstracted names of the environment has the advantage that they might easily be identified by the auditor.	Describes the significant qualities that the person relates to, perceives, and utilizes for an affordance. The environmental functional qualities are what someone may picks up what may invite to the potential affordance.	Describes the multiple and potential possibility for actions.
One example taken from ETOPF (Study 2 Paper II)	Topographic features such as hills, slopes, depressions and cliffs in the terrain	• Surfaces can vary in degree of smoothness; varying surfaces provide different textures • Varying degree of steepness or inclination • Varying sizes and heights or depths • Weather conditions may change functional qualities (e.g., more slippery because of snow or rain)	• Sliding, sledding, gliding, running, climbing up, rolling down, jumping down • Rolling things down and watching, building bridges over puddle • Enjoying outlook from high up

Notes. For a full list see Study 2 (Paper II) Table 16 for Compact Version of the ETOPF.

This approach has some advantages: First, it adds to an understanding of play affordances as they are usually perceived through a combination of functional qualities rather than a single functional quality assumed by previous taxonomies. Identifying these combinations of functional qualities allows an auditor to describe the physical environment better. Subsequently, such an

evaluation underpinned by affordances and a transactional perspective assist in understating how outdoor play is shaped through an ongoing configuration between the children and the environment's multiple functional qualities. Second, using the conceptual meaning of environmental features supports the ease of identifying these physical features proposed in the ETOPF and, afterwards, assessing their functional qualities. This is especially relevant to reducing the time required for the auditing procedure and improving the practicability of the ETOPF and the PVUA tool, which use the same approach.

To sum up, approaching a play affordance perspective in an environmental analysis that uses both environmental categories and functional qualities demonstrates a justified and promising avenue and foundation for the developed PVUA in this thesis.

10.2.4 Summary: Relationship Between Environment and Play Value from an Affordance Perspective: Theoretical Implications

In summary, the relationship between environment and play value can be theoretically justified using the affordances theory. The three expanded key principles of affordances provide a solid foundation for interpreting the PVUA tool content. The three elaborations support approaching a play affordance analysis of playgrounds (i) from a group and population perspective that (ii) considers the stable but diverse, multiple and potential play affordances for diverse user groups and diverse environments and (iii) describes the multiple functional qualities alongside their categories contributing to potential play affordances. Therefore, this thesis supports the validity of the PVUA tool also from a theoretical perspective grounding its interpretation in the affordance theory.

The next section will explore how these theoretical insights inform the central construct of play value, which this thesis has sought to operationalise in the Playground Play Value and Usability Audit tool. This section will also discuss the evolution of the play value construct throughout the thesis.

10.3 Unpacking the Dimensions of the Play Value Construct

In response to the research objective of operationalising play value and research question three, "*How can a playground audit tool utilise an affordance analysis to describe play value?*" this study's findings not only suggest a method for operationalising play value through the Playground Play Value and Usability Audit (PVUA) tool but also expand the understanding of the construct of play value. This is especially relevant to address, as was reviewed in Chapter Two having a solid understanding of how the play value construct is conceptualised supports the PVUA's intended purpose. This section of the discussion will revisit the initial starting point from which this study began to understand the play value construct (see Chapter Two). This is followed by new insights gained regarding the construct of play value as this research progressed, including dimensions of the play value construct covered by the PVUA tool.

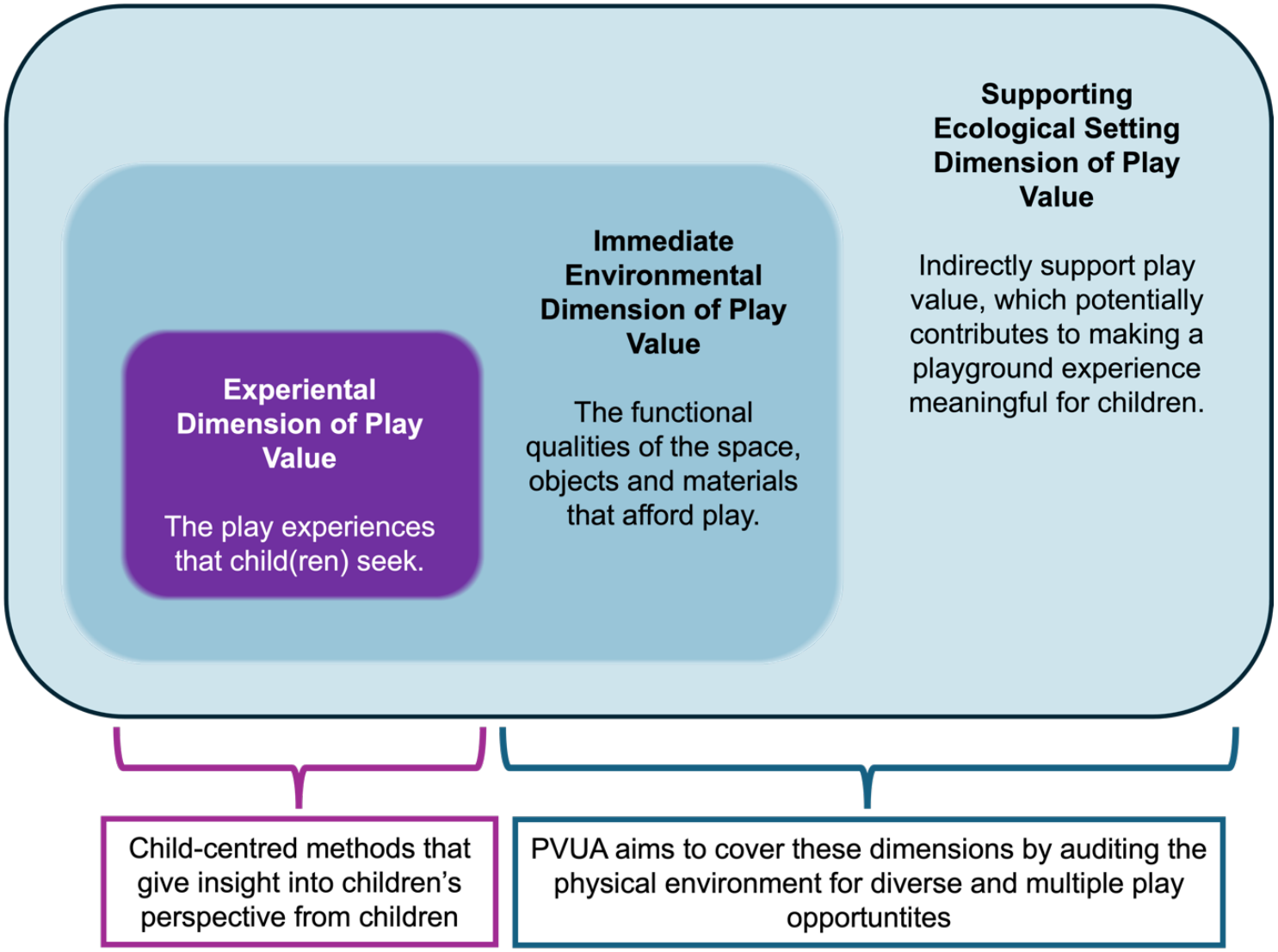
Play value is the main concept that this study intended to find ways to operationalise through a playground audit tool. In Chapter Two, the construct of play value was examined and explored based on four perspectives outlined in previous scientific and grey literature:

(1) Play value is understood by developmental benefits
(2) Play value is understood by the variety of play affordances (or play types) supported by environmental features
(3) Play value is understood by a playground design/provision catering to users with diverse backgrounds, ages and abilities, and
(4) Play value is understood by children's subjective experiential meanings of play supported by environmental features.

Through this initial review, it became clear that the construct of play value has been described and understood in several different ways. These four perspectives of the play value construct were found to be overlapping and not completely distinct, which suggested that they need to be understood in combination. In acknowledgement of these overlaps, this thesis study initially adopted a combination of three of these perspectives. The initial play value

perspective this thesis research drew from was perspective (2), variety of play affordances in combination with (3), catering to diverse abilities represented through the concept of usability and, to a lesser extent, also (4), subjective experiential meaning of play (See also Chapter Two, Section 2.5.2). Therefore, the play value construct adopted in this study was noted as follows: *Play value is conceptualised by the diverse, multiple, and potential play affordances supported by diverse, varied and combined environmental features for diverse user groups.* This understanding of play value has evolved during this thesis, and the findings provided evidence and justification for the three dimensions of play value (see Figure 12 for a visual representation). The *Immediate Environmental Dimension of Play Value* draws most from Study 2 (Paper II), which focuses on the physical environment and its relationships to play affordances. Since the *Immediate Environmental Dimension of Play Value* is underpinned by the theory of affordances, as discussed in detail in the previous section, it will not be further elaborated on here. In the following two subsections, the other two dimensions of play value will be discussed (*Supporting Ecological Setting Dimension of Play Value* and *Experiential Dimension of Play Value*), supported by findings from this thesis research, and discussed with previous research to strengthen their relevance.

Figure 12. *Proposed Dimensions of Play Value and Proposed Method of Investigation*



10.3.1 Supporting Ecological Setting as a Dimension of Play Value

In the expert panel study (Study 3, Paper III), participants acknowledged the relevance of examining the *Immediate Environmental Dimension of Play Value* in a playground. However, these experts noted the absence of ecological aspects. This led to the forming of a separate, yet interconnected dimension termed the *Supporting Ecological Setting Dimension of Play Value.* This dimension which emerged through relocation items into new or other content areas and generating new items via expert suggestions across the two rounds of the expert panel study. The *Supporting Ecological Setting Dimension of Play Value* could be described as indirectly supporting play value, which potentially contributes to making a playground experience meaningful for children and includes characteristics such as playground location, character and development of the playground, climate, weather and season, playground management and maintenance, sensory space related qualities, and physical supporting features as signage, seating, amenities, and fencing all of which have also been described in Chapter Nine (see above). Indirectly supporting play value suggests a relationship between the *Immediate Environmental Dimension of Play Value* embedded in the *Supporting Ecological Setting Dimension of Play Value*. While the *Immediate Environmental Dimension of Play Value* captures the functional qualities of the physical environment from a play affordance perspective, the *Supporting Ecological Setting Dimension of Play Value* tries to capture qualities of the supporting atmosphere and supporting physical-social environment, which might make a playground visit successful. Table 27 provides some example items associated with the *Supporting Ecological Setting Dimension of Play Value* (see Appendix 22 for the entire audit tool and items Version 3).

Table 27. *Example Items of Domain Supporting Ecological Setting*

	Sub-domain	Content area name	Num. Items	Example items from the PVUA tool (Version 3)
Domain: Supporting Ecological Setting	Contextual supporting considera-tions of the playground	Development and character of the playground	8	… regularly hosts community events that offer users new play opportunities (e. g. announced on an information board on the playground)
				… reflects cultural and historical aspects of the community (e. g. local art/stories/heritage is represented, locally sourced materials are used, …)
		Playground location	10	… has information about the playground provided (e. g. online and signposted information about opening hours, accessibility, …)
				… is near to other public opportunities that might be interesting/important to children and families (e. g. park space, community centre, library, amenities, community gathering places, museums, community garden, nature areas)
		Management and maintenance	7	… is maintained in a way that promotes play opportunities (e. g. branches from trees, fallen leaves and non-toxic fruit are intentionally left to be play with for a while, vegetation and shrubs are not cut too much)
				… is mostly clean (look for graffiti, cigarette butts, litter, or other dangerous litter such as such as glass, syringe, animal faeces) consider all areas of the playground (natural environment, water sand play area, toilets, small spaces)
		Sensory space-related qualities	4	… has some colour and does not appear dull
				… has no periodic and consistent noise pollution (e. g. heavy traffic, trains, regular ambulance, or helicopter, …)
		Climate, weather, and season adaptability	10	… has appropriate lighting for geographic location, local weather and community to ensure feeling of safety (e. g. electronic lighting suitable for winter months, evenings or changing weather conditions, or lit paths to the playground)
				… is adapted to local weather such as for rain or snow for play opportunities (e. g. dips, puddles, dry creek paths that offer new play opportunities

				after/during rain, or hills or slopes for snow play after snowfall)
	Physical supporting features of the playground	Signage (orientation and rules)	9	… does not restrict certain type of play or behaviour (e. g. being loud, ball play, bringing wheeled play equipment on the playground bringing sleds on the playground, …) Every type of play is allowed on this playground.
				… has a map for orientation at the entrances, in appropriate height for a child using a wheelchair and which is illustrated in a child friendly way using symbols, colours, and pictures
		Seating (formal and informal)	6	… is adjoining popular play areas or on edges of more busy areas for ease of parental supervision
		Fencing, boundaries, and entrances	11	… has fences that are only provided to separate playground from hazards such as traffic or deep and flowing water features e. g. (rivers, ponds), no fences are provided when no hazards are close
				… has no fencing around specialized play equipment that separate their users from other users (e. g. fenced in wheelchair swings)
		Amenities (toilets, water fountains)	3	… has clean toilets that are open to the public (not locked away or needing payment, represent gender inclusivity)

Notes. Num = number.

Including the *Supporting Ecological Setting Dimension of Play Value* in the PVUA tool can be further recommended because previous scholars have noted that audit tools often overlook or downplay the importance of such ecological factors that potentially influence children's play opportunities (Clark & Uzzell, 2006; Jaffe & Loebach, 2024; Kaştaş-Uzun & Dikmen-Güleryüz, 2024). Kaştaş-Uzun and Dikmen-Güleryüz (2024), who analysed 25 playgrounds in one neighbourhood in a city in Turkey, identified the relevance of the playground's location and if other opportunities relevant for the users were in proximity to the playground. They noted how this significantly influenced how the playground was used (Kaştaş-Uzun & Dikmen-Güleryüz, 2024). Kaştaş-Uzun and Dikmen-Güleryüz (2024) concluded that this adds to a playground's play value and suggested an important relationship between the playground space itself and the surrounding neighbourhood characteristics, which are covered in PVUA's content area of "Location of the

playground". Furthermore, research confirmed that ecological factors are elusive playground characteristics relevant to children's free play (Loebach et al., 2021). They identified elusive characteristics such as if a playground is of good quality, if a neighbourhood feels secure enough for play, and if the playground is near users' homes (Loebach et al., 2021). As expressed by parents, a higher level of social cohesion within the community is another influencing factor for successful outdoor play (Jeanes & Magee, 2012; Loebach et al., 2021). Other ecological factors considered in the PVUA tool are supported by previous research. For example, how clean a playground is (Pitsikali & Parnell, 2019), if a playground is perceived as a sensory-friendly environment (Finnigan, 2024; Lynch et al., 2020), the influence of seasons offering new and varied play affordances (Kaplan, 2023; Kuh et al., 2013), the presence of fencing and boundaries depending on where the playground is located (Black & Ollerton, 2021), and if seating is situated to ease parental supervision (Nasar & Holloman, 2013). To conclude, the items suggested by the expert panel can be corroborated as relevant characteristics influencing outdoor play on playgrounds and, therefore, relevant to include in the *Supporting Ecological Setting Dimension of Play Value*.

10.3.2 Experiential Dimension of Play Value

The findings in this study illuminate the subjective play experiences that are important for children while engaged in play on the playground. Synthesised from evidence literature (Study 1, Paper I) on the children's perspective suggested multi-faceted play experiences, including the desire for fun, challenging, and intense motor and sensory play; the wish to self-direct their play including having a choice, utilising any potential affordance perceived and having moments to unfold own play. Further, children valued opportunities to play alone and with relatable social partners including children, animals and adults; and a desire for welcoming, safe, and for children aesthetically beautiful playgrounds. Some of these play experiences have been identified in previous research (for an overview see Chapter Two; Lynch, Moore, Edwards, et al., 2018; Lynch, Moore, & Prellwitz, 2018; Moore et al., 2023; Wenger, Lynch, et al., 2024; Woolley & Lowe, 2013), and some were revealed in this study. These multifaceted play experiences add to the fourth

Play Value understanding described in Chapter Two: "*Play value is understood by children's subjective and experiential meanings of play supported by environmental features*". This perspective on play value is the most recent understanding of play value and highlights children as the primary informants of the environment supporting and hindering their play.

Figure 12 proposes a connection of the *Experiential Dimension of Play Value* nested within the *Immediate Environmental Dimension of Play Value*. The findings of this research align with those of Wenger, Lynch et al. (2024), showing that what children do on the playground (actualised play affordances) is connected to their experiences, as these experiences evolve during their engagement in play occupation. Therefore, the play affordances that children perceive and actualise are intertwined with the subjective and personal meanings arising while being in play. For example, it is not solely about the play affordance of climbing but it is equally about experiencing a challenging route for climbing, experiencing belonging while climbing with a good friend or experiencing the thrill of reaching great heights while climbing. In other words, valuable play experiences that are meaningful to children evolve while children are engaged in outdoor play through the transaction with the environment, including the spaces, objects, materials and social partners over time.

This connection between what children do, what they experience, and the environment suggests that play experiences could be partially considered when a playground is audited for its potential play value understanding of diverse, multiple and potential play affordances as utilised in the PVUA tool. For example, as discovered in Study 1 (Paper I), children noted children's desire for intensive motor and sensory play experiences in relation to environments which afford messier, faster, slower, longer, heavier, deeper, bumpier, curvier, further, and more elevated play is strongly linked to physical environmental characteristics of being bigger, taller, higher, wavier, longer, offering various textures and materials.

However, not every play experience can be captured via an audit, meaning that to capture the subjective play experiences of children, additional approaches are needed. In agreement with the recommendations of Zallio and Clarkson (2021), it is necessary to utilise both observer-based environmental audit tools in combination with subjective user-based tools to fully capture

concepts such as play value. This is also in line with a child rights perspective, which allows children to express their views on matters that affect them, considering their age and maturity (Davey & Lundy, 2011; UNCRC, 1989). Including children's perspectives is especially relevant in playground evaluations as playgrounds are being critiqued not to include children's perspectives in the first place, such as in the design phase of the playground (Jansens et al., 2023; Schoeppich et al., 2021). In the scoping review (Study 1, Paper I), the most valuable ways to elicit children's perspectives came from qualitative research. Still, no tool or method was identified that collected data more systematically. This warrants the need to find child-friendly approaches to elicit the subjective perspectives of children in a more systematic way, perhaps as an additional tool utilised in combination with the PVAU tool. This is an essential priority for ongoing research.

A second tool eliciting children's perspectives on their subjective experiential play experiences would be a valuable addition. Such additional approaches could create metrics that allow children themselves to determine if a playground constitutes a successful environment for their play based on how the children feel about it (Jaffe & Loebach, 2024). This warrants the question: *How does such a second tool may look like?* Guided by findings from the scoping review (Study 1, Paper I; Morgenthaler, Schulze, et al., 2023a), the most common and valuable methods to elicit children's lived experiences were semi-structured interviews and walk-along methods combined with creative methods such as picture taking. From Study 1 (Paper I) findings, potential item questions for a semi-structured walk-along approach were created (see Appendix 23). These proposed item questions need to be tested in a suitable child-centred way and further developed through a participatory research study with children. Furthermore, it is important to find ways to utilise the PVUA in combination with a child-centred evaluation of play value and how these approaches inform each other and provide a more comprehensive understanding of a playground's play value.

10.3.3 Summary: Unpacking the Dimensions of the Play Value Construct

In this section, the research question '*How can a playground audit tool utilise an affordance analysis to describe play value?'* was answered by elaborating on three dimensions of play value. The developed audit tool underpinned by an affordance perspective captures play value in two dimensions (The *Immediate Environmental Dimension of Play Value* and the *Supporting Ecological Setting Dimension of Play Value*). While the *Immediate Environmental Dimension of Play Value* can be best described from an affordance perspective, the *Supporting Ecological Setting Dimension of Play Value* was defined as having an indirect influence on children's play affordances. Both dimensions are invaluable to include in the PVUA tool and are supported by findings of this research and grounded in previous studies, providing a solid foundation for this audit tool's preliminary test content. While the current PVUA tool proposes a two-dimensional framework for play value, further research using modern test theory methods is required to validate the construct. Additionally, it is crucial to explore the relationship between the two dimensions in the PVUA tool.

This study also underscores the significance of using child-friendly methods to gain subjective and experiential insights into play value from the user's perspective. The refinement and combined evaluation of the PVUA tool and the child-centred walk-along interview are necessary to provide researchers and practitioners with valuable tools for evaluating playgrounds in their communities.

In conclusion, this thesis's research built the foundation for future research projects by developing a preliminary version of the PVUA tool. The PVUA tool is evidence-informed and is designed as a space-oriented approach for socio-spatial inclusion to support play provision and practice.

10.4 Transactional Perspective on Outdoor Play Occupation

The last and fourth research question, 'What insights can be gained into the transactional perspective on occupations through the lens of the physical environment as an active agent in outdoor play?' aimed to further knowledge specifically on outdoor play occupation from the perspective of affordances in

a transactional manner. By answering this research question, insights gained in this research will be explored and discussed for their usefulness in advancing perspectives in occupational science on the occupation of outdoor play. Two key insights will be discussed. The first insight highlights the often-neglected agency of the physical environment in play occupation, and the second insight argues for the idea of a collective-child perspective as an extension for research and practice. These two insights will be discussed regarding how they contribute to current occupational science literature and could potentially guide future research on outdoor play occupations.

10.4.1 Agency of the Physical Environment

The agency of the physical environment in shaping occupational engagement is an underexplored area in the study of occupations. This thesis's findings shed new light on how the physical environment significantly influences outdoor play occupations. It adds to the limited knowledge occupational scientists have on researching the physical environment from a transactional perspective, with occupation at the core of the inquiry. Therefore, this thesis contributes significantly to the knowledge gap on the physical environment's contribution to occupations, as identified by several occupational scientists over the years (Henderson, 1996; Lee Bunting, 2016; Lynch & Stanley, 2018; Pierce, 2012).

These occupational scientists have noted a noticeable tendency on the environment's social, cultural and political aspects (Hocking, 2021; Lee Bunting, 2016; Pierce, 2012). Similarly, Lee Bunting (2016) noted, "this bias in a transactional perspective on occupation's development limits its conceptualisation of occupation since all aspects of context [environment] are relevant to understanding the phenomena" of occupation (p. 333). Lynch and Stanley (2018) emphasised that occupational science research has not yet fully unpacked an understanding of transactions between the person and the physical environment. They stated that the physical environment's influence on occupations has been overlooked or a "taken-for-granted dimension" (p.64) when occupations have been researched from a transactional perspective (Lynch & Stanley, 2018).

The findings from this thesis acknowledge the physical environment as an active component that supports, provides and shapes children's outdoor play occupations. The unique focus of this thesis, combining a transactional worldview with affordances theory and the understanding of test construction and development (Altman & Rogoff, 1987; Gibson, 1979; Wilson, 2005), allowed the physical environment to be considered as an active ingredient and not as a passive backdrop in understanding outdoor play occupation. A unique contribution of this thesis is the synthesis of more stable patterns[7] of transactional relationships among entities, such as the environmental characteristics and what children want to experience, as well as the environmental characteristics and what children actually do. Identifying this stable and changing relationship of environment-children-play transactions builds a foundation for a better understanding of outdoor play, gives us language to describe these relationships, and offers a way to evaluate these relationships in future research.

10.4.2 Collective-child Perspective: Extending the Scope of Practice and Research on Outdoor Play Occupation

The findings of this thesis foreground the importance of understanding play occupation in relation to the environment. Such foregrounding of the child-environment relationships was approached through an affordance perspective. If occupational science seeks to expand its research on the physical environment and occupation relationship, then a collective perspective is central, as environments almost always have multiple users.

A shift from an individual child perspective to a *collective-child perspective* is theorised. A collective-child perspective is described as an approach to evaluating a space, such as a playground, from a population, community, or group standpoint[8] rather than focusing on a single child-

[7] This argument is further explored above see 10.2.2 Affordances are dynamic and changing over time, BUT for an audit tool, the focus is on utilising the more stable relationships.

[8] This argument is further explored above see 10.2.1 Affordances are relational between the environment and the child, BUT for an audit tool, they should be approached from a group and population perspective

environment unit or individual child-family-environment unit, which is more common in occupational therapy and occupational science. A collective-child perspective acknowledges diverse user groups with varying abilities, preferences and other characteristics in analysing environments such as public playgrounds. It recognises diverse and multiple possible play affordances that may or may not be actualised (which was also elaborated on earlier in this chapter; see 'Relationship between environment and play value from an affordance perspective: Theoretical implications'). The gathered and synthesised knowledge on relevant environmental characteristics necessary to adopt such a collective-child perspective and its preparation into a playground audit is a helpful way for an environmental evaluation which still centres on occupation at its core. These aspects include understanding the multiple play experiences of children and their relationship to the environment and the multiple play affordances children perceive and engage within playgrounds.

Arguably, a collective child-perspective is relevant for occupational science because it offers an opportunity to broaden the current scope of practice and research. Integrating this collective-child perspective alongside an individual perspective marks a departure from traditional discussions in occupational science, especially those framed through a transactional lens. These occupational scientists explain an individual perspective as rooted in individualism, which has also been a driving critique from occupational therapists and occupational scientists who adopted a transactional perspective (Cutchin & Dickie, 2013b; Dickie et al., 2006; Kantartzis & Molineux, 2017). These scholars and those who have adopted a critical lens on contemporary theories to understand occupation (Farias & Laliberte Rudman, 2016; Gerlach et al., 2018; Kantartzis, 2017; Laliberte Rudman, 2013) argued that individualism is rooted in neoliberalism and a biomedical model and demonstrate how the professional practices of occupational therapy influence occupational science research (Gerlach et al., 2018; Laliberte Rudman et al., 2022). This thesis suggests that a collective-child perspective resonates with critiques of the individualistic approach. However, findings also underscore the importance of insights directly from children, which point to the need for an individualised approach to fully capture outdoor

play occupations. An individual perspective helps to illuminate children's lived experiences (also discussed above; see Experiential Dimension of Play Value), while a collective-child perspective aids in understanding the broader environmental influences on occupation within groups and populations. Together, these perspectives provide a more comprehensive framework for examining outdoor play in occupational science.

The point of agreement with these scholars is their critique that occupational therapy and occupational science do not sufficiently acknowledge or value the environmental and contextual influences on occupations. For example, to understand and research occupations, it is necessary to examine the environmental and contextual influences on occupations (Dickie et al., 2006; Gerlach et al., 2018). These scholars emphasise to recognise environmental dimensions related to persons and occupations as an avenue to acknowledge a more situated nature to understanding occupations (Cutchin & Dickie, 2013b; Gerlach et al., 2018; Kantartzis & Molineux, 2017; Laliberte Rudman et al., 2022). This thesis aligns closely with these insights, underscoring the importance of considering environmental and contextual factors into a comprehensive view of occupation. This thesis emphasises the physical environment, with some attention to other environmental dimensions as presented in Chapter Nine. However, to fully understand outdoor play occupations from a transactional perspective, it is essential to consider also other environmental dimensions comprehensively.

For occupational therapists, a collective-child perspective in an audit tool is also valuable. For example, there is a lack of assessment and evaluation procedures that go beyond the individual child or individual child-environment perspective (see for examples: Lynch et al., 2017; Moore & Lynch, 2018a; Romli & Wan Yunus, 2020; Schlager-Jaschky, 2019). Individualised assessments target only a single child's play skills, playfulness, play preferences and interests, motivations to play, and an individual child-environment fit (Bundy, 2011). Currently, no evidence is available on assessments utilised by occupational therapists to investigate play occupations focusing on populations or groups of children and their environmental characteristics. However, in some parts of the world, new

practice areas emerge, emphasising community engagement (Lauckner et al., 2019; Letts et al., 2022) and a shift from practice beyond clinical settings in medical environments to practice in the real-life settings of children's schools, homes, and community settings (Marshall et al., 2017; Meuser et al., 2023; Moore & Lynch, 2015). In such new settings, where the community, groups and population are the target of occupational therapy interventions the need for suitable assessments applicable to these settings and diverse user groups becomes more pressing. Importantly, such instruments potentially also support the capacity to shift practice into such practice settings. This urgency for such tools is also supported by Lynch and Moore (2016), who advocate for developing assessment tools "that are able to more accurately capture play occupation in context" (p. 520), such as public playgrounds, and by Kuhaneck et al. (2024), who calls for the development of "valid and reliable measures of play [which] … further elucidate the influences of contextual variables on play, considering both the physical and the social play environments" (p. 5). The PVUA tool and the ETOPF are tools that potentially support occupational therapists and other professionals in making evidence-based decisions to identify environmental barriers and facilitators to outdoor play and create enabling environments.

10.4.3 Summary: Transactional Perspective on Outdoor Play Occupation

In summary, while this study on outdoor play and environmental analysis of playgrounds contributes to many disciplines, its convincing foregrounding of play occupation provides a valuable contribution to occupational science and occupational therapy. The research delves into the transactional perspective of outdoor play occupations and sheds light on the often-overlooked influence of the physical environment. It emphasises the need to consider the collective-child perspective in research and practice, acknowledging diverse user groups and their varying abilities and preferences. The thesis' unique contribution lies in its synthesis of a transactional worldview with affordances theory, providing a foundation for a better understanding of outdoor play occupation within environment and offering a framework for evaluating these relationships in future research on outdoor play occupation.

10.5 Methodological Considerations

While limitations were addressed in the applicable Chapters of the three research papers, this section presents a few additional and final thoughts on the methodological rigour.

In the scoping review (Study 1, Paper I), the use of the methodological framework Arksey and O'Malley's (2005) with further methodological guidance from Levac et al. (2010) and Peters et al. (2020) provided a comprehensive, rigorous, and systematic approach to the scoping review. Several steps were pivotal to support a comprehensive search strategy. The search strategy was supported by an information specialist from the university library who validated the search string and the selection of databases. Furthermore, several test searches were conducted, which supported refinements of the search string. One important journal (Child, Youth, Environment) was hand-searched, and a follow-up search was conducted in January 2023 to capture relevant and up-to-date research papers. However, it is important to recognise that the parameters of the search blocks may have excluded certain noteworthy papers, and grey literature was not included.

The screening of abstracts and full texts is claimed as an iterative process (Arksey & O'Malley, 2005; Levac et al., 2010; Peters et al., 2020). In this scoping review, this integrative process was foregrounded by not only having one abstract screening phase but rather having two screening phases (see Figure 5). Between the two screening phases, the whole research team met and discussed the refinement of the inclusion and exclusion criteria, which then supported the reduction of papers for full-text reviews. While showcasing this iterative process is often overlooked in scoping reviews, it adds to the methodological clarity of this scoping review.

Another aspect worth discussing is how the interdisciplinary nature of the research topic of outdoor play and playground, as pointed out by previous scoping reviews (Martin et al., 2023), was handled methodologically. First, it was important to locate relevant databases to ensure that research output from relevant disciplines such as health, psychology, education, architecture and other social sciences were included. In total, seven databases were included. Second, the scoping review method was appropriate because it did not exclude papers based on methodological quality, a common step in other

systematic literature review types (Peters et al., 2020). This was seen as especially relevant because the research papers included in the scoping review originate from a diversity of disciplines, all of which follow diverse methodological guidance common in their disciplines. For example, some studies from education did not report ethical approval and/or ethical considerations, which would, in some quality appraisal tools, be marked as lacking methodological quality and might result in the exclusion of relevant papers.

The secondary analysis (Study 2, Paper II) used a subset of research papers previously identified in the scoping review. While this approach has several advantages, such as reduced time needed to gather new studies, it also warrants certain limitations. First, this approach is fairly new, and not many secondary data analysis papers on published scoping reviews have been identified. Therefore, little methodological guidance was available for such an approach. The data set of 45 research papers was initially collected for a different research purpose. Thus, employing a secondary data analysis might not perfectly align with the new research question, potentially leading to gaps or inconsistencies in the analysis (Johnston, 2014; Ruggiano & Perry, 2019). One way to deal with the alignment of research purpose and data set within a secondary data analysis of systematic reviews could be to conduct either an updated search of the review, such as how Laur et al. (2023) have suggested, or to perform an updated search aligned explicitly with the new research question.

This Study 2 (Paper II) rigour was enhanced by the involvement of new team members (Dr Loebach), who served as an expert advisor (Ruggiano & Perry, 2019). This can be considered an advantage as Dr Loebach is an established researcher in child-environment analysis. Furthermore, adding Dr Loebach to the research team made the team more interdisciplinary, potentially enhancing the findings. For example, Dr Loebach independently coded a subset of the included papers, and several meetings were held to support the formation of the environmental taxonomy and a choice of terminology in the taxonomy. This interdisciplinary collaboration has improved the readability and applicability of the taxonomy for a wider multidisciplinary audience.

The analysis conducted in Study 2 (Paper II) focused on the children-environment transactions and counted each identified transaction as evidence supporting the formation of the *Environmental Taxonomy of Outdoor Play Space Features*. While this analysis showed the number of research papers supporting each identified environmental category relation to play affordances, the analysis did not state how confident each paper reported on this relation for example by indicating how often one paper supported this relationship. This is a relevant critique of the performed analysis, as previous research found that certain types of play are more or less common between environmental features. For example, as documented in Chapter Three, several research studies found that functional play or being physically active is predominantly common in manufactured playgrounds. In contrast, more naturalised playgrounds support a wider diversity of play affordances. Another limitation is that this analysis only reported positive transactions but not negative affordances or constraints. Therefore, the analysis could have included another layer showing these aspects of how confident a paper supported a certain play affordance or play type as well as negative affordances.

Overall, regular supervision supported the conceptualisation and data analysis of Study 3 (Paper III). However, several methodological reflections can be made for the expert panel evaluation study. As already briefly mentioned in Paper III discussion, addressing every expert's suggestion was difficult. For example, a significant challenge that several experts stated was the length of the PVUA tool. A reduction of items was not the focus of this modified Delphi study; it focused more on extending its content to the relevant items needed to operationalise play value. Since other Delphi studies have led to item reduction (van den Bogerd & Maas, 2024), a reflection of the methods used could lead to an explanation. One explanation could be that ratings of relevance and clarity were not conducted on each item individually but more on clusters of items in content areas. This decision was made because of the number of items, and rating each item individually for both relevance and clarity would have enormously extended the time experts needed to designate the survey and, therefore, was an informed decision. However, this has led this study not to calculate the Content Validity Ratio (CVR), Content Validity Index (CVI) on item level, or the modified kappa (k*), which would have

supported an informed decision on what individual items can be dismissed (von der Gracht, 2012). Reducing the item pool is a relevant aspect that could increase the PVUA's practicability, as suggested by experts, and warrants future development on the PVUA tool. One way to do this further is to identify the items most sensitive to rate, such as the items that are most difficult and the items that are easiest to rate and create a short version of the PVUA tool. This future research should apply the Rasch Model through more extensive data collection utilising the PVUA tool (Bond & Fox, 2015; Boone et al., 2014).

Methodological rigour in the expert panel study was considered by not only calculating agreement in expert ratings in round 2 but also through stability calculations throughout both rounds. Stability refers to "the consistency of responses across successive rounds of a study" (Dajani et al., 1979, p. 84). Next to agreement, stability is indicated as a necessary criterion in Delphi studies, but it is often not calculated (von der Gracht, 2012). However, these stability calculations could have been improved in this Delphi study by not only relying on one question (overall usefulness) but by introducing several questions such as overall clarity, overall relevance and overall practicability. Another methodological consideration would have been to conduct a third round of expert panel consultation and calculate the stability of responses on content areas in relevance and clarity. However, ongoing development of the PVUA tool and the use of the ETOPF is needed to advance knowledge and practice in order to influence authentic auditing of playgrounds for play value.

10.6 Critical Reflections on the PVUA Tool and Auditing Procedures

The development of the Playground Play Value and Usability Audit (PVUA) tool represents a significant contribution to the evaluation of outdoor play environments; however, its current form presents several areas for further refinement and critical consideration. These critical reflections regarding the tool, as well as the auditing procedures in general will be presented in this section of the thesis.

One of the key limitations is its strong Global North perspective, as both the literature informing the tool and the expert input in Study Three were primarily derived from this context. This raises questions about its applicability

in the Global South, where environmental, cultural, and policy-related differences may necessitate adaptations. Future work should focus on testing and refining the tool in diverse global contexts to ensure its relevance beyond Western settings.

Another challenge concerns the level of detail and length of the tool, which, while comprehensive, may pose barriers to practical implementation. Streamlining its structure and reducing redundancies—such as the overlap between content areas like "Open Space Characteristics for Play" and "Topography for Play"—would enhance its usability.

The PVUA tool also implicitly privileges certain types of play, particularly physically active play, as evidenced in the play equipment section of the tool. While this thesis found that physically active play, particularly challenging play opportunities (see Paper 1, Study 1, “Intensive Play Experiences”), is important for children, these play experiences are often more physical in nature. The emphasis on physical play in some sections of the PVUA tool may unintentionally overshadow other crucial forms of play, such as imaginative, social, or sensory play. This bias could lead to a limited evaluation of playgrounds, potentially overlooking elements that foster creativity, role-playing, and inclusive social interactions, which are equally relevant to the play value of a playground. A more balanced representation of diverse play opportunities would be necessary to provide a holistic assessment of playground quality.

Several aspects of the tool were flagged as being highly sensitive to contextual factors. For instance, certain items are influenced by geographical location (e.g., weather-related considerations), national policies (e.g., country-specific safety regulations), and cultural play traditions (e.g., the integration of natural elements in playgrounds). These factors suggest that while a standardized tool is useful, some level of flexibility or contextual adaptation may be necessary to ensure meaningful assessments across diverse settings.

In addition to this reflection on the PVUA tool developed in this thesis, broader reflections on audit tools and auditing procedures must also be considered. One of these reflections is the operationalisation that an audit tool seeks to achieve by assigning numbers to items. While this aspect helps to simplify a construct, such as play value and usability, it also presents pitfalls,

which will be discussed in the following section based on the PVUA tool. It is also crucial to understand that the items of the PVUA tool are rated based on their presence or the degree to which environmental characteristics are present. This means it is not always straightforward to determine if such presence is something positive for every user group. For example, some items, such as the presence of loose materials like sand, might enhance the play value for some users but act as a barrier for others (e.g., children using mobility devices). Furthermore, at this current stage, each item is operationalised on the same scale, meaning that each item holds the same weight. Furthermore, at this current stage, each item is operationalized on the same scale, meaning that each item holds the same weight. However, certain items may be more relevant or important than others for specific user groups or contexts. This is problematic, as some items might be easier to score than others, and someone could assume that a playground that scores highly on these easier items is inherently of higher quality. Future work on the PVUA tool may need to identify the most important items or find ways to assign greater weight to certain critical items to ensure a more accurate and meaningful evaluation.

Another problem with an approach to operationalising characteristics is that linking an environmental characteristic to a number on the rating scale could lead to a misinterpretation that certain characteristics are required. A user employing such tools in an audit capacity may assume that fulfilling more criteria will result in a higher-scoring playground. However, this can introduce significant bias and incorrect interpretations. First, it may lead users to believe that a particular item must be included to create a high-quality play space, even if it is unnecessary or inappropriate for certain populations. This could eventually result in users treating the items as rigid design templates, which is not the tool's intended use. In fact, this would be the opposite of what the PVUA tool aims to achieve—rather than enforcing a one-size-fits-all approach, it should serve as a reflective and flexible resource for assessing play value and usability. Therefore, the items and their operationalisation need to be carefully interpreted in audit tools. The PVUA tool should be viewed as a capability-building resource that guides playground managers, designers, and decision-makers in making informed choices about outdoor play

environments. To mitigate the risks of operationalisation described above, it is of utmost importance that a detailed manual be created to accompany the tool in the future, clarifying its interpretation and intended use. Training in the tool's application will also be necessary to ensure consistency in assessments and to reinforce that the PVUA tool is not a prescriptive checklist but a flexible guide for enhancing play value and usability.

Inclusivity remains an area that requires stronger emphasis within the PVUA tool. While the audit tool does address usability, the experts from inclusive play provision critiqued that the tool might not cater specific to these user group and their needs. While this thesis tried to consider children with disabilities and their needs through the construct of usability it is not as clear how these user groups are considered. This might have been the results of not basing the underlaying theories within disability studies (Burke and Stafford, 2023) or evolving design solutions of Universal design for play space design (Moore et al., 2020; Moore & Lynch, 2015). There is a need for a more explicit focus on inclusive design principles, ensuring that playgrounds cater to children of all abilities and needs.

In summary, while the PVUA tool represents an important step toward systematically assessing playground play value and usability, critical refinements are necessary to improve its global applicability, practicality, inclusivity, and adaptability to diverse contexts. Future iterations of the tool should focus on streamlining its content, addressing cultural and geographical variations, enhancing its sensitivity to different play needs, and ensuring that its use does not inadvertently privilege certain play types or populations over others.

10.7 Impact of this Research

The impact of research should be, in the best case, made to different audiences and contexts. In this section, the impact of this thesis research to date is reviewed for the scientific community, for professional practice and for the education of professionals.

10.7.1 Impact on the Scientific Community

Overall, this thesis made several contributions to the body of evidence, including three open-access publications (Morgenthaler, Schulze, et al., 2023a; Morgenthaler, Lynch, Loebach, et al., 2024; Morgenthaler et al., accepted), five oral presentations (Morgenthaler, Schulze, Jackson, et al., 2022; Morgenthaler, Schulze, Lynch, et al., 2022; Morgenthaler, Schulze, et al., 2023b; Morgenthaler, Lynch, Schulze, et al., 2024; Morgenthaler & Schulze, 2022), two poster presentations (Morgenthaler, Bergin, et al., 2021; Wenger, Morgenthaler, et al., 2021), and five workshops (Morgenthaler, 2024; Morgenthaler, Lynch, et al., 2023; Morgenthaler & Vinçon, 2022; Schulze et al., 2024; Veiga-Seijo et al., 2023). These contributions were made to diverse audiences of the scientific community, including interprofessional journals (International Journal of Environmental Research and Public Health and Children, Youth and Environments) specifically to Occupational Therapy practitioners (American Journal of Occupational Therapy) as well as conferences targeting occupational scientists (for example, Inaugural World Occupational Science Conference), occupational therapist (for example, 18th World Occupational Therapy Congress) and interprofessional audiences (for example, 22nd International Play Association Triennial World Conference).

Some metrics can be provided for the individual articles. The metrics provided by the academic journals and *Scopus* will be reviewed for Studies 1 (Paper I) and 2 (Paper II). The third Study (Paper III) has been recently accepted, and no metrics are available. The scoping review (Morgenthaler, Schulze, et al., 2023a) was published on the 18th of January 2023 as the cover study in the International Journal of Environmental Research and Public Health, Volume 20, Issue 3 (see https://www.mdpi.com/1660-4601/20/3). The International Journal of Environmental Research and Public Health has a CiteScore[9] of 7.3 for the year 2023 (Scopus, 2023). I was invited to create a visual cover picture alongside the article submission. On the Journal homepage, it has been accessed by 7917 individual Internet Protocol addresses (IP addresses) (accessed 03.11.2024). This article lies in the 80nd

[9] CiteScore is one journal evaluation metric based on citations in the Scopus database. CiteScore 2023 is calculated by dividing the number of citations from 2020–2023 by the number of articles published in the same period (Scopus, 2023).

percentile; in other words, it is in the top 20% of articles globally (Scopus accessed 03.11.2024). Its Field-Weighted citation impact[10] score is 1.46, higher than expected for similar research work (Scopus accessed 03.11.2024). The scoping review has 31 registered citations (Google Scholar accessed 06.04.2025) and 18 (Scopus accessed 06.04.2025). To date, it has been contributed to various interdisciplinary scientific research on the topic of playground and outdoor play of perspectives of professionals in naturalised playground provision (Karaba Bäckström et al., 2024), children's perspectives on playground provision and participation in design (Bergin, 2024; Orain et al., 2025; Ouafa & Abida, 2024; Rivas-Quarneti et al., 2024; Wenger, Lynch et al., 2024), children's perspective on digital play (Loudoun et al., 2023), bibliographic analysis on scientific literature contributing to inclusive playground development (Wang et al., 2025), parental perspectives on green open space quality for their children's outdoor play (Asadi, 2024) assistive technology contribution to outdoor play (Dabiri Golchin et al., 2024) enhancing social interaction experiences on playgrounds (Yang et al., 2023), play space evaluation in high and low socioeconomic areas in South Africa (Clarkson et al., 2025), the need to consider children's perspectives in tools to evaluate existing playgrounds for inclusivity (Taylor et al., 2023), a state of practice papers in occupational therapy (Kuhaneck et al., 2024), and two book chapters on the topic of inclusive outdoor play and the built environment (Bishop, 2025; Fich Jesperrsen, 2025).

The secondary analysis (Morgenthaler, Lynch, Loebach, et al., 2024) was published on the 28th of May 2024, in Volume 78, Issue 4, in the highest-ranked academic journal in the profession of occupational therapy (American Journal of Occupational Therapy; Reynolds, 2023). The American Journal of Occupational Therapy has a two-year impact factor[11] of 2.9 and a five-year impact factor is 3.1 (Reynolds, 2023). This recently published article has to

[10] Field-Weighted Citation Impact (FWCI) shows how well cited this document is compared to similar documents. A value greater than 1.00 means the document is more cited than expected, according to the average. The FWCI considers i) The year of publication, ii) Document type, and iii) Disciplines associated with its source. Scopus provides the FWCI score.

[11] A journal impact factor is one common metric indicating how often, on average, articles from a journal are cited within a specific period, usually measured over 2 or 5 years.

date six registered citation (Scopus accessed 06.05.2025). Two are in occupational therapy (Kuhaneck et al., 2024; Orain et al., 2025), one in rehabilitation science (Taylor et al., 2024), one in environmental psychology (Deng et al., 2024), one in human geography (Stenning, 2025), and one in environmental education (Dankiw et al., 2025), demonstrating the paper's influence across diverse disciplines and contexts. Since its publication date, it has been viewed 4080 times by individual Internet Protocol addresses (IP addresses) and downloaded 1235 times on the journal homepage (AJOT accessed 07.05.2025). This article is in the 87th percentile, ranking it in the top 13% of articles globally. Its Field-Weighted citation impact score is 2.26, so more than double as expected for similar work published at that time (Scopus accessed 03.11.2024).

The modified Delphi study paper was submitted on the 29th of February 2024 to the editors of a collective special issue for consideration to be published in *Child, Youth, Environments* invited after I presented at the 22nd International Play Association Triennial World Conference (Morgenthaler, Lynch, et al., 2023). This paper went under minor revisions, sent back to the Journal and is currently in second cycle of peer-review (See Appendix 21). At the moment no metrics are available.

In addition to these metrics, the research output has also sparked some future collaborations, such as with Dr Janet Loebach, who also became an advisor to this project and will continue to support the work on the development of the PVUA tool. There is also the master's student in health assisting engineering in Austria who supports data collection using the PVUA tool. Both show the valuable contribution of this thesis work and sustainability to further developing this PVUA tool.

10.7.2 Impact on Professional Practice

This thesis topic was situated in the area practice area of a larger project (www.p4play.eu), and it extended the body of knowledge on evidence-informed practice by developing new tools supporting the analysis of playgrounds of play value and usability. Research on outdoor play and playgrounds originates from diverse disciplines, including architecture and

landscape architecture, health care, education, psychology, built environment, and geography (Martin et al., 2023; Morgenthaler, Schulze, et al., 2023a). Although it is challenging to quantify the direct impact of this thesis' research on current practice, some indications of its influence can be observed. Potential impact can be anticipated through specific individuals' uptake, engagement on social media, and personal interactions with various professionals.

The *World Playground Research Institute*, based at the University of Southern Denmark, picked up the scoping review. The institute has created a comprehensive research brief with the key findings of the scoping review (World Playground Research Institute & Gramalla, 2024). The World Playground Institute promotes children's health, well-being, physical activity, and positive development worldwide through research and advocacy for evidence-informed playground planning and design. This research brief, based on the scoping review findings, is the most downloaded research paper from the World Playground Research Institute website (personal communication Gramalla B. 25.09.2024). Additionally, the findings of the scoping review were summarised on the *Children & Nature Network* websites dedicated to disseminating evidence-based research on the topics of outdoor play and nature (Children & Nature Network, n.d.), and I was invited to write a blog post, which was published on the website of *Outdoor Play Canada* (Morgenthaler, 2023). These outreach activities created additional resources, making the findings from this scoping review more accessible in easier-to-read language and are hoped to reach multi-professional audiences, the general public and policymakers.

Some metrics were available for the recently published secondary analysis through social media engagement. Published in an occupational therapy journal, some occupational therapy practitioners contacted me and provided insights for its practical use. For example, Caroline Hui, a researcher and practitioner from Canada, wrote, "The new taxonomy you propose will be very useful for occupational therapists and others looking at play spaces. … What a valuable contribution" (personal communication with Caroline Hui). Maureen Rayan, a paediatric occupational therapist from Ireland, highlighted: "This has many applications to everyday clinical practice and at a population

level" (Rayan, 2024). Similarly, Susan Bazyk, an Emerita professor and community of practice researcher focusing on school-based practice from the United States, wrote, "excellent study and recommendations for environments that foster play. … This is an important contribution to promoting play and health in children and youth" (Bazyk, 2024). These examples from occupational therapists align with the intentions behind this research, including environmental evaluations of public playgrounds and schoolyards, providing tools that support practitioners, and offering tools that address play preferences for various populations (collective-child perspective). Furthermore, through these outreach activities, I was invited to present his research at the annual International Sensory Integration Congress in Sydney, Australia, in October 2024.

Beyond occupational therapy, this study also reached interdisciplinary audiences, including play advocates, municipality-responsible people for playgrounds and parks, outdoor play researchers, and play equipment providers. *A Playful City,* a not-for-profit-focused organisation based in Ireland, shared Study 2 (Paper II) on their social media. Their post reached 135 likes, 20 reposts and 23 comments (A Playful City, 2024). Similarly, Amanda Scot, a municipality official responsible for parks and open spaces in Westminster City, England, highlighted how this study could support her work, which focuses on "to ensure a purposeful and meaningful outcome that meets the needs of local children … and taking the voices of children seriously [which] pays dividends for their futures and reducing inequalities" (Scott, 2024). Marianne Brussoni, a leading researcher in the area of outdoor play, endorsed the article on her social media profile (Brussoni, 2024). I was also providing feedback to other interdisciplinary research projects, including the national research study investigating inclusive playground provision in Germany (Weber et al., 2023). Playground equipment providers also showed interest in the findings, for example, through online consultation supporting the development of a White Paper on the topic of Universal designed playgrounds (Fich Jesperrsen, 2024) and feedback on the research findings' usefulness in their work (personal communication *Earthscape Play*, Spring 2023). In September 2024, I was invited to present my research to 15-20 employees of KOMPAN including user-centred researcher, engineers, industrial designers

and landscape architects which included a discussion on inclusive play solutions.

Furthermore, outreach activities on the research findings targeted diverse stakeholders in city and community development in the Netherlands and Ireland. For example, during his secondment time in the Netherlands with the project partner (https://speeltuinbende.nl), a get-together event was organised, and interdisciplinary outdoor play advocates, policymakers, and playground providers attended. In discussions, I provided evidence-informed information from children's perspectives and reframing viewpoints to consider children's play preferences, such as experiencing speed. Children using mobility devices might not use a slide but hills and dips to experience speed. A similar event was hosted by *P4Play* and *Let's Play Cork*, where I was able to analyse, together with diverse stakeholders, existing playgrounds, their play value and their potential for change in Ireland (Morgenthaler, 2024). This event also has led to further community partnerships when new playgrounds are planned in local communities. Combined, these metrics and insights from various individuals show that, up to date, this research has impacted practitioners in multiple fields and locations globally.

A potential future impact on practice could stem from this thesis's synthesised work, especially from Study 2 (Paper II). For example, the findings confirm that the play equipment category significantly supports physical play affordances. However, they also support more restorative play, such as resting, sitting, laying or sitting, talking, sitting, and observing. So, suppose the evidence points to these two commonly observed children's play preferences (see Figure 11 in Chapter Nine). In that case, the play equipment designs should also be intentionally designed to support such potential play affordances and need to move beyond providing only for physically active free play. Such information could be precious for playground providers and designers. Figure 11 could also be interpreted similarly in other categories of playground features identified in the ETOPF.

Beyond this tangible impact on practice, this thesis also advances the discipline of occupational science. The knowledge generated not only provides new evidence on outdoor play as an occupation but also contributes to the methodological development of the field. Occupational science, as a relatively

young discipline founded approximately 30 years ago (Clark et al., 1991; Wilcock, 1993) has primarily relied on qualitative methodologies to explore the complexities of human occupation (Pierce, 2014b). Foundational scholars, including Yerxa (1991) and Zemke and Clark (1996), emphasized the value of qualitative approaches in capturing the subjective and experiential dimensions of occupation. This has shaped the discipline's research trajectory, as reflected in multiple literature reviews demonstrating the predominant use of qualitative inquiry (Glover, 2009; Li et al., 2024; Molke et al., 2004; Occupational Science Europe Research Committee (OSERC) et al., Occupational Science Europe Research Committee et al., 2023; Pierce et al., 2010). However, as occupational science continues to evolve, there is a growing recognition of the need to expand its methodological toolkit to include quantitative approaches that can systematically assess occupational constructs. Some progress has been made in this direction, with scholars developing instruments that attempt to quantify various aspects of occupation (see for examples: Björklund et al., 2014; Eakman et al., 2010; Heatwole Shank, 2013; Wood, 2005). Yet, despite these efforts, quantitative research remains a relatively underdeveloped area within occupational science (Pierce, 2014b). This thesis represents an important step toward addressing this gap by developing a structured tool that captures the usability and play value of outdoor environments. By doing so, it advances the discipline beyond its traditional qualitative roots and demonstrates the potential for mixed-methods and quantitative approaches to enrich occupational science research.

10.7.3 Impact on the Education of Professionals

Educating new generations of professionals is a crucial responsibility that shapes the future of practice. I implemented some research findings in occupational therapy programs.

For example, teaching activities included pilot testing the *Playground Play Value and Usability* tool (Version 1) with a group of Students at University College Cork 2022. These students were given an introductory lecture on the PVUA tool, instructed on its practical application, and provided feedback on the tool after pilot tests. An empirical bachelor thesis on parental evaluation of an inclusively designed playground in a rehabilitation centre, which I co-

supervised with Dr Alice Moore, was awarded the best bachelor thesis by the Association of Occupational Therapists Ireland (Wallace et al., 2023). A guest lecture was given on outdoor play and playground evaluation at the University of Ljubljana to a Bachelor undergrad class in 2022, and a lecture on methodology and methods was presented in the European Master's in Occupational Therapy programme in 2022. Furthermore, I was able to support other occupational therapy lectures on his topic by providing them with resources (for example the occupational therapy programs at the University of Winchester in the United Kingdom and NYU Steinhardt in the United States. These are just some educational opportunities could combine with his research to date.

10.7.4 Implications for Policy

This research contributes to international policy comitments in the broader fields of child rights and sustainability. The findings reinforce the importance of integrating children's voices into decision-making processes, providing an argument that children are knowlegal stakholders about their outdoor play. This supports the importance of participatory approaches regarding playground planing, design and managment (Jansens et al., 2023; Schoeppich et al., 2021) which has the potental to lead to more inclusive play environments meeting their preferences and needs (Wang et al., 2025). While this thesis not directly worked with children, the children's perspective and what is important for them was the starting point of this thesis and contioously infuenced in the development of the PVUA tool.

As described in Chapter Three existing policy frameworks for playground auditing procedures are limited, often focusing solely on safety, physical activity, or learning (Ball et al., 2019; Spiegal et al., 2014; Verstrate & Karsten, 2016). This thesis findings builds the foundation for a stronger legal and policy commitments to the right to play. It emphasizes the importance of evaluating current conditions, including the physical environment of playgrounds, as recognized in General Comment 17 (UNCRC, 2013) as well as by the International Organization for Standardization (IOS 2023) with IOS 4980:2023 (Benefit-risk assessment for sports and recreational facilities, activities, and equipment). Therefore this thesis knowlege is needed and has

the potental to extend current practices in playground evaluation procedures providing a more nuanced evaluation that consideres greater diversity of play opportuntites and considerations of a diverse abeled children and dverse play preferences. Such tools are essential, and my interactions with various stakeholders at conferences and community events—including practitioners, policymakers, playground managers, designers, and other researchers—underscore this need.

Furthermore this thesis findings aligns with national and international commitments, including the United Nationas Sustainable Development Goals (SDGs) (United Nations, n.d.). Particularly Goal 11: Sustainable Cities and Communities, which aims to "provide universal access to safe, inclusive, and accessible green and public spaces, particularly for women and children," and Goal 3: Ensure healthy lives and promote well-being for all at all ages (United Nations, n.d.). This thesis directly supports Goal 11 by demonstrating how well-designed and managed outdoor spaces contribute to child development, social inclusion, and community well-being (United Nations, n.d.). The thesis findings highlight that accessibility alone is not enough—playgrounds and outdoor environments must also provide meaningful and diverse play opportunities that cater to different abilities, sensory needs, and cultural contexts. Inclusive and high- play value play spaces can strengthen social cohesion, create safer and more welcoming public spaces. This insight is crucial in addressing disparities in access to outdoor play and ensuring that urban development prioritizes the needs of all children, including those with disabilities.

The thesis also has direct implications for Goal 3, which focuses on ensuring healthy lives and promoting well-being for all (United Nations, n.d.). The research underscores that outdoor play is not just a recreational activity but a vital part of childhood and contributor to physical, mental, and emotional health. Through its examination of how play environments support autonomy, creativity, and social engagement. Importantly, it brings attention to the fact that marginalized children—such as those with disabilities—often experience reduced access to quality play opportunities, negatively affecting their well-being. By identifying these gaps and proposing solutions, this research supports efforts to create healthier and more equitable urban environments.

In conclusion, the knowledge generated by this thesis extends beyond playground evaluation and holds societal relevance within the broader domains of children's rights and sustainability. It aligns with national and international commitments, including the United Nations Convention on the Rights of the Child (United Nations, 1989) and the UN Sustainable Development Goals (SDGs) (United Nations, n.d.). By addressing social, environmental, and children's play preferences, the research provides a valuable framework for policymakers, urban planners, and educators working toward more inclusive and sustainable cities.

After revealing the impact and implications of this research to date, the next section will explore potential future research needs.

10.8 Points of Departure for Future Research

The preliminary version of the PVUA tool developed in this thesis needs ongoing further work. As Wilson (2005) noted that the construction of a new instrument always begins with a general idea about what phenomenon one wishes to measure; this in turn demands careful conceptualisation of that phenomenon. While it was first planned to have a final tool constructed and tested, this was not possible due to the length of time it took to evolve concepts, articulate underlying theories and values, interpret the test content, and develop the items and domains. These rigorous steps are essential and have often been ignored in previous playground audit tool development (see Chapter Three).

From a scientific standpoint, other sources of validity evidence must be gathered. For example, future research should test the tool's internal structure to establish construct validity. This will support whether the PVUA's content gathered in this thesis also statistically supports the play value construct and, subsequently, its interpretation. A more extensive and systematic data collection with the PVUA tool is a way forward to achieve this. Data collection might include various playground types such as naturalised, manufactured, inclusively designed, or different sizes with various playground features. Modern Test Theory with the underlying Rasch Model (Bond & Fox, 2015)

could support identifying the most sensitive items, including those that are easy and difficult to score in relation to these playground types.

Instrument development is an ongoing process in which an instrument is tested for a new potential interpretation (AERA et al., 2014; Sireci & Benítez, 2023). This thesis laid the foundation for its potential interpretation, but empirical evidence needs to be gathered to test these interpretations. To establish this, future research might ask: Can the PVUA tool identify playgrounds high and low in play value and usability, and what are the significant characteristics (items, domains) that are sensitive to detect these playgrounds? To answer this question, the tool should be combined with other methods, such as observations and user feedback, to see if high or low scores match.

The PVUA tool is expected to evolve further, with future research addressing additional issues raised by experts beyond those discussed in Study 3 (Paper III). Key areas for improvement include the tool's length, which may impact practicability, and the need for familiarity with a playground's community and history to accurately evaluate certain items. Experts also noted a potential bias, as the tool may priorities certain types of play, such as physical activity on playground equipment. Additionally, questions about how the type or size of a playground influences score interpretation suggest areas for refinement. Addressing these issues could guide the continued development of the PVUA tool.

Another avenue of research is the research-praxis transfer of the PVUA tool in playground management or refurbishing processes of existing playgrounds. As pointed out in Chapter Three, playground audit tools have been claimed to support informed decision-making to enhance playground quality and guide upgrades, refurbishments, and funding allocations (Meng & Wang, 2022; Taylor et al., 2023). These tools bridge the research-practice gap by advocating for inclusive playground provision (Taylor et al., 2023). These claims are very important for practice but have not been empirically proven. Therefore, future work should involve the people responsible for playground provision, design, planning and management. The purpose of this research might be to investigate the processes of how the PVUA tool is used and inform the decision-making of these professions.

Besides this future work on the PVUA tool the literature reviews (Study 1, Paper I and Study 2, Paper II), provide valuable future research directions for outdoor play. Two of these research gaps are (i) nature play of children with disabilities and (ii) underexplored playground features. Regarding the nature play of children with disabilities, a lack of evidence exists on how nature-based solutions are effectively and successfully designed and provided for children with various disabilities. However, the findings identified that nature play is important for children's outdoor play, and this can be confirmed by other systematic reviews of children's perspectives (Wenger, Lynch, et al., 2024). While other scholars argue that nature play would represent an ableist perspective on play (Beckett & Fenney, 2024), it was noted in Studies 1 and 2 (Paper I and II) that, to date, research has not explored enough on how natural features and materials best support play affordances for these user groups. Most research focuses only on physical accessibility and often focuses on physical disabilities and children who use mobility devices such as wheelchairs or walkers. Future research should specifically gather evidence of more diverse abled populations engaged with more natural environments, and in the best case, other diversity characteristics, including gender, sexuality, and cultural and socio-economic backgrounds should be considered. The second topic of underexplored environmental features draws on the findings of Study 2 (Paper II), where various playground features were identified and linked to potential affordance. These underexplored features include pathways and walkways, topographical features, built environments for play like seating and fencing/boundaries, spaces on the edge, and wildlife-friendly habitats. Future research should specifically focus on these categories and their environmental functional qualities support play or how these can be improved to enhance children's outdoor play.

10.9 Concluding Statement

This thesis contributes with an evidence-informed and space-oriented approach to socio-spatial inclusion in play provision and practice informed by a transactional perspective and the theory of affordances. Taking the stance of influencing and shaping the nature of the physical environment, the preliminary validity evidence in relation to the test content of the *Playground*

Play Value and Usability Audit tool was first guided from the viewpoint of children with and without disabilities and further evaluated and extended by an international expert panel on outdoor play. Theoretically, this playground audit tool is underpinned by the theory of affordances with the *Environmental Taxonomy of Outdoor Play Space Features*, providing a solid evidence base for its interpretation. The *Playground Play Value and Usability Audit tool* has the potential to support practice and research to justify environmental improvements or changes during the retrofitting or expansion processes of public playgrounds. This preliminary playground audit tool is now ready for field testing and gathering of additional validity evidence. Additionally, this thesis advances knowledge of the play value construct as a multi-dimensional construct. As justified this play value construct needs two ways of investigation. The experiential and subjective dimension of play value might be investigated by child-centred methods eliciting children's lived experiences-environment transactions. The PVUA tool investigates dimensions of the *ecological setting for play* and the *immediate physical environment's contribution to play.* Ideally, an evaluation of a playground's play value and usability should use a kit of tools, including environmental audit tools such as the PVUA tool, user observations, and user-based feedback. Ultimately, these tools could drive informed decision-making in playground provision, design, and management, ensuring that children's play preferences are effectively met.

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APPENDICES

Appendix 1. *Review of Grey Literature Playground Audit Tools*

Playground audit tools developed for public playgrounds (published in grey literature)					
Name of Tool (Reference) [Country]	**Intended Use**	**Test Content in Domains (Number of Items)**	**Evidence Base of Test Content**	**Test format**	**Strengths (+) and Limitations (-)**
Patent for a Method and System for assessing play value on playground (Cosco et al., 2017) (USA)	To determine the play value of playground, the challenge level of a playground or both. To determine what playground are of greatest play value	Description of the Assessment tool Physical play Domain: First identification of play possibilities - Identify play opportunities are present at the playground (climbing, rocking, sliding, crawling, spinning, balancing, swinging, upper body exercise - How many components are available for each play opportunity (range) - How many different types are available? - How many social (side-by-side) play? Second, identification of challenge level whereas each play possibility has different challenge categories e.g. climbing: Distance between risers, Inclination, Climbing direction, Stability of step, Height This results in sum scores of:	Not reported	On site evaluation of playground structures	(-) Mostly focuses on play equipment and play structures (-) No items for usability presented (-) Unclear how tool was developed including content of the tool

		- DESTRIBUTION of PLAY OPPORTUNITIES - SOCIAL OPPORTUNITIES (in this physical play opportunities) - LEVEL of CHALLNGE 2) Social/Cognitive Domain Identify play opportunities present on play equipment? Dramatic Play: playhouses, steering wheels, telescopes, and panels with windows. Manipulative Play panels Creating Music and At: drums, Xylophones, and music panels, painting, drawing. Communication: talking tubes. Small Group Play. Cozy areas, hooks. Natural Elements: intentionally designed opportunities to play with natural elements like sand, water, dirt, sun, Wind, or rocks. Games. tic tack toes, electronic gains, table games. Learning Science, Math, Social Studies, literacy: panels showing numbers, letters, words, plants, birds, informational panels and/or hand-on panels with movable parts. All items are captured by following leading questions: - How many components are available for each play opportunity (range)			

		- How many different types are available? - How many social (side-by-side) play? This results in sum scores of: - DESTRIBUTION of PLAY OPPORTUNITIES (Opportunity, Quantity and Variety) - SOCIAL OPPORTUNITIES (Number of components for multiple users) 3) **Site attributions** Rating: 0= not available, 1= partly available, 2 completely available Inclusion, Primary Pathways, Topography, Planting Pockets, Trees & Shrubs, Site Enclosure (Boundaries), Shade, Seating, Signage, Surfacing, Amenities, Cultural/Historical Themes			
Simple Play Tool (Timberplay LTd, n.d.) UK	Not reported	32 questions survey ENVIRONMENT (4 items) CHALLANGE (4 items) MOVEMENT (4 times) SENSORY (4 items) ELEMENTAL (4 items) CREATIVE (4 items) SOCIAL (4 items) SPACE (4 items)	Not reported	On site evaluation of playground using website	(-) Developed by a playground provider, might has commercial interest (-) unclear how test content was developed (-) some items do not fit to the proposed scale

					(-) no items for diverse users
Play Wales Play space audit tool Playing out questionnaire (Play Wales, 2021) UK	• To managing existing play spaces or develop a new play space • To identify where, what and how often the space is used for play, • To realize if neglection and maintenance is needed • To realising current opportunities for play and identify opportunities for further enhancement of play	**Play space audit tool:** DETAILS ABOUT OBSERVATION (Time, Day, Weather) KEY FEATURES and AFFORDANCES of SITE (brief open description) open description) USAGE by CHILDREN, TEENAGER and ADULTS (NUMBERS): gender, age indication if in group, alone, accompanied BEHAVIOUR OBSERVED BY THE PRESENCE OF CHILDREN AND TEENAGER: (walking, traveling through space, sitting/gathering/hanging out, riding bike/scooters/skateboards, use of natural features, playing with elements (water, earth, fire, air), Use of the senses (taste, smell, sight, sound, textures), movement (running, jumping, climbing, balancing, rolling), rough and tumble, risk and challenge (physical), playing with props/loose parts, playing with identify, walking dog PLAY PROVISION ACTION PLAN – HOW DO YOUR OBSERVATIONS CONTRIBUTE TO EVIDENCE ABOUT WHAT CHILDREN/THE COMMUNITY WANT? (Indicate requirements and actions)	Not reported	On site evaluation of playground	(+) Combination of audit und questionnaire, observation (-) unclear how test content was developed (-) mostly focusing on features of play spaces not qualities

		Playing out questionnaire Children characteristics: school, gender, disability Where are you allowed to play? What, if anything stops you from being able to play in these places? (given answers) When you go out, what do you like to do?(given answers) How good are these places for playing?			
Plan Inclusive Play Area (PiPA) (Wagenfeld & Hurley, n.d.) UK	To identify gaps in provision or barriers in accessibility to inform new play spaces,	Plan to Go (traveling to the playground) 11 items Plan to Access (access within the playground) 15 items Plan to play (play diversity in 6 senses, imitative play, physical play, individual and quite play, risk and challenge) 12 items Plan to Rest and Re-charge (Providing Downtime) 12 items Plan to Engage (promoting your inclusive Playground e. g. website, social media) 5 items	Not reported	Yes/no checklist Possibility to give comments	(-) was developed by play equipment provider, has a commercial interest by accreditation and own products (-) unclear how test content was developed (+) focus on usability and accessibility but neglecting other play value aspects (-) strong focus on play equipment only
Getting it right for Play: A toolkit to assess and improve local	To assess the quality of any play spaces in local communities	Name of the play Space. How often do you play here? (Given answers) Is the play place easy to get to? - I can see my house from here	Not reported	Yes and No Checklist	(-) unclear how test content was developed

play opportunities (Cole-Hamilton & Crawford, 2010) UK	from the user perspective	- I can walk here on my own or with friends. - I can only walk here if an adult is with me - I can only get here by car or bus. What is the play place? - The play place has natural things to play on or with eg. tree logs, rocks. - There are things to move around and play with in different ways. - There is fixed play equipment to play on. What can you play here? PHYSICAL play: running, chasing, hopping jumping; Climbing; Swinging; Sliding; Spinning or rocking; Balancing or crawling; Bike or shooter riding; Roller skating or skateboarding; Ball games like basketball, tennis, football or rounders; CREATIVE play: Sand/Soil for digging or making things, Water for pouring, measuring or splashing, Things or places for pretend play, chalking drawing or painting, A place to perform/sing/act, Building dens or other structures SOCIAL play: quiet places to be on your own or with a few close friends. Other boys and girls to play with of different ages and abilities. Grownups around to ask for help with play if needed. CHALLANGE/RISK: You can make playing more difficult and take risks if you want to.			(+) focus mostly on presence of play featers

		INCLUSION: You can play with all the playthings that are in the space. CONTACT with NATURE: Long grass, wildlife insects and plants around. Clean and Safe: - It is usually free from dog mess. - It is usually free from too much litter laying around. - There is no broken equipment or missing parts. - There is no danger from traffic. - You can cross any roads safely on the way to this place. - There are houses or building nearby with people who could help you if you were in trouble. What would make this a better place to play in? (Open question) Where else do you play nearby? (open question)			
Quality of play environments: Providers assessment tool (Play Scotland, 2010)	To assess the quality of any play spaces in local communities	LOCATION: (8 items) e.g. Signage welcoming play ACCESSIBILITY (5 items) e.g. Play surface in good condition FEATURES: (10 items) e.g. Sensory play opportunities, Long grass, Boulders, Water features CHALLNAGE and Risk (2 items) e.g. Play items offer excitement, daring play experience	Not reported	On site evaluation yes and no checklist	(-) unclear how it was developed (-) only focus on presence and absence of features not their characteristics

Appendix 2. *Recruitment Email*

Email to be send to P4Play consortium and known experts to gain access of experts in the area of playground design and outdoor play.

TO: Potential participants
FROM: Thomas Morgenthaler, PhD researcher at Zurich University of Applied Sciences, University College Cork, Queen Margaret University Edinburgh
Subject: Invitation for experts in the area of outdoor play, playgrounds and children's rights to play.
Date: ……

Dear NAME OF EXPERT [FULL NAME AND TITLE]

I hope this email finds you well!

My name is Thomas Morgenthaler. I am a PhD researcher in the P4Play project. Together with my supervisors Christina Schulze, Helen Lynch and Duncan Pentland I am conducting research about the development of a new evidence-informed audit that supports the evaluation of environmental qualities of public playgrounds for play and inclusion.

Why am I emailing you? [will be tailored to the experts I am addressing]

- **Experts who have research background on playground and outdoor play:**

I have identified you as an expert who has published in the area of outdoor play and public playground provision. Your expertise will be valuable for our research project about the development of a new audit to evaluate public playground's play value from a children's perspective.

- **Experts that work in practice with communities:**

I have identified you as an expert in the area of outdoor play and playground provision and community engagement (e. g. planning playgrounds with children, consultant as a play expert with communities). Your expertise will be valuable for our research project about the development of a new audit to evaluate public playground's play value.

- **Experts that have an instrument development background:**

I have identified you as an expert who has developed an instrument, assessment, audit (MSQA and SASQ) focusing on environmental qualities. Your expertise will be valuable for our research project about the development of a new audit to evaluate public playground's play value.

- **Experts that are within the P4Play consortium**

I emailed you as you are a partner in the P4Play consortium and because we identified you as an expert in the area of outdoor play and playground provision. Your expertise will be valuable for our research project about the development of a new audit to evaluate public playground's play value.

You might wonder if you are such an expert?
You would be an expert who could contribute to the study if:

- You are a researcher and/or practitioner with experience in providing/designing/advocating/evaluating playgrounds.
- You are a member of a profession like (but not limited to): play researcher, occupational therapist, play consultant, play advocate, landscape architect with experience in playground provision and design, playworker, experts working with children with disability considering playground and outdoor play, and others.
- You might be a researcher who has developed an instrument yourself.
- Additionally, you are fluent in English language, and you have time to take part in this study.

What is the aim of the study?
The aim of this research is to obtain consensus opinion from a panel of experts on the content of a new audit investigating playground environments, by considering children's preferences, needs and wishes.

What will you be asked to do?
Should you choose to participate, you will be asked to provide your feedback and expertise in two to three rounds in the next months.

Round one	...will ask you to review the draft audit, suggest additional content, and identify possible changes. … will be online discussion (individual or group or survey)	approximate 90 minutes	Round one1st-15th February
Rounds two and three	...will ask you to rate your agreement of the content. You will also have opportunities to suggest changes in content. … will be survey	approximate 60 minutes	Round two [Time frame] Potential round three [Time frame]

In between the rounds you will be provided with an overview of changes made to the content of the audit.

With your permission your contribution will be acknowledged in publications. We will inform you about the results of this study and we will forward you the published research output. It is planned to make the audit available free to use.

We are aware of the time-commitment associated with participating in this study. To make participation in this study as easy as possible you can choose for us to meet with you online to elicit your feedback on the audit content and tailor the survey to your availability. Please discuss your potential participation with Thomas (thomas.morgenthaler@zhaw.ch).

Do you need more information about the audit in development?
We are welcoming all kind of questions, considerations, and interests for participation in this study. Thomas can meet with you individually online to explain the research and the proposed audit in detail. Alternatively, you can watch a 15 Minute presentation by following this link: [LINK TO THE VIDEO PRESENATION] or an information sheet about the study and the audit can be provided on request.

If you are interested in participating in the study, please contact Thomas.
Thank you for considering possible participation in this study.

Thomas Morgenthaler, PhD Researcher
CONTACT: **thomas.morgenthaler@zhaw.ch**; +353 (85) 8535280
PhD Supervisors:
Prof. Dr. Christina Schulze, Institute of Occupational Therapy, Zurich University of Applied Sciences, Switzerland christina.schulze@zhaw.ch
Dr. Helen Lynch, Department of Occupational Science & Occupational Therapy of University College Cork, Ireland h.lynch@ucc.ie
Dr. Duncan Pentland, Division of Occupational Therapy & Arts Therapies, Queen Margaret University Edinburgh, Scotlanddpentland@qmu.ac.uk

Appendix 3. *Information Leaflet*

An Expert Panel Study on the Content of a New Playground Instrument

What is the aim of this study?
The aim of this research is to obtain consensus opinion from a panel of experts on the content of an evidence-informed instrument that supports the evaluation of environmental qualities of public playgrounds for play and inclusion. This instrument is an AUDIT.

Consensus opinion in this study will be sought for the content of items, domains, and to further clarify the construct of play value for inclusion. Content means the relevance of proposed items, whether they are comprehensive or if some are missing, their readability, and any domains that might need to be added.

Ethical approval for this study has been given by the Social Research Ethics Committee from University College Cork (Log 2022-190).

Description of the proposed instrument

What is the aim of the audit tool?

- The **audit** is an **observer-rated evaluation of the environmental qualities** of community playgrounds. The aim of the audit is to evaluate a playground's potential play value for inclusion by rating observable qualities of the physical environment that contribute to play value for inclusion construct.

When to use the audit?
The audit is intended for use in both research and practice.

- To find out the play value of one or several playgrounds in a local community and to determine their play value.
- To provide a justification for local communities and authorities to make changes of one or several playgrounds in the community.
- To provide playground providers, playground designers, or other experts a way to evaluate playgrounds while keeping play value and inclusion in mind.

Who will use the audit?
The audit is anticipated to be used by different professionals in research and practice, including as examples, health professionals such as occupational therapists working with communities, play specialists working with communities, those involved in playground provision, and landscape architects.
What format will the audit have?

It is planned to have a print as well as digital format for use on mobile-phone or tablet. The audit will be available for free.

How was the content of the audit developed up to this point?
The content of the audit was drawn from published peer reviewed literature that investigated children's perspectives on playground provision. This research was a scoping review that can be accessed here: [Scoping review link]. Furthermore, a review of instruments looking at different constructs such as play value, play ability, usability and accessibility was conducted.

What your participation would involve
Should you choose to participate, you will be asked to provide your feedback and expertise in two to three rounds in the next months.

Round one	...will ask you to review the draft audit, suggest additional content, and identify possible changes. … will be online discussion (individual or group or survey)	approximate 90 minutes	Round one1st-15th February
Rounds two and three	...will ask you to rate your agreement of the content. You will also have opportunities to suggest changes in content. … will be survey	approximate 60 minutes	Round two [Timeframe] Round three [Timeframe]

In between the rounds you will be provided with an overview of changes made to the content of the audit.

Time commitment tailoring to your availability
Participation is voluntarily and you can end your involvement at any point. We are aware of the time commitment for this study. To make participation in this study as easy as possible we also offer alternatives:

- Thomas Morgenthaler (the lead researcher) will meet with you online to elicit your feedback on the audit content.
- Alternative you can opt to take a survey that can tailor to your time availiablity

Benefits of participating in this study
With your permission your contribution will be acknowledged in publications. We will inform you about the results of this study and we will forward you the published research output. It is planned to make the instruments available free to use.

You are welcome to discuss your potential participation and time commitment with Thomas. Thank you for considering your participation in this study.

Thomas Morgenthaler, PhD Researcher
CONTACT: **thomas.morgenthaler@zhaw.ch,** 353 (85) 8535280

PhD Supervisors:
Prof. Dr. Christina Schulze, Institute of Occupational Therapy, Zurich University of Applied Sciences, Switzerland christina.schulze@zhaw.ch
Dr. Helen Lynch, Department of Occupational Science & Occupational Therapy of University College Cork, Ireland h.lynch@ucc.ie
Dr. Duncan Pentland, Division of Occupational Therapy & Arts Therapies, Queen Margaret University Edinburgh, Scotlanddpentland@qmu.ac.uk

Appendix 4. *Playground Play Value and Usability Audit Tool Version 1*

Dear panel member,
In this document you find the draft playground audit and information about the intended construct *play value and usability*. **In preparation of our meeting, I would kindly ask you to review this document.**
The aim of first meeting is to elicit your reflections on the proposed audit tool and further develop its content (what is missing, what needs changes).

In the meeting I will ask your feedback on following elements:

- Your general feedback
- The proposed construct *play value*
- The structure of the audit including the screening mechanisms
- The item and category content (Content means the relevance of proposed items, whether they are comprehensive or if some are missing, their readability, and any domains that might need to be added.)
- I will ask you to rate the overall usefulness of the current content. (One question delivered in survey).

Kind wishes
Thomas

A. Playground Information

Instruction: Please fill out details below.

Date: __ __ / __ __ / __ __ __ __

Name of playground:					
Name of Country:		Name of City:		Address of Playground:	
Time	Start of the audit: ____ : ____		End of the audit: ____ : ____	Total amount of observation time: minutes	
Current Season	□ Spring	□ Summer	□ Autumn	□ Winter	
Current Weather Condition	□ Sunshine	□ Cloudy	□ Overcast	□ Windy	□ Raining/Snowing	Temperature: ℃ Celsius
Location (urbanization)	□ Urban	□ Suburban	□ Rural		

Which of the following hierarchies' best describes the location of the play space?

	□ City Park	□ District Park (Serves needs of district)	□ Neighbourhood Park (Serves neighbourhood radius of 1km)	□ Local Park (Serves neighbourhood radius of 400m)	□ Pocket Park (Serves neighbourhood radius of 200m)

B. Observer Details

Observer Name:	Observer Profession:

C. Overall playground characteristics include location in the community, aesthetics and maintenance, climate, and weather

*Instructions: Rate each item (*characteristics*) individually to this specific playground*

C.1. Playground location in the community These items compare playgrounds within one community within 15 minutes walking distance. How many playgrounds are within 15 minutes walking distance from this playground location: _____ (*use online map*) *Instructions: To what extent does this playground consider the following* characteristics*:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… there are several playgrounds in proximity to this playground location, in 15-minute walking distance (*use online map*)					
… playgrounds in the community have varying sizes from big playgrounds to small niche playgrounds					
… this playground in this community has novel and unique features only found on this playground that have potential to attract children and family to visit this playground. This playground is special.					
… this playground is located central in the community. For example, other possibilities are close like shops, restaurants, coffee places					
… this playground is located in 15-minute walking distance to where children live (are houses/apartment buildings close) (*use online map*)					

… this playground is located in 15-minute walking distance to schools of children (*use online map*)					
… this playground is located in 15-minute walking distance to other recreational opportunities like parks, nature areas, water areas (use online map)					

C.2. Aesthetics and maintenance of the playground *Instructions: Observe the playground. To what extent are characteristics of aesthetics including maintenance, built and natural environmental provision, seasonal experience considered:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… this playground uses a mix of materials including built and natural materials					
… this playground considers colourful provision in the built environment. Is play equipment colourful. Are fences, benches colourful?					
… this playground considers colourful natural environment: Are plants provided, that change colour in autumn or bloom in spring.					
… this playground considers brighter colours and colour contrast					
… this playground is clean (look for graffiti, cigarette butts, trash or other dangerous litter)					
… this playground provides several trash bins					

… provided sandboxes and water areas are clean (e. g. no dirty water, no litter in sand)					
… no animals excrements (dog or birds) are found in grass areas or play equipment					
… the play equipment is not broken rotten or damaged					
… no unpleasant smells are located on the playground (e. g. urine)					
… the provided natural environments are free from litter					
… the provided natural environment is not overgrown meaning is maintained and allow access					

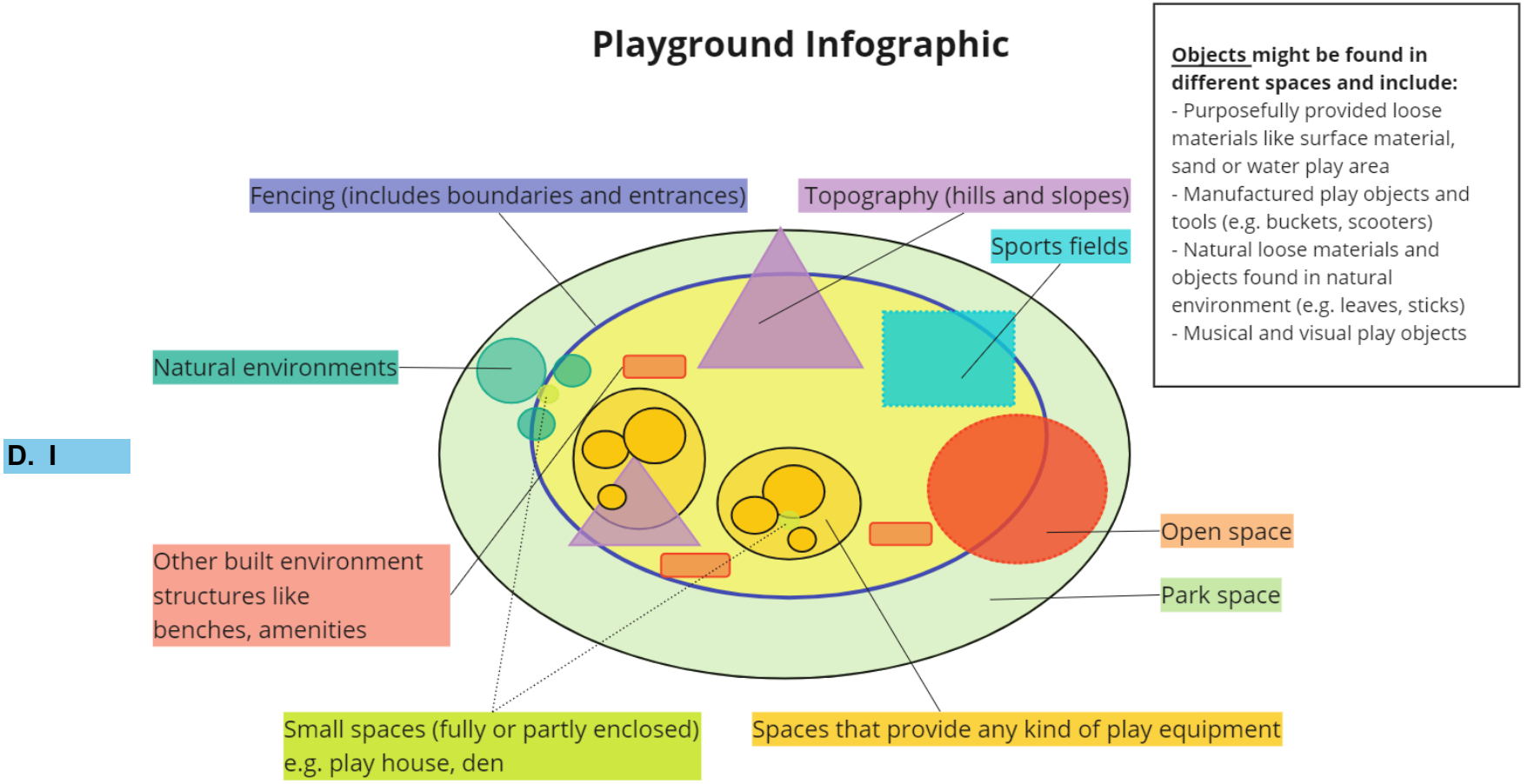
C.3. Climate, and weather (includes shade provision, season, and weather changes) *Instructions: Observe the playground at its current season in relation to characteristics of geographical location and its influence on climate and weather in their playground design:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
Shade provision					
… this playground has both shaded and sunny areas					
… shade is provided throughout the day					
… shade is provided partly by trees and not just built structures					
… shade is partly provided in sand play area and water play areas					
… shade is partly provided in seating areas					

Season and weather changes					
… this playground has electronic light when sunlight is not available in winter months.					
… this playground has a shelter for rain and wind.					
… this playground has heating for cold days (a warm-up place)					
… for wet climates. If needed water drainage is considered.					
… for playgrounds in hot climates. Play equipment made of metal is protected from direct sun preventing overheating.					
… this playground has natural elements allowing children to experience seasonal changes (look for leave trees, trees with fruits like chestnuts, flower bushes, flowers, ponds for ice, gardens, fruits and herbs, water areas like ponds that allow to experience freezing)					
… this playground has hills and slopes and encourages to use them for sledding in winter months					

D. Playground Spaces and Object Characteristics

Instructions: This infographic represents a schematic playground that visualises potential space and object categories. Get familiar with the playground you want to evaluate. Walk around the playground and compare to playground infographic. The audit evaluates the playground using the categories of spaces and objects. Screen the playground you want to evaluate by identifying what categories of spaces and objects are provided on this playground. Not every playground provides all kinds of spaces and objects. The screening helps to narrow down what category of space and objects will be included in the further evaluation.

D. I



Playground Spaces and Object Characteristics

Instructions: Check what potential spaces and objects are provided on the playground you want to evaluate. (It is planned that a digital version of the tool will automatically generate the audit tool fitting to this playground)

Categories of spaces include:	
□	Spaces that provide any kind of play equipment

Categories of objects include:	
□	Purposefully provided loose parts (includes sand or water, mud, surface material, ...)

□	Open Spaces
□	Paths and walkways
□	Topography (includes hills and slopes)
□	Small spaces (in the natural and built environment, fully or partly enclosed, have clear boundaries e. g. playhouse, den)
□	Natural environments (includes vegetation, high grass, spaces with trees and bushes, woodlands and forest close to the playground or integrated into playground design)
□	Sport fields (designated specific sport e.g. basketball court, soccer field)
□	Spaces that provide seating and tables
□	Fencing (includes boundaries and entrances)
□	Amenities (toilets, water fountains)

□	Manufactured play objects and tools (e. g. scooters, funnels, buckets, building blocks, ...)
□	Natural loose materials and objects (found in natural environment e. g. flowers, leaves, stones, sticks, small animals, ...)
□	Musical and visual play opportunities

D.I.1. Open Space Characteristics This playground provides more than one open spaces. Number: _____ *Instructions: Compare all available open spaces and consider if the following characteristics are considered:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… open space is open what means an area with no play equipment, bushes/trees or other built structures is provided					
… open space is mostly flat meaning no inclines					
… open space surface properties have no obstacles to trip over. Surfaces could include grass, wood chips, pavement, or others					
… partly the open space is sufficiently solid surfaced (e.g., pavement) to allow wheeled devices such as scooters or wheelchairs to be used					
… open spaces are provided with a variety of sizes allowing big group play and small group play. (e.g. there are two separate, differently sized open spaces provided)					

D.I.2. Paths and Walkway Characteristics *Instructions: Observe if paths and walkways consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… one obvious route (a main path) throughout the play space is provided. This main path is easy visually identifiable					
… paths are linked and allow to drive/run/walk in loops					
… paths include obstacles meant for play like waves or bumps allowing for jumping or to be driven/run/walked over					
… paths include opportunities to drive/run/walk straight and curved					
… paths include full enclosures like tunnel or partly enclosures like bushwalk					
… all play opportunities/areas/components are accessible by a path that is solid and levelled					
… all play opportunities/areas/components are accessible by a path that is solid and levelled					
… paths are wide enough allowing children to drive/run/walk side by side					
… children are allowed to bring wheeled play devices onto the playground					
… paths and walkways are not promoting shortcuts through the playground from non-users					

… paths have a clearly defined edge (e.g. colour contrast) allowing discern the location of the pathway more easily					

D.I.3. Topography (includes hills and slopes for play) This playground provides several landscape features. Indicate the Number: _____ *Instructions: Observe if topography consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… Topography invites children to play on (e. g. are integrated into playground or are nearby the playground)					
… If topography is the highest point of playground several different routes to the top are considered including a path with low inclination and sufficiently solid surfaced					
… Topography has partly natural grassy slopes					
… Topography is partly sufficiently solid surfaced (e.g., pavement) to allow wheeled devices such as scooters or wheelchairs to be used					
… Slopes include a variety of lengths					
… Hills include a variety of heights					
… Slopes include a variety of inclinations					
… Surface properties from smooth and solid, dry and slippery are included offering sliding and coasting down					
… Topography includes obstacles on the slope meant for play (e. g. bump) to drive/run/walk/roll over					

… is allowed to bring sleds or similar play equipment in wintertime (rule related item)					
D.I.4. Natural environments (including vegetation, high grass, spaces with trees and bushes, woodlands and forest close to the playground) *Instructions: Observe if natural environments consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… natural environments are integrated into the playground design (e. g. trees, bushes, boulders are found between play equipment)					
… natural environments are easy to access (natural environments are not fenced out from playground or natural environments are fenced in within the playground)					
… natural environment surrounds the playground and invites children to play in					
… natural environments provide some areas with more dense bushes affording hiding (disappearing from others)					
…natural environments provide climbing opportunities (e. g. climbing trees or boulders)					
… natural environments have sufficiently solid surfaced paths into the natural space					

… natural environment is not overgrown that hinder access					
… natural environments afford opportunities to linger in quiet					
… natural environments afford opportunities to be and play alone					
… natural environments provide things to smell or taste (herbs, fruits, flowers)					

D.I.5. Enclosed and smaller spaces (provide a clear boundary and could be fully or partly enclosed, could be found in the natural and built environment) This playground provides several small and enclosed spaces. Number: _____ *Instructions: Observe if enclosed and smaller spaces consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… small and enclosed spaces are found in both the built and in the natural environment					
… some small spaces are fully enclosed					
… some small spaces have low raised boundaries providing a smaller space in a space (e.g. small niches)					
… some small spaces provide windows and doors to open and close					
… some small spaces have windows to look out into a more open space (provide outlook)					
… small spaces include different sizes meaning they have capacities in space from only one child to a group of children					
… some small spaces are provided on ground level accessible by a solid and levelled path, some are provided elevated areas					
… some small spaces afford opportunities to linger in quiet					

D.I.6. Seating (formal and informal seating provision) This playground provides several seating opportunities. Formal Seating Number: _____ Informal Seating Number: _____ *Instructions: Observe if seating provision consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… a variety of formal and informal seating are provided. Formal seating might be for adults who want to supervise their children, informal seating invite children to play on (multifunctional use)					
… some seating has also tables					
… some seating provides a space for the wheelchair on the solid surface alongside the bench					
… some seating has backrests					
… some have arm rests					
… some seating is sheltered and protected from direct sun (could be also through trees)					
… some seating is integrated into play structures allowing active rest					
… some seating is provided in small spaces					
… seating is located on edges of more busy areas like sport and open spaces and on the site of play equipment					
… some seating is provided in natural environment					

… some seating is purposefully arranged to afford communication (circular arranged, arranged facing each other)					
… some seating allows for children's buggies or wheelchairs to sit up close alongside the other seating					

D.I.7. Fencing, boundaries, and entrances *Instructions: Observe if fencing, boundary and entrance provision consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… fences are only provided to separate playground from hazards such as traffic or water features, no fences are provided when no hazards are close					
… natural fencing as boundaries is considered such as bushes, trees or shrubs					
… boundaries are provided to prevent balls falling or thrown into other play area					
… fences out of built material is colourful and aesthetic and invites to play with					
… fences out of built material are designed for seeing through					

… some of the space on the playground shows clear boundaries through visuals indication the start of a different activity space					
… fences and boundaries are provided that hinder other people crossing through the playground space and interfere children's play (e. g. hinder shortcuts through playground spaces)					
… does this playground provides a map at the entrances, in children's hight, illustrated child friendly that gives the child and family orientation					
… a map gives ideas how to go through playground and how to use play equipment					
… are the entrance(es) to the playground visually easy to differentiate (a different colour is provided)					
… are all children (consider ages and abilities) welcome on the playground look for signage at entrances about age ranges					

D.I.8. Amenities (toilets, water fountains) *Instructions: Observe if amenities consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… provided restrooms are accessible, are big enough to fit two people and have a changing table					
… water fountains, are easy to understand and are in children hight					

… Restrooms/toilets are freely open to the public (not locked away or needing payment)					

D.I.9. Sport fields This playground provides several sport fields. Number: _____ *Instructions: Observe if sport fields consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… sport fields having clear division (e.g. low to high raised boundaries) that hinder balls rolling/thrown/kicked into other areas of the playground					
… sport fields are flat and open					
… sport fields surface is suitable for provided activity like grass for soccer, pavement for basketball etc.					
… sport fields size is big enough for a small to a big group play					
… sport fields provide needed qualities or equipment for the activity such as markings on the floor, goal posts, basketball baskets					

D. II Play Equipment

*Instructions: **Screening**; Check what potential play opportunities through play equipment are provided on this playground.*

Categories of play equipment include:	
□	swinging
□	spinning
□	sliding
□	climbing
□	jumping on/off
□	balancing and crossing
□	rocking
□	Zipline
□	recognizable play structures and objects (e.g. themed play structures)

D.II.1. Swinging opportunities Number of swinging opportunities: _____ *Instructions: Observe if swinging opportunities consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… swings allow smaller and bigger range of swinging (swings that go high and not to high)					
… swings are hung on two anchors (going linear back and forth), swings that hung on one anchor (going circular), swings that are hung on three or more anchors (staying even but going in all directions)					

… swings allow different body positions including sitting, standing, laying					
… swing seats provide different sorts of body support for children with different needs (e. g. baby seat, seat with straps, seat with wide base, seat with full body support seat					
…some swings are made of more solid material and swings that are made of more flexible material is provided allowing children position themselves comfortable					
… swings are hung up different heights (higher and lower seating height for transitions in and out)					
… swings consider comfortability e. g. the material used; a solid basket swing is more comfortable than a basket swings out of cord)					
… swings make sounds when in use					
… swings standalone - to be used only alone					
… swings are placed in close proximity allowing to swing next to each other on separate swings					
… swings are arranged in a line and swings that are arranged in circles					
…swings allow to swing alone and in small groups of children					
… swings that purposefully go slow allowing to rest (e. g. hammocks)					

D.II.2. Spinning opportunities Number of spinning opportunities: _____ *Instructions: Observe if spinning opportunities consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… spinning play opportunities allows to control the speed (e. g. are control wheel or breaks provided)					
… spinning play opportunities are smooth and has no friction					
… spinning play opportunities afford to be easily used without adults needing to push it (no adult support needed)					
… spinning opportunities considers tilt: from flat to slanted providing a waved movement					
… spinning opportunities allow diverse body positioning (e. g. standing, sitting, laying)					
… spinning opportunities provide a variety of handrails and grips to hold on (consider height and grip sizes)					
… spinning opportunities allow both: being on while being pushed and being off while push others					
… spinning opportunities allow to be used alone and in a small group of children					
… spinning opportunities are arranged next to each other (in proximity) and stand-alone spinning					

D.II.3. Sliding opportunities Number of sliding opportunities: _____ *Instructions: Observe if sliding opportunities consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… sliding opportunities provide different lengths (shorter to longer)					
… sliding opportunities provide different inclinations (even to steeper)					
… sliding opportunities provide different heights (close to the floor to in great height)					
… sliding opportunities provide different directions (straight to curved to spiral)					
… sliding opportunities provide different movements (a waved slide or just straight and linear)					
… sliding opportunities provide different width (narrow to wide)					
… sliding opportunities provide different closure (open to enclosed)					
… sliding opportunities provide different sliding mechanism e.g. solid slides, slides with rolling cylinders (rollerslides), pole slides					
… sliding opportunities are for single use only					
… sliding opportunities are for pair and small group use					
… sliding opportunities have extented exit points at the bottom of the slide - transfer system					

… sliding opportunities can be reached through multiple ways from easy to more difficult (e.g. ramp, steps, climbing net)					

D.II.4. Climbing opportunities Number of climbing opportunities: _____ *Instructions: Observe if climbing opportunities consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… one of the climbing opportunities is especially high meaning; it is clear that this climbing opportunity is the highest point					
… climbing opportunities provide different climbing heights (low, medium and high)					
… climbing opportunities provide different inclinations (vertical to tilted)					
… climbing opportunities provide different lengths to climb (short to long)					
… climbing opportunities provide different distances between steps (short to wide)					
… climbing opportunities provide different stability (stable to unstable)					
… climbing opportunities provide different directions (side to side, up and down, diagonal)					

… climbing opportunities provide different human made and natural climbing opportunities (e. g. rock wall and climbing trees or boulders)					
…climbing opportunities provide different handrails hand grips, ropes are provided for different size hands and different abilities					
… climbing opportunities provide resting points between climbing (e. g. platforms)					
… climbing opportunities provide space to climb next to each other					
… climbing opportunities provide spaces for social gathering for at least two children (e. g. in between or endpoints)					
… climbing opportunities are provided on ground level meaning climbing opportunities are close to the ground and go horizontal					
… the highest point is reachable through several difficult climbing opportunities including a ramp provide easy access to highest point					
… when arriving on the highest point other play opportunities are provided and not just a slide down opportunity (no dead end)					

D.II.5. Jumping on/off opportunities Number of jumping opportunities: _____	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections

Instructions: Observe if jumping opportunities consider the following characteristics:					
… jumping off points from variety of heights are provided (ground level to more elevated)					
… jumping opportunities in diversity of distances are provided (short distances to longer distances)					
… jumping opportunities such as trampolines, jumping play on floor (drawings) are provided					
… jumping opportunities are circular arranged					

D.II.6. Balancing opportunities (includes bridges and crossing) Number of balancing opportunities: _____ *Instructions: Observe if balancing opportunities consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… balancing opportunities are provided in both the built and the natural environment					
… balancing opportunities are provided out of artificial (e.g. plastic, metal) and natural materials (e.g. wood, stone)					
… balancing opportunities provide different inclinations in surfaces (even to uneven/steep)					
… balancing opportunities provide different elevated heights (on ground level to elevated levels)					

… balancing opportunities provide different supports like handrails for different size hands and different abilities					
… balancing opportunities provide different stability from stable to unstable balancing/bridges (e.g. moving bridges and still bridges)					
… balancing opportunities provide different bridges to cross leading to another play opportunity and are not resulting in a dead end					
… balancing opportunities are circular arranged					
… balancing opportunities like bridges are wide enough to play next to each other					

D.II.7. Rocking opportunities Number of rocking opportunities: _____ *Instructions: Observe if rocking opportunities consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… rocking opportunities provide different movements (move back and forth, side to side, and circular)					
… rocking opportunities provide different heights in seesaws (going up high or stay low)					
… rocking opportunities can be used alone and in pairs/small groups					

… rocking opportunities provide different hand grips for different size hands and different abilities					
… rocking opportunities provide different sorts of body support for children with different needs (e.g. seat with full body support seat)					

D.II.8. Zipline opportunities Number of zipline opportunities: _____ *Instructions: Observe if zipline opportunities consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… zipline opportunities provide different lengths (shorter and longer)					
… zipline opportunities go linear and allow to swing at the same time					
… zipline opportunities provide different sorts of body support for children with different needs (e.g. full body support to sit in)					
… zipline opportunities can be used alone and with several children together (e.g. two ziplines site by site)					

D.II.9. Recognizable play structures and fixed objects (includes themed play structures) Number of recognizable play structures: _____ Number of recognizable fixed play objects: _____ *Instructions: Observe if recognizable play structures and objects consider the following characteristics:*	**YES (2)** **All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1)** **Some characteristics met the score** considers the characteristics to some extent	**NO (0)** **No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… recognizable play structures are provided such as a castle, a pirate ship, animals to ride on,					
… recognizable small play elements are provided like a steering wheel, a window to open and close, things to push, slide, turn open and close					
… recognizable play structures allow to enter and exit e. g. some of them are provided through small and enclosed spaces					
… play equipment that is intuitive, non-prescribed easy to use					

D.II.10. Flow and Arrangement of play equipment *Instructions: Observe if flow and arrangement consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… are play components arranged to invite children following a play route (intuitive flow)					
… are play components arranged along a circular route inviting children can follow the route and come back to where they started					
… are play components grouped together for younger/older children					

D. III Play Objects

D.III.1. Manufactured play objects and tools *Instructions: Observe if manufactured play objects and tools consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… open ended objects are provided to play such as tyres, tubes, boxes,					

… tools to manipulate materials and objects are provided such as shovels, funnels, buckets, hammers					
…children/families are allowed to bring manufactured play objects such as balls, freebees and wheeled play equipment on the playground					

D.III.2. Musical and Visual play opportunities *Observe if musical and visual play opportunities consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… there are instruments that allow to make noise and be loud provided					
… Instruments that are provided are low in height so younger children or children in wheelchairs can reach					
… visual play with contrasting colours are provided (e.g. things to spin, push, or other mechanisms)					
… talking tubes are provided					

D.III.3. Provided loose materials for play *Instructions: Observe if provided loose materials consider the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… this playground provides a space that is meant for sand play, water play, and sand and water play in combination					
… this playground provides a mud play area					
… sand/water/mud play areas partly provide shade throughout the day					
… provided water provision can be controlled by children themselves (damming, switch on and off)					
… water controlling features are easy to understand and positioned in a low hight reachable to children					
… other loose parts are provided including tools such as shovels, funnels, buckets, hammers, ...					
… are surface materials like sand, woodchips, gravel used in children's play					
… are other loose parts (e. g. sticks, stones, pinecones, grass, ...) available and invite children to combine and mix with the provided sand/water/mud					
… provided sand/water/mud tables are integrated into the same area of the sand/water/mud play, consider a central spot in this area and are reachable through is sufficiently solid surfaced paths					

… considerations are made that endorse collaborative play for at least two children e. g. transporting buckets to an elevated level or water switch on providing water for another child					
… sand is smooth enough not too gravely (feels pleasant)					

D.III.4. Natural loose materials and objects *Instructions: Observe if natural loose materials consider the the following characteristics:*	**YES (2) All characteristics met the score** considers the characteristics to great extent	**PARTIAL (1) Some characteristics met the score** considers the characteristics to some extent	**NO (0) No characteristics met the score** does not consider the characteristics	Not Applicable	Comments/ Reflections
… natural loose materials and objects can be accessed easily (e. g. natural environments is not fenced out or playground is fenced in)					
…natural materials are provided such as sand, gravel, earth, mud, tree sap, snow (look for observable usage in the environment)					
…natural materials from small loose objects are available including plant materials such as leaves, grass, bark, flowers, pinecones, seeds, sticks, branches					
… natural materials from medium to bigger loose objects are available including wood, branches, stones					
…possibilities to explore/observe/collect and take care of wild animals including insects, snails, frogs, fish, birds are available					

…does this playground offer children to mix different material together, (e. g. children have mixed sand with water, earth with water, stick in the sand)					
… does this playground offer children to children transport natural loose objects and materials elsewhere (e. g. children have built something with natural materials and objects)					
… materials and objects are different textures (soft, smooth to rough)					
… materials and objects are heavy to low in weight					

Appendix 5. *Expert Panel Interview Guide Round 1*

	Phase	Materials	Instruction and questions (page numbers)	Time in Minutes
Expert Panel Meetings	0. Before Meeting	☐*Test MS teams Link*, and recording function ☐MS teams background P4Play ☐*Fully charged Headphones*, audio test ☐*Printed Version of the AUDIT* ☐*Printet Version of Preparation* ☐*Set alarm clock for 1 hour as a 30 r* ☐*Prepare Link for short USEFULLNI participant after interview*		10 before meeting
	1. Joining Experts	☐*Have RedCap Link Informed conse* ☐*PowerPoint on Content of this Mee* ☐*Power Point Aim, Developement an user of AUDIT*	**Welcome Experts:** *Thank you for joining this meeting. Before we start with introducing our self's I wanted to ask if you had time to the short survey and informed consent and demographic data. If not, I kindly ask you to do it now before we start.* *Do you have any questions regarding this research project?* **Send REDCAP Link in chat.** Shortly **present the aim of this meeting** and the content we will cover. Short introduce again the audit (its aim, development, it intended users)	10 0:00-0.10
	2. Start recording		Ask for verbal consent: "*With your permission I will now start with the audio and video recording including the transcript function*"	1

	3. Time to Introduce each other	⬚ *Created MS Teams Links* ⬚ *Instructions MS teams Link docum* ⬚ *Informed consent survey (Red cap* ⬚ *Demographic data survey (Red Ca* ⬚ *DraftAudit tool and Instruction f*	**Ask to introduce each other.** *Again, thank you for joining this meeting. As you are all Experts in the field you may know each other. However, I would invite you to shortly introduce your self's. Perhaps tell us* - *What is your name?* - *Where you from?* - *What is your professional background?* - *What expertise is in playgrounds and outdoor play is?* - *Why were you interested in joining this study?*	5 0:10-0:15
	4. General feedback		**Ask for general feedback** - *Please describe what your first impression is about the draft audit tool I send out?* - *Why is such a tool needed in your opinion.* - *Would you work with such a tool? Why? Why not?* - *What is missing in this tool?* *Is there something that is important that you like to talk today? Please let me know and I will get back to it in the moment that it fits best this query. OR yes, we plan to talk about this*	5 0:15-0:20
	5. Construct of the audit	⬚ *PowerPoint* on construct	**Present the underlaying construct and idea of the play value for inclusion construct – share PPT** **Stop sharing PTT for discussion** *Which specific comments or suggestions for changes regarding the play value for inclusion construct (e. g. likes/dislikes, changes in wording, missing details) do you have?* - *What did you like on the definition and why?* - *What was difficult to understand and What are your suggestion for changing it?* - *What would make it clearer?*	10 0:20-0:30

	6. Overview of the audit	⬚ *Audit tool headings* ⬚ *Audit tool screening pages* p.8-9 spaces and objects; p 18 play equipment,	**Share audit tool and headings,** *First, I wanted to talk about the structure of the Audit tool including the main headings and its screening mechanism.* *The main headings are* *A. Playground Information,* *B. Observer details,* *C. Overall playground characteristics and* *D. Playground Spaces and Objects* *"Do you think this structure need changes?"* *"Do you have any specific comments or suggestions for changes regarding the initial audit page and structure of the audit (e. g. likes/dislikes, changes in wording, missing details)?"* **Screening in the audit** (pages 8 and 9 for spaces and objects page 18 for play equipment) **PPT:** *The screening mechanism should allow users to tailor the audit tool to the playground that the auditor will evaluate. This should make the audit longer or shorter depending on what is presented in the playground that is evaluated.* *What do you think about this screening mechanism?* *Would you change something? And Why?* (Ask for explanation: Can you explain why you would change this? - *In General, when you look at these categories of spaces and objects p. 7. Is something missing? Which* - *In General, when you look at these categories of play opportunities p. 16 is something missing?*	10 0:30-0:40

	7. Content overall playground criteria	⬚ $Audit\ (pages\ 2-4)$	**Share overall playground characteristics** *Now I will share the pages of the overall playground characteristics This include:* - *location in community,* - *aesthetics and maintenance,* - *climate, and weather and seasons* *Which specific comments or suggestions for changes regarding overall playground criteria do you have (e. g. likes/dislikes, changes in wording, missing details)?* - *What do you like and Why?* - *What is missing?* - *What would you change and Why?* *What do you think about the rating mechanism applied to the audit?* - *What would you change? And Why?* - *How would you change this? Do you have an example?*	15 0:40-0:55
	8. Content Space and object criteria	⬚ $Audit\ pages\ 8\ and\ ongoing$	**Share space and object criteria** *Now we will talk about the spaces and object characteristics.* *This are represented on pages 8 and onwards. Before we start from the beginning. Is there something you want to discuss. Is something missing or need changes?* *Which specific comments or suggestions for changes regarding space and object criteria do you have? (e. g. likes/dislikes, changes in wording, missing details)?* - *What do you like?* - *What don't you like? Why?* - *What is missing?*	20 0:55-0:75

	9. Anything we have not discussed yet?		**Ask for anything that we have not covered yet** *Thank you for this valuable input. Is there anything that we have not covered yet that you want to mention or elaborate on?*	10 0:75-0:85
	10. Overall usefulness rating	⬚ *RedCap to overall usefulnes raitin* send through RedCap	**Share RedCap link** *We have now finished the discussion about the audit content. Thank you very much. I would like to invite you to quickly answer this one question about the overall usefulness of the current content of the audit in this short survey.*	1
	11. Explain next steps		**Verbally explain next steps** *Before we end this meeting, I wanted to give you an overview of the next steps.* *I and the research team will now look at your feedback on the instrument. We will analyse the data and update the content of the audit.* *We will provide you with a short email what changes have been made. We will then invite you to participate in the Delphi round 2 what is planned to be a survey where you will have the change to rate the content on item and categories level. You will also have the change to provide additional feedback on change of content e. g. missing criteria. Please reach about to Thomas about your availability and if we can find accommodation if this is a problem in your further participation.*	5 0:85-0:90

Appendix 6. *Demographic Questionnaire Round 1*

Question number	Question	Response options
1	Please provide your Email address This information will be kept confidential	Open text field
2	What is your professional background? (Check more than one if applicable to you)	Check: ○ Research/academic ○ Landscape architect ○ Playworker ○ Occupational therapist ○ Working for a non-governmental institution ○ Teacher ○ Practitioner (e.g. working with children and families) ○ Others (please specify below)
3	You selected others. Please specify your professional background.	Open text field
4	Please briefly describe your expertise on the topic of in outdoor play and playgrounds.	Open text field
5	How many years of experience you have on the topic of interest?	Number
6	With what population do you mainly associate your expertise with? (Check more than one if applicable to you)	Check: ○ Children with disabilities ○ Caregivers of children with disabilities (e.g. parents) ○ Children without disabilities ○ Caregivers of children with disabilities (e.g. parents) ○ Other adults like teacher, playground management/maintenance staff, playworker, health professions ○ Others (please specify below) ○ Not applicable
6.1	Other selected, please specify the population you have	Open text field

	experiences in relation to playground and outdoor play	
7	Do you have experience in instrument development (e.g. assessments, audits)	○ Yes (please describe below) ○ No
7.1	Please describe your experience in instrument development.	Open text field
8	In what country do you live?	Open text field
9	Is English your first language?	○ Yes ○ No (please describe below)
9.1	If you speak another language fluently? Please describe here.	Open text field
9.2	Please describe what your first language is and other languages you speak fluently.	Open text field
10	What is your gender identity?	○ Male ○ Female ○ Diverse ○ Prefer not to say
11	In what year were you born?	Number

Appendix 7. *Part of Expert Panel Survey Round 2*

Survey overview

Dear panalist, the survey on the audit will start with the next page. To provide you with an overview of the audit you can download the new draft of the audit tool (version 4.0) below. You do not have to review this document. Download the play value audit v.4.0 here:

[Attachment: "202304010_AUDIT Play value for inclusion tools v.4.4_proveread.pdf"]

How play value will be investigated

The construct play value is based on the two main domains: (1) contextual and physical environment that support play value to evolve and (2) immediate physical environment affording play opportunities.

(1) contextual and physical environment that support play value to evolve

The contextual and physical environment has 9 content areas and is investigated by environmental characteristics of the"contextual: supporting considerations of the playground" (e. g. character of playground, location of playground in community, management, and maintenance, climate-, weather- and season adaptability, sensory-place related charecterisitcs of the playground) and "physical: supporting features of the playground" (e. g. amenities, fencing, seating, or signage). Both these physical and contextual environmental characteristics indirectly support play opportunities. Indirectly refers to a potential relationship between physical and contextual environmental characteristics on play opportunities that support play value of a playground to evolve.

(2) immediate physical environment that affords play opportunities

The immediate physical environment (that affords play opportunities) has 20 content areas and will be investigated by observable physical and physical-social environmental characteristics of three aspects: "play opportunities by spaces" (e. g. topography, natural environment, paths); "play opportunities by loose parts and materials" (e. g. loose materials like sand to build) and "play opportunities by play equipment" (e. g. climbing and hanging on opportunities). Physical-social environmental will be investigated by characteristics that offer possibilities to engage with, being close to other children or afford be alone.

What your participation in the second expert panel round involves

You are asked to read and rate each content area and items for (A) their RELEVANCE of inclusion in the audit investigating play value
(B) their CLARITY of the content and
(C) optional provide your SUGGESTIONS for changes.

Practical information: Safe and return later

You will have the option to pause the survey at any time by saving your answers and return later.

To do this, simply scroll to the bottom of the page and click on the "Save & Return Later" button.

If there are any problems, please contact Thomas Morgenthaler (PhD Student) (thomas.morgenthaler@zhaw.ch)

Contextual: Supporting considerations of the playground

Your progress: Section 1 from 5

This section is about contextual considerations of playgrounds that support play value to evolve. Following content areas will be reviewed:

Character of the playgroundPlayground location in the communityManagement and maintenanceSensory-space related qualitiesClimate/weather and season adaptabilitYou are asked to read and rate each content area and items for

(A) their RELEVANCE of inclusion in the audit investigating play value

(B) their CLARITY of the content and

(C) optional provide your SUGGESTIONS for changes.

Please read "character of the playground" and then answer the questions below Character of the playground Character of the playground describes aspects that offers potential opportunities for users to connect with the playground and their community. These aspects relate to if the local history/heritage/art/stories of the community are represented within the playground, if community events are hosted on the playground and if the playground was designed and built for certain populations.

This playground...

1

... was developed and designed by involving users of the playground (children and/or adults) in the design of the playground

2

... involves users of the playground (children and/or adults) in maintenance activities (e. g. landscaping, painting, adults living nearby appointed to keep an eye on the playground, ...)

3

... is staffed by an adult who has knowledge about children's play and provides regularly new play opportunities

4

... regularly hosts community events that offer users new play opportunities (e. g. announced on an information board on the playground)

5

... reflects cultural and historical aspects of the community (e. g. local art/stories/heritage is represented, locally sourced materials are used, ...)

6

... was designed specifically to provide play opportunities for one or more known underserved population such as children with disabilities, girls, minorities, or older children's play, ...

7

... has novel and unique play opportunities only found on this playground that may be attractive to children and family. This playground is special (e. g. specifically naturalized playground, a large playground, a playground that can be shaped and manipulated by children)

8

... has a main attraction that is available to all children (consider if children can access the main attraction and use it).

How relevant do you find the content of "character of the playground" to be included in the audit?	◯ Very relevant ◯ Somewhat relevant ◯ Not relevant at all
Please provide your suggestions (e.g. specify items you find NOT relevant to include and/or relevant items you find missing)	_____
Is the content of "character of the playground" easy for you to understand?	◯ Yes, very easy to understand ◯ No, could be clearer - I have suggestions for changes ◯ No, not clear at all - I have suggestions for changes
Please provide your suggestions to make content "character of the playground" more clear.	_____

Appendix 8. *Numerical Analysis of Content Changes from PVUA Version 1-3*

	v.1.0	**v.2.0**	**v.3.0**
Changes in content areas header and description			
Number of content areas total	26	30	28
Number of new content areas		4	n/a
Number name adjusted content areas		13	10
Number of adjusted descriptions of content areas		All content areas	11
Number of deleted content areas		n/a	2
Changes on item level			
Number of items total	211	221	203
Number of items deleted (redundant)	n/a	Minus 22	Minus 26
Number of items new (added)	n/a	Plus 44	Plus 10
Number of items merged with other items	n/a	Minus 12	Minus 2
Number of items rephrased to clarify the meaning	n/a	40	36
Number of items rephrased with minor changes (small changes keep the meaning of an item)	n/a	All items	40
Number of shortened items (keep the meaning of an item)	n/a	n/a	6
Number of added more details to item (keep the meaning of an item)	n/a	n/a	11
Instruction of PVUA	n/a	All instructions	n/a
Scoring text		All scoring texts	n/a
TOTAL adjustments:		396	158

Appendix 9. *Raw Data Overall Usefulness Ratings*

Expert Number	Rating of PVUA Version 1 (Round 1)	Rating of PVUA Version 2 (Round 2)
1	1	1
2	2	2
3	2	2
4	2	missing
5	1	2
6	2	missing
7	2	missing
8	2	1
9	1	1
10	1	1
11	2	missing
12	1	2
13	2	1
14	1	1
15	2	1
16	3	3
17	2	missing
18	2	1
19	4	3
20	3	missing
21	missing	1
22	missing	2
Notes. 4 = Not useful. 3 = a little useful. 2 = somewhat useful. 1 = very useful.		

Appendix 10. *Overall Usefulness Rating Frequency And Percent*

	Not useful	A little useful	Some-what useful	Very useful	Missing	Median
Overall usefulness* audit version 1 (n = 22)	1 (4.5)	2 (9.1)	11 (50.0)	6 (27.3)	2 (9.1)	2
Overall usefulness* audit version 2 (n = 22)	0	2 (9.1)	5 (22.7)	9 (40.9)	6 (27.3)	1
Note: * Question: Please rate the overall usefulness of the current content of the audit tool.4 = Not useful. 3 = a little useful. 2 = somewhat useful. 1 = very useful.						

Appendix 11. *Ethical Approval Social Research Ethics Committee UCC*

Von: Ethics Committee, Social Research <srec@ucc.ie>
Gesendet: Freitag, 4. November 2022 09:41
An: Morgenthaler Thomas (morh) <morh@zhaw.ch>; Thomas Morgenthaler <121101888@umail.ucc.ie>
Betreff: Log 2022-190 Approved

Dear Thomas
The Social Research and Ethics Committee has now approved your application Log 2022-190 entitled "The evaluation of children's outdoor play to inform public playground design – A modified Delphi study."

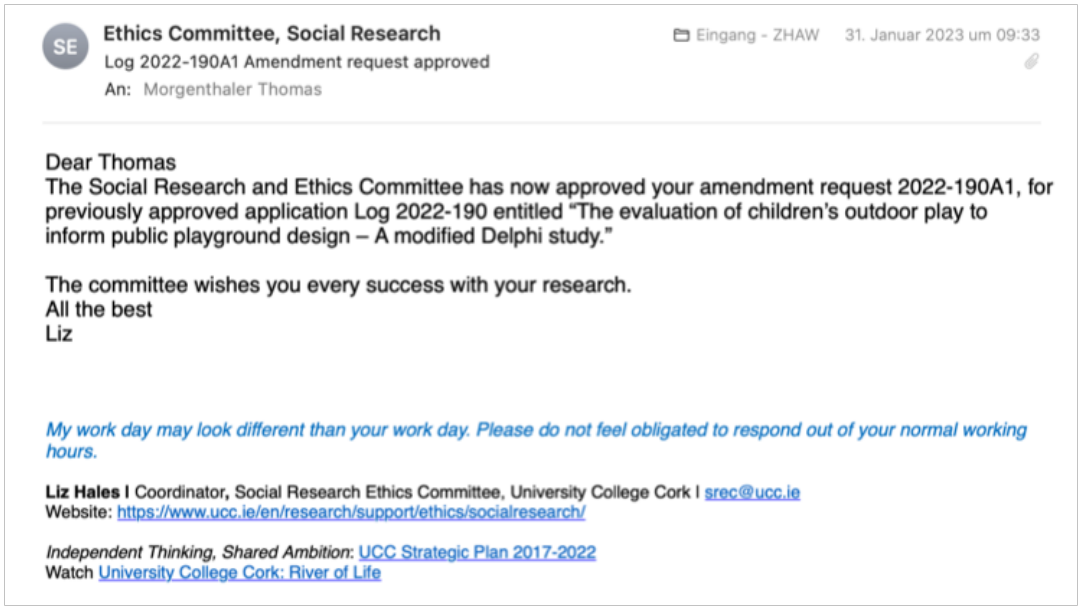
The committee wishes you every success with your research.
All the best
Liz

My work day may look different than your work day. Please do not feel obligated to respond out of your normal working hours.

Liz Hales I Coordinator, Social Research Ethics Committee, University College Cork I srec@ucc.ie
Website: https://www.ucc.ie/en/research/support/ethics/socialresearch/

Independent Thinking, Shared Ambition: UCC Strategic Plan 2017-2022
Watch University College Cork: River of Life

Appendix 12. *Amendment Approval Social Research Ethics Committee UCC*



SE **Ethics Committee, Social Research** Eingang - ZHAW 31. Januar 2023 um 09:33
Log 2022-190A1 Amendment request approved
An: Morgenthaler Thomas

Dear Thomas
The Social Research and Ethics Committee has now approved your amendment request 2022-190A1, for previously approved application Log 2022-190 entitled "The evaluation of children's outdoor play to inform public playground design – A modified Delphi study."

The committee wishes you every success with your research.
All the best
Liz

My work day may look different than your work day. Please do not feel obligated to respond out of your normal working hours.

Liz Hales I Coordinator, Social Research Ethics Committee, University College Cork I srec@ucc.ie
Website: https://www.ucc.ie/en/research/support/ethics/socialresearch/

Independent Thinking, Shared Ambition: UCC Strategic Plan 2017-2022
Watch University College Cork: River of Life

Appendix 13. *Ethical Approval Switzerland*

Kanton Zürich
Kantonale Ethikkommission

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Präsident

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21. Juli 2022 / plm
BASEC-Nr. Req-2022-00922
Clarification of responsibility

Title: "The evaluation of children's outdoor play on public playgrounds"

Dear Mr Morgenthaler

We refer to your submission dated 20/07/2022

Your research project does not fall within the scope of the Human Research Act (HRA). Therefore, an authorization from the ethics committee is not required.

Kindly note that an invoice in the amount of CHF 200.- will be issued by the cantonal accounts department.

Sincerely yours,

Peter Kleist

Appendix 14. *Excluded Studies on Parents' Perspective –Aims, Characteristics, Participants, and Playgrounds Sample*

Study Location of data collection	Aim	Study design	Methodology	Participants sample	Playgrounds sample	
				Adult population (n, sex, age range of the children, disabilities of children if applicable)	Type of playground (n)	Urban/ suburban/ rural
van Engelen (2021) The Netherlands	To explore facilitators, barriers and solutions influencing the participation of children with physical disabilities in Dutch outdoor playgrounds, from parents' and professionals' perspectives.	Qual	Descriptive qualitative	n=57 Fathers n=1, Mothers n=16 Parents from 4-12 y children Physical disabilities Professionsals (n=40)	N/A	N/A
Bekci (2021) Turky	To examine the concerns of parents on their children and the effect of environmental factors on children	Quant	Survey	n=missing Parents from 0-14y children	Missing type (n=missing)	Urban
Luo (2022) China	To study how public space (playgrounds) influences parents' engagement with their young children.	Qual	Etnography	n=missing	Public playgrounds	Urban
Prellwitz & Skär (2016) Sweden	To describe parents' perceptions of the ways playgrounds affect the participation of their children with disabilities in play activities.	Qual	Descriptive qualitative	n=18 Male n=6, Female n=12 Parents from 7-12 y children Cognitive disability (n=4) Autism (n=2) Visual impairment (n=6) Motor impairment (n=6)	Public and school playground (n=missing)	Rural

Qiao (2021) China	To identify the consumer preferences of parents in the presence, location, form, operational features, safety requirements, and comfort of children's playgrounds.	Quant	Survey	n=1030 Male n=422, Female n= 608 Parents from 3-9 y children	Public playground (n=missing)	Urban
Stanton-Chapman & Schmidt (2017) United States of America	To survey and interview caregivers of children with disabilities (ages 2–5 years) to obtain their input as to whether current playground equipment meets their child's needs	Mixed	Survey	n=149 Male n=25, Female n=106 Parents, grandparents, and foster parents of 2-5-year-old children Specific language impairments Developmental delay Autism Orthopaedic impairment Intellectual disability Other health impairments Behaviour disorder Hearing impairment Learning disability	missing type (n=missing)	Missing
Sterman et al., (2019)	To understand outdoor play decision-making for children with disabilities from the perspectives and interactions of: local government and families of primary school-aged children with disabilities.	Qual	Case study	n=11 Mothers (n=5) Local park officials (n=4) Children and disability advocates (n=2) Parents of 5-12-year-old children Multiple disabilities Development delay=2 Autism n=3 Intellectual disability n=3	Public Playgrounds (n=missing)	Urban

				Hearing loss n=1 Heart impairment n=1		
Black & Ollerton (2021)	To explore whether Livvi's Place, an inclusive playspace in Port Macquarie, Australia, met the principles and values articulated in Australia's early childhood learning framework: Belonging, Being, and Becoming, and, more specifically, if the playspace was meeting its goal of social inclusion	Quant	Survey	n=166 Parents (n=16 children with disabilities) Parents (n=150 no children with disabilities) Sex missing Parents of 0-14-year-old children	Public playground n=2	Urban

Notes: Qual=qualitative studies, Quant=quantitative studies, Mixed=mixed methods studies. N/A=not applicable for study.

Appendix 15. *Comparison of Affordance Taxonomies of Outdoor Play Environments*

Affording Features (Gibson, 1979)	**Functional Classes of Outdoor Features (Heft, 1988)**	**Classes of Outdoor Features of Preschool Environments in Denmark (Lerstrup & van den Bosch, 2017)**	**Environmental Taxonomy of Outdoor Play Space Features (This Article)**
Places (immobile)	Flat, relatively smooth surface	Open ground	Open spaces
	—	—	Designated sports areas
	—	—	Paths and walkways
	Relatively smooth slope	Sloping terrain	Topographic features
	Shelter	Shielded places	Enclosed and bounded spaces
—	—	—	Spaces on the edge
Attached objects (immobile countable)	Attached object	Rigid fixtures	Fixed natural features
	Climbable objects		Play equipment
	Nonrigid attached object	Moving fixtures	
	—	—	Themed and suggestive play features
—	—	—	Features not purpose-built for play
Detached objects (movable, countable)	Graspable or detached object	Loose objects	Manufactured tools and toys
			Loose natural parts
Substances (movable, not countable)	Mouldable material	Loose material	Malleable materials
—	Water	Water	
Events (changes)	—	Creatures	Wildlife-friendly habitats
—	—	Fire	—

Note. A dash indicates not defined in this taxonomy.

Appendix 16. *Coding Frame and Examples*

Examples of Extracted Data	Code Used		
	What **Codes Were Used When a Study Described a Type of Play a Child or a Group of Children Engaged In**	***Where*** **Codes Were Used When a Study Described a Specific Space Children Used for Their Play**	***With What*** **Codes Were Used When a Study Described What Objects or Materials Children Used in Their Play**
"Collecting insects and all kinds of flowers and different kinds of shells in the sand" (Norðdahl & Einarsdóttir, 2015, p. 195)	*What:* collecting or picking up		*With What:* wildlife (insects) *With What:* natural loose parts (shells) *With What:* natural loose parts (flowers) *With What:* loose materials (sand)
"Hills were used in many ways, such as for running up and down or exploring, particularly hills with vegetation on them" (Jansson et al., 2016, p. 232)	*What:* running (up and down) *What:* exploring (not specified how)	*Where:* topographic feature (hills) *Where:* natural vegetation	
"Truck-shaped theme of the fixed play equipment, the most common play episodes were children pretending to be the driver and passengers while traveling and talking to one another during trips" (Cetken-Aktas & Sevimli-Celik, 2023, p. 963)	*What:* driver–passenger play *What:* talking while playing	*Where:* themed play structure (truck)	
"One of the children said, 'I can crawl to the swing and then we can sit and talk; we don't play anything we just talk about different things'" (Prellwitz & Skär, 2007, p. 148)	*What:* sitting and talking		*With What:* play equipment (swing)
"Children were also recorded observing or following butterflies, wild birds, and insects in diverse locations	*What:* animal play (observe and follow)	*Where:* diverse location on playground	*With What:* butterflies, birds, insects

across *The Backyard*." (Loebach & Cox, 2022, p. 19)			
"Particular boys were found on the paved area at Center C as this playground is overwhelmingly dominated by pavement. . . . Most children (and in particular, boys) observed were engaged in functional play and were riding bikes, pulling wagons or playing rule bound games (e.g. chasey)" (Dyment & O'Connell, 2013, p. 274)	*What:* biking *What:* pulling wagons *What:* play with rules chasing *What:* playing chase	*Where:* open space (paved)	*With What:* manufactured driving device (bike) *With What:* manufactured driving device (wagons)

Note. *With whom* codes (e.g., play alone, play with one peer [friend], play next to each other or parallel, play in big groups, play in small groups, play with adult) were applied but not used for the analysis and creation of the taxonomy. Every play can take on a social aspect. Therefore, the social qualities in outdoor play need to be understood throughout the taxonomy.

Appendix 17. Tool of Observing Play Outdoors: Play Types and Shortened Descriptions

Play Type (Compact Types)	Description (Subtypes)	Examples
Physical play	*Gross motor:* large-muscle activities requiring coordination *Fine motor:* smaller muscle movements when manipulating smaller objects *Vestibular:* activities that test and improve sense of balance, movement of the head, or quick movements in multiple directions *Rough and tumble:* playful physical fighting or wrestling	Climbing, picking up small objects, hanging upside down, wrestling
Exploratory play	*Sensory:* passive exploration of objects and environments *Active:* manipulation of objects and environments *Constructive:* building or deconstructing	Touching soft grass, digging a hole, building a dam
Imaginative play	*Symbolic:* using objects and ideas as symbols *Sociodramatic:* pretending social, domestic, or interpersonal experiences or roles *Fantasy:* enacting unlikely scenarios	Using a piece of wood as a telephone, playing family, playing being mermaid
Play with rules	*Conventional:* common, universal, and well-known rules *Organic:* children agree to play with negotiated or changing rules	Playing hide and seek, developing a chasing game, playing soccer
Expressive play	*Performance:* intentional performing for others *Artistic:* creating for artistic outcomes *Language:* playful use of words and language *Conversation:* social interaction through conversation	Singing for others, drawing in the sand, telling jokes, talking to a peer
Digital play	*Device:* playing on digital devices *Augmented:* playing with devices that digitally augment interactions *Embedded:* interacting with embedded digital prompts	Playing on phone, playing augmented reality game, playing with digital sensors as part of the playground
Bio play	*Plants:* Observing and interacting with living plants *Wildlife:* Observing and interacting with wildlife *Care:* Demonstrating care for nature	Examining a flower, catching an animal, planting a seed
Restorative play	*Resting:* taking mental or physical breaks	Laying down, looking out from an enclosed

	Retreat: withdrawing to observe or be on one's own *Reading:* reading and writing for pleasure *Onlooking:* observing others nearby	space, reading, observing other children
Non-play	*Self-care:* taking care of self or appearance *Nutrition:* breaks for eating and drinking *Distress:* disengagement with signs of distress *Aggression:* Nonplayful antagonistic interactions *Transition:* Nonplayful movement between spaces	Taking clothes off, eating a snack, crying, walking across play space, picking up belongings to leave space

Note. The descriptions are shortened to provide a concise overview of each play type and subtype. For greater detail, see Loebach and Cox (2020).

Appendix 18. *Characteristics of the Studies Included in the Scoping Review (N = 45)*

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
Aminpour (2021)[a] Australia	Qualitative	To identify the physical characteristics of natural settings with which children prefer to interact on school grounds	Children without disability, *N* = 228 (ages 8–10 yr; sex NR)		•		•			• Walking tours • Focus groups • Behavior mapping
Aminpour et al. (2020)[a] Australia	Qualitative	To examine the concept of "in-between spaces" valued by children in self-directed play and define their environmental characteristics from the children's perspective	Children without disability, *N* = 228 (ages 8–10 yr, sex NR)		•		•			• Walking tours • Focus groups • Behavior mapping
Birkner et al. (2021) Germany	Mixed	Not provided	Children with disabilities, *N* = 17 (ages 2–14 yr; 1 boy, 16 girls)	•	N/A					Survey
Bourke & Sargisson (2014) New Zealand	Quantitative	To assess children's play preferences by measuring the frequency of play	Children without disability, *N* = 1,534 observations	•		•		•		• Observation • Interviews • Fieldnotes

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		area and equipment usage, as well as the engagement of boys and girls	(ages 0–14; 763 boys, 771 girls)							• Photographs
Burke (2012) Australia	Qualitative	To explore how some children with impairments construct their experiences of play in the local community playground	*N* = 72 (ages 6–10 yr; 42 boys, 30 girls)			•	NR			• Onsite observation • Focus group interview • Photography taking by children • Scrapbooks
Caro et al. (2016) The Netherlands	Qualitative	To explore child-identified determinants of activity-friendly school playgrounds	Children without disability, *N* = 18 (ages 9–12 yr; 8 boys, 10 girls)		•		•			Participatory group meetings and discussions
Cetken-Aktas & Sevimli-Celik (2023) Turkey	Quantitative	To examine the design features of 6 outdoor play areas and the play preferences of children using these areas	Children without disability, *N* = 102 (ages 5–6 yr; 55 boys, 47 girls)		•		NR			Behavioral mapping of play types and environmental interaction

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
Chen et al. (2020) China	Qualitative	To explore the experiences of both children and their parents in a children's park and play space in Guangzhou	Children without disability, *N* = 11 (ages 4–7 yr; sex NR)	•		•	•			• Observations • Fieldnotes and photographs • Semistructured interviews • Survey
Czalczynska-Podolska (2014) United States	Quantitative	To uncover whether the contemporary playground can be a true play and social environment and how to increase its playability and sociability	Children without disability, *N* = 2,217 observations (ages 2–12 yr; 1,028 boys, 1,184 girls)			•		•		• Observation • Site observations • Photographs
Dyment & O'Connell (2013) Australia	Quantitative	To examine where and how children choose to play in 4 Australian preschools	Children without disability, *N* = 2,361 observations (age NR; 1,350 boys, 1,011 girls)		•		NR			• Systematic observation • Field notes
Fahy et al. (2021) Ireland	Qualitative	To explore the outdoor play preferences of a	Children with disabilities, *N* = 5	•	•	•			•	• Observation

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		group of children with autism ages 6–9 yr	(ages 6–9 yr; 4 boys, 1 girl)							• Behavioral mapping • Interviews
Goodenough et al. (2021) United Kingdom	Qualitative	Not provided	Children without disability, *N* = 12 (ages 7–10 yr; sex NR)			•	NR			• Observation • Drawings • Fieldnotes as a recording device • Child-led walking interviews • Map-making and installations
Hayward et al. (1974) United States	Mixed	To explore the connection between children's play and their play environment and to examine differences be-tween play and the environment in playgrounds with varying designs	Children without disability, *N* = 91 in interviews; *n* = for obser-vations NR (age range and sex NR)			•	NR			• Behavioral mapping observation • Behavior setting records • Interviews
Horton & Kraftl (2018)	Mixed	To analyze the diverse ways in	Children without			•	•			• Survey

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
United Kingdom		which play was valued and practiced at 3 playgrounds and to explore the narratives, anxieties, and urban myths that emerged at these 3 sites	disability, *N* = 1,243 observations (ages 5–13 yr; 596 boys, 647 girls)							• Mapping • Observation
James et al. (2022) Canada	Quantitative	To examine how a newly built playground intentionally designed to be accessible to and inclusive of children of all ages, genders, and abilities is being used by the community	*N* = 1,333 observations, (1 child with disabilities, 1,332 children without disability; ages 0–13 yr; 51.82% boys, 48.20% girls)			•	NR			Systematic observation using system for observing play and recreation children (soparc) tool
Jansson (2008)[b] Sweden	Qualitative	To investigate children's viewpoints regarding local public playgrounds and their experiences of	Children without disability, *n* = 141 (ages 6–11 yr; sex NR)			•			•	• Focus group interviews • Interviews

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		playground play in 2 distinct Swedish communities								
Jansson (2010)[b] Sweden	Qualitative	To find playgrounds that, from a user's point of view, are better functioning and more attractive and to identify qualities that make them successful	Children without disability, *N* = 141 (ages 6–11 yr; sex NR)	•		•			•	• Focus group interviews • Questionnaires • Observation
Jansson (2015)[b] Sweden	Qualitative	To examine the perspectives of children on their onsite playground use and to compare the children's perspectives with those of local park workers	Children without disability, *N* = 141 (ages 6–11 yr; sex NR)			•			•	• Focus group interviews • Interviews
Jansson & Persson (2010)[b] Sweden	Qualitative	To assess the extent to which existing playground provision aligns with the identified needs and preferences of user groups, taking into account	Children without disability, *N* = 141 (ages 6–11 yr; sex NR)	•		•			•	• Observation • Focus group interviews • Questionnaires • Interview • Photographs

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		potential variations in local contexts.								• Geographic Information System mapping
Jansson et al. (2016) Sweden	Qualitative	To reveal the role of green spaces and their management from children's perspectives	Children without disability, *N* = 16 (ages 10–11 yr; 5 boys, 11 girls)			•			•	• Focus group interviews • Walk-along interviews • Photographs • Observations • Fieldnotes
Jeanes & Magee (2012) United Kingdom	Qualitative	To explore parents' and young people's experiences of using the new facility and whether it was considered inclusive	Children with disabilities, *N* = 19 (ages 4–12 yr; sex NR)	•	•		•			• Interviews • Focus groups
Lerstrup & van den Bosch (2017) Denmark	Qualitative	To determine suitable terminology and analytical approaches for comprehending the affordances of outdoor en-	Children without disability, *N* = 49 (ages 3–6 yr; sex NR)		•				•	• Participatory observation • Field notes

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		vironments for preschool-age children								• Video recording
Loebach & Cox (2022) United States	Quantitative	To capture and examine the environmental features and conditions of a large natural playscape that support diverse outdoor play activities among young children	Children without disability, *N* = 693 observations (ages 0–8 yr; 406 boys, 287 girls)			•	•			Behavior mapping using tool for observing play outdoors, little risk behavior typology, and environmental interaction of loose parts, fixed parts, and topographical change
Luchs & Fikus (2013) Germany	Quantitative	To explore how diverse play environments afford different forms of play in kindergarten children ages 5–6 yr	Children without disability, *N* = 59 (ages 5–6 yr; 33 boys, 26 girls)		•		•			• Systematic observation • Field notes

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
Lynch et al. (2020) Ireland	Qualitative	To examine the perspectives of both children and adults regarding their experiences in public parks and playgrounds and to investigate the experiences and viewpoints of local council park and playground providers concerning inclusive public parks and playgrounds	*N* = 12 (ages 3–11 yr; 5 boys, 7 girls) Children with disabilities, *n* = 5 Children without disability, *n* = 7	•		•	•			• Playground audits • Walk-and-talk observation and interviews • Semistructured interviews
Moore et al. (2021) Australia	Qualitative	To investigate the impact of features in an outdoor play space on the emotional well-being of young children	Children without disability, *N* = 6 (ages 4–5 yr; 2 boys, 4 girls)		•			•		• Conversational storytelling • Drawings, walks, photographs, collecting objects, creating maps, positioning wishing stones

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
Norðdahl & Einarsdóttir (2015) Iceland	Qualitative	To ascertain the preferences of children regarding outdoor activities and their surroundings in the outdoor school environment	Children without disability, *N* = 16 (ages 4–9 yr; 8 boys, 8 girls)	•	•			•		• Interviews • Walking tours
Nunma & Kanki (2022) Thailand	Mixed	To investigate the characteristics and use of playground areas under flyovers and expressways in Bangkok	Children without disability, *N* = 58 (ages 5–11 yr, sex NR)			•	•			• Field observation • Survey • Interviews
Obee et al. (2020) Norway	Qualitative	To analyze and present findings on actualized affordances for risky play	Children without disability, *N* = 38 (ages 3–5 yr; 6 boys, 5 girls, 27 sex NR)	•	•		NR			• Field observation • Field notes • Photographs • Secondary data source focused-video observation
Pitsikali & Parnell (2019)	Qualitative	To make comparisons between contrasting	Children without disability (*N,*			•	•			• Observations • Field notes

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
Greece		cases but to study the typical playground population, examining a range of patterns of behavior	age range, and sex NR)							• Informal discussions • Interviews
Prellwitz & Skär (2007) Sweden	Qualitative	To better understand how children with different abilities use playgrounds to engage in creative play and interact with peers	*N* = 20 (ages 7–12 yr, 11 boys, 9 girls)		•	•			•	Interviews
Refshauge et al. (2015) Denmark	Mixed	To develop, explore, and evaluate an approach to evidence-based playground design, which can be helpful to practitioners	Children without disability, *N* = 96[e] (ages 0–12 yr; 44 boys, 52 girls) *N* = 152 observations (97 boys, 55 girls)	•		•		•		• Onsite observation • Survey
Ripat & Becker (2012) Canada	Qualitative	To gain an understanding of the experiences of playground use of	Children with disabilities, *N* = 9 (ages 7–15	•	N/A					Interviews

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		children with disabilities and their caregivers and to generate ideas that would improve the usability of future playground constructions	yr; 3 boys, 6 girls)							
Sanderud et al. (2020) Norway	Qualitative	To explore how a group of children build their understanding of themselves and their environment during playful explorations in winter landscapes	Children without disability, *N* = 20 (ages 3–6 yr; sex NR)		•			•		• Observation • Play-along • Interviews • Photographs
Sandseter et al. (2021)[c] Norway	Quantitative	To examine the relationship between outdoor play spaces and play materials for the occurrence of children's risky play	Children without disability, *N* = 86 (ages 3–6 yr; 44 boys, 42 girls)		•		NR			Systematic observation using video recording
Sandseter et al. (2022)[c] Norway	Quantitative	To examine how features in children's early childcare education center	Children without disability, *N* = 86 (ages 3–6 yr; 44		•		NR			Systematic observation using video recording

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		outdoor environment (spaces and materials) were actualized by children for different types of play	boys, 42 boys)							
Sargisson & McLean (2012) New Zealand	Mixed	To assess the extent and manner in which children use natural elements when present in public playgrounds and to determine their preferences for playing on built equipment versus engaging with natural elements	*N* = 4,597 observations (ages 0–10; sex NR)			•	•	•	•	• Systematic observation • Photographs • Google Earth satellite images of 23 playgrounds
Stanton-Chapman & Schmidt (2021) United States	Mixed	To develop an in-depth understanding of children's social play behaviors on school and community playgrounds	Children without disability, *N* = 6 (ages 4–5 yr; 3 boys, 3 girls)		•	•	•			• Observation • Interviews
Stettler et al. (2022)[d]	Qualitative	To explore the play experiences, participation, and	Children with disabilities, *N* = 5			•	NR			Secondary analysis of semistruc-

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
Switzerland		social interaction of children with cerebral palsy in inclusive playgrounds	(ages 9–12 yr; 4 boys, 1 girl)							tured interviews
Truong & Mahon (2012) Thailand	Qualitative	To explore how children experience play and sense of place at the Duangkae Centre	Children without disability, *N* = 23 (ages 8–12 yr; 12 boys, 11 girls)			•	NR			• Participatory photography • Walking tours • Creation of maps • Drawings • Discussion groups
Veitch et al. (2021) Australia	Quantitative	To examine the relative importance of park features among children for influencing their choice of park for engaging in park-based physical activity	Children without disability, *N* = 252 (ages 8–12 yr; 105 boys, 147 girls)		N/A		•			Survey instrument
Veitch et al. (2020) Australia	Qualitative	To gain in-depth insights from children about park features that influence their park visitation, park-	Children without disability, *N* = 30 (ages 8–12; 14			•	•			• Parent demographic questionnaire

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		based physical activity, and social interaction using walk-along interviews in parks	boys, 16 girls)							• Walk-and-talk interview
Wenger et al. (2021)[d] Switzerland	Qualitative	To explore the experiences of children with and without disabilities of playing on inclusive playgrounds	*N* = 32 (ages 7–12 yr) Children with disabilities, *n* = 18 (16 boys, 2 girls) Children without disability, *n* = 14 (7 boys, 7 girls)			•	•	•		• Interviews • Observations
Wishart et al. (2019) Australia	Quantitative	To investigate whether the naturalized design of the new space can offer comparable opportunities for various types of physical activity, compared with the traditional play	Children without disability, *N* = 50 (ages 4–5 yr; sex NR)		•		•			Behavior mapping

Citation and Country of Data Collection	Study Design	Study Aims	Participants		Playground Sample					Data Collection Methods
					Located in		Urbanization			
			Children	Adults	School	Public Space	Inner City	Suburban	Rural	
		space with its conventional equipment								
Yates & Oates (2019) United Kingdom	Qualitative	To gather young children's insights on new play provision of 2 local playgrounds.	Children without disability, *N* = 60 (ages 6–7 yr; sex NR)			•			•	Different participatory methods (inspired by mosaic approach)

Note. Observational counts were excluded from total sample size. N/A = not applicable; NR = not reported.

[a,b,c,d]Studies with same superscript use the same dataset but different analysis. [e]Number of participants in a survey.

Appendix 19. *Environmental Taxonomy of Outdoor Play Space Features (Extended Version with Supporting Literature)*

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Open spaces are areas within or surrounding a playground characterized by *primarily flat terrain* and *mostly open, typically with ample space* between play equipment, other built structures, or natural fixed features such as trees and bushes, resulting in features being distributed rather clustered in one location. The specific surface qualities of open spaces can vary, and the affordances they offer may differ depending on the ground surface material (soft or solid surfaces; Caro et al., 2016; Czalczynska-Podolska, 2014; Pitsikali & Parnell, 2019; Sargisson & McLean, 2012). Subcategories might be grassed open spaces and open spaces with hard surfaces.		
Physical play	Running; riding, driving, skating; using wheeled devices or wheelchairs; pulling wagons; playing with brought manufactured play objects (e.g., hula hoops, kites, frisbees, balls), doing gymnastic—like handstands and backflips; jumping on floor markings; chasing games; play fetch with pet dog	18 (Aminpour, 2021; Aminpour et al., 2020; Bourke & Sargisson, 2014; Caro et al., 2016; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Fahy et al., 2021; Jansson, 2010; Lerstrup & van den Bosch, 2017; Lynch et al., 2020; Moore et al., 2021; Nunma & Kanki, 2022; Obee et al., 2020; Pitsikali & Parnell, 2019; Sandseter et al., 2020; Veitch et al., 2020; Wenger et al., 2021; Wishart et al., 20198)
Exploratory play	Watching objects that roll or spin, building and construction in open space	2 (Fahy et al., 2021; Jansson, 2010)
Imaginative play	Floor-is-lava play, sociodramatic play (not specified), symbolic play (not specified)	3 (Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Fahy et al., 2021)
Play with rules	Most often this play was some kind of ball play such as soccer, basketball, or a chasing or tag game	9 (Aminpour, 2021; Aminpour et al., 2020; Bourke & Sargisson, 2014; Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Sargisson & McLean, 2012)
Expressive play	Singing song games	1 (Lerstrup & van den Bosch 2017)
Digital play	NA	
Bio play	NA	
Restorative play	Sitting, standing,	6 (Dyment & O'Connell, 2013; Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Moore et al., 2021; Sargisson & McLean, 2012)

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Nonplay	Picnicking, walking across, transitioning to another area	4 (Aminpour, 2021; Jansson et al., 2016; Refshauge et al., 2015; Sargisson & McLean, 2012)
Others[a]	NA	
Designated sports areas are *flat areas* that afford children certain kinds of play, such as soccer, basketball, and table tennis. These sports areas are sometimes separate from the playground or close to the playground. Designated sports areas usually *provide rigid built elements* (sports equipment such as goal posts) or *visual floor markings* that are used by children for sports or other play. Sports areas can have variety of ground surfaces depending on the activity (Caro et al., 2016; Nunma & Kanki, 2022; Pitsikali & Parnell, 2019; Sandseter et al., 2020; Veitch et al., 2020).		
Physical play	Hanging on the basketball basket	1 (Caro et al., 2016)
Exploratory play	NA	
Imaginative play	NA	
Play with rules	Playing soccer, playing basketball	4 (Bourke & Sargisson, 2014; Cetken-Aktas & Sevimli-Celik, 2023; Pitsikali & Parnell, 2019; Veitch et al., 2020)
Expressive play	NA	
Digital play	NA	
Bio play	NA	
Restorative play	NA	
Nonplay	NA	
Others[a]	NA	
Paths and walkways are supporting features of the playground that are easily distinguishable by their *distinct surface transitions and clear boundaries*. They serve as *connecting elements, linking various zones* within the playground (Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Moore et al., 2021) and providing access to play components (Ripat & Becker, 2012). Sometimes designed as a stand-alone feature that *loops around* the playground, affording running, driving, and walking in circles (Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Moore et al., 2021; Wenger et al., 2021), and may have having different-sized elements, such as *bumps, obstacles, dips, and dikes,* affording running, driving, walking, and jumping over (Lerstrup & van den Bosch, 2017; Moore et al., 2021; Veitch et al., 2020; Wenger et al., 2021).		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Studies described paths and walkways as needing a *solid surface* such as pavement, wood, or concrete (Bourke & Sargisson, 2014; Moore et al., 2021; Prellwitz & Skär, 2007), sometimes described as an *accessible surface* (Prellwitz & Skär, 2007; Ripat & Becker, 2012). Rubber surfaces were disliked because they slow children's speed when driving or riding something (Wenger et al., 2021). A common environmental category that was linked to paths and walkways was manufactured tools and toys, such as driving devices (e.g. wheelchairs, bikes, scooters) used to drive on paths.		
Physical play	Riding, driving, skating with bike, scooter, trikes, skates; running	9 (Bourke & Sargisson, 2014; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Lerstrup & van den Bosch, 2017; Moore et al., 2021; Pitsikali & Parnell, 2019; Sandseter et al., 2020; Veitch et al., 2020; Wenger et al., 2021)
Exploratory play	NA	
Imaginative play	NA	
Play with rules	Ball play on concrete path	1 (Bourke & Sargisson, 2014)
Expressive play	NA	
Digital play	NA	
Bio play	Enjoying nature and wildlife from a path	1 (Veitch et al., 2020)
Restorative play	Sitting and observing	1 (Bourke & Sargisson, 2014)
Nonplay	Walking somewhere	2 (Bourke & Sargisson, 2014; Czalczynska-Podolska, 2014)
Others[a]	NA	
Topographic features can be identified as hills, slopes, ramps, and depressions or cliffs in the terrain. Environmental qualities of slopes and hills, such as *more or less smooth with varying degree of steepness or inclination* (Goodenough et al., 2021; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Obee et al., 2020; Wishart et al., 2019), *varying sizes or heights* (Goodenough et al., 2021; Norðdahl & Einarsdóttir, 2015), and *varying surfaces providing different textures* (e.g., artificial turf, snow with varying properties, ice, earth, grass; Goodenough et al., 2021; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Sanderud et al., 2020).		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Play can be enhanced through *steeper* slopes and *bigger* hills (Goodenough et al., 2021; Norðdahl & Einarsdóttir, 2015; Wishart et al., 2019), as well as *weather and/or seasonal conditions* (such as rain, snow, ice, or frost making terrain more slippery or dry and crumbly; Goodenough et al., 2021; Jansson, 2010; Jansson et al., 2016; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sanderud et al., 2020). Five studies also pointed to hilly terrain, emphasising *varying landscape* and *the presence of several* hills or slopes (Cetken-Aktas & Sevimli-Celik, 2023; Goodenough et al., 2021; Jansson, 2010; Jansson et al., 2016; Lerstrup & van den Bosch, 2017), and 1 study described a playground built on a sloped yard contributing to affordances of rolling objects (Fahy et al., 2021). Less commonly, topography pointed to *depressions* such as puddles and ditches (Norðdahl & Einarsdóttir, 2015), *cliffs* (Obee et al., 2020), or *human-constructed flowing water features like creeks* (Loebach & Cox, 2022).		
Physical play	Going up and/or down hills and slopes: sliding, sledding, gliding; running, climbing up, rolling themselves down, biking and driving, jumping, balancing, carrying things up, making up an own obstacle course	13 (Fahy et al., 2021; Goodenough et al., 2021; Jansson, 2010; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Refshauge et al., 2015; Sanderud et al., 2020; Stanton-Chapman & Schmidt, 2021; Veitch et al., 2020; Wishart et al., 2019)
Exploratory play	Interest in observing and watching rolling things down a hill, making paths and footprints in snow up the hill, a space utilisedto construct and built, puddles and depression in the terrain with water to build dams, manipulating floating toys in creeks	6 (Cetken-Aktas & Sevimli-Celik, 2023; Fahy et al., 2021; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Sanderud et al., 2020)
Imaginative play	Described as a space where sociodramatic play occurred (not specified)	1 (Cetken-Aktas & Sevimli-Celik, 2023)
Play with rules	Hide-and-seek games, developing own rules in a racing game, battle or war play	3 (Goodenough et al., 2021; Jansson et al., 2016; Loebach & Cox, 2022)
Expressive play	NA	
Digital play	NA	
Bio play	Hills with vegetation used to explore nature	1 (Jansson et al., 2016)

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Restorative play	Observing other children's physical play, enjoying an outlook (view)	2 (Norðdahl & Einarsdóttir, 2015; Stanton-Chapman & Schmidt, 2021)
Nonplay	NA	
Others[a]	NA	
Enclosed and bounded spaces provide a *more or less clear bounded area that might be fully to partly enclosed*. Enclosed and bounded spaces are found in the natural and human-built environment. These spaces were described as *having low raised boundaries, walls* and/or *coverage* or roofs as well as *a bounded area nested between a bigger space.* Bounded qualities refer to *a subtle change in surface pattern indicating a space within a space.* Natural enclosed and bounded spaces were formed by natural features, such as low hanging trees, entrances into vegetation such as bushes, circle of trees, dense planting, high-grown grass, or a change in natural ground surfacing, such as a dry patch of grass (Aminpour, 2021; Goodenough et al., 2021; Jansson, 2015; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015). Human-made or -built enclosed and bounded spaces included huts, smaller spaces integrated in play structures, storage areas, forts, tree houses, nooks, niches, edges, crannies and corners, willow domes, under stairs, between low raised boundaries, between clustered benches, or semipermanent enclosures such as zip-up tents (Aminpour et al., 2020; Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2015; Lerstrup & van den Bosch, 2017; Luchs & Fikus, 2013; Stettler et al., 2022). Enclosed and bounded spaces are also created by children themselves, such as building a den or fort, forming a nest in high-grown grass or simply laying out a picnic blanket in open space spaces (Aminpour, 2021; Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2008, 2015; Jansson et al., 2016; Jansson & Persson, 2010; Loebach & Cox, 2022; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015). Functional qualities included affordances for *seclusion and privacy or semiprivacy*, being *less supervised,* and offering a *less interrupted space* that *shields their play from others* and at the same time provides a place that children can call "their" space" for their play (Aminpour et al., 2020; Goodenough et al., 2021; Lerstrup & van den Bosch, 2017; Norðdahl & Einarsdóttir, 2015; Stettler et al., 2022). Studies described these enclosed and bounded spaces as cozy, secretive, and offering a new perspective and outlook on the surroundings (Aminpour et al., 2020; Goodenough et al., 2021; Lerstrup & van den Bosch, 2017; Norðdahl & Einarsdóttir, 2015).		
Physical play	Jumping between parallel standing benches that formed a small space, accessing small spaces by climbing in, physical play incorporated in imaginative play such as house play or superhero play	3 (Aminpour et al., 2020; Goodenough et al., 2021; Moore et al., 2021)
Exploratory play	Exploring a small space in a natural environment, such as in high grass;	4 (Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2015; Norðdahl & Einarsdóttir, 2015)

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
	constructing a small space such as dens or creating a small space, such as digging a big hole, making a nest	
Imaginative play	Fantasy, symbolic, and sociodramatic play that often also included loose natural parts such as playing house, playing shopping, mum and dad play, being a princess, secretive space entered by password play, monster play, witch play, superhero play, and mer-maids play; fighting invisible people	6 (Aminpour et al., 2020; Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2023; Goodenough et al., 2021; Moore et al., 2021; Prellwitz & Skär, 2007)
Play with rules	Playing chase and tag in a cops-and-robbers play where a hut functions as the prison	1 (Cetken-Aktas & Sevimli-Celik, 2023)
Expressive play	Chatting with peers	2 (Hayward et al., 1974; Prellwitz & Skär, 2007)
Digital play	NA	
Bio play	NA	
Restorative play	Enjoying being inside a small space, resting in a small space that provided shade, enjoying the outlook, hiding in a hideout, sitting or lying in a small space	6 (Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Goodenough et al., 2021; Jansson, 2015; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022)
Nonplay	NA	
Others[a]	Social opportunity to sit with peers in a small space	1 (Cetken-Aktas & Sevimli-Celik, 2023)
Play equipment was the most represented environmental feature in the studies, with almost all studies referring to some kind of play equipment. Play equipment is always human-constructed and refers to stand-alone play components such as one swing or one slide but also play structures where diverse play opportunities were integrated into one bigger structure offering multiple play opportunities. Play equipment is rigid or has moving fixtures. Play equipment was importantly understood as human-constructed or -built structures that are placed intentionally on the playground. Play equipment was described as *made from different materials* such as metal, plastic, or wood but also *natural materials* such as boulders, tree stumps, or tree logs placed on the playground for the purpose of being played with (referred to as *hybrid play structures*). Another aspect of playground equipment is that it is often designed with		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
specific play affordances, such as a climbing frame intended for climbing. However, play equipment is commonly repurposed for other affordances, such as sitting on a climbing frame (see also theme of flexible use in Morgenthaler et al., 2023).		
Physical play	Balancing, using a cable way, climbing on, crossing bridges, and balancing opportunities, crawling under, doing gymnastics, hanging on, jumping, pulling themselves up, rocking, running, throwing things on play equipment, sliding, spinning, turning, rotating, swinging, repetitive play routes, bumping into each other	41 (Birkner et al., 2021; Bourke & Sargisson, 2014; Burke, 2012; Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Chen et al., 2020; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Fahy et al., 2021; Goodenough et al., 2021; Hayward et al., 1974; Horton & Kraftl, 2018; James et al., 2022, 2022; Jansson, 2008, 2010, 2015; Jansson et al., 2016; Jansson & Persson, 2010; Jeanes & Magee, 2012; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Luchs & Fikus, 2013; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Obee et al., 2020; Pitsikali & Parnell, 2019; Prellwitz & Skär, 2007; Refshauge et al., 2015; Ripat & Becker, 2012; Sandseter et al., 2021; Sargisson & McLean, 2012; Stanton-Chapman & Schmidt, 2021; Stettler et al., 2022; Truong & Mahon, 2012; Veitch et al., 2020, 2021; Wenger et al., 2021; Wishart et al., 2019; Yates & Oates, 2019)
Exploratory play	Making sounds with musical instruments, filling or building on play equipment with surface material, digging under play equipment, walking barefoot over play equipment	5 (Fahy et al., 2021; James et al., 2022; Jansson, 2015; Lerstrup & van den Bosch, 2017; Refshauge et al., 2015)
Imaginative play	Sociodramatic play; slide becomes a mountain to climb, swing becomes an imaginative boat, crocodile-pulls-me-down-the-slide play	5 (Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; James et al., 2022; Prellwitz & Skär, 2007; Stanton-Chapman & Schmidt, 2021)
Play with rules	Hide and seek, playing duck, duck, goose in circularly arranged tree stumps, playing tag on play equipment, creation of own obstacle course game that included play equipment	3 (Caro et al., 2016; Loebach & Cox, 2022; Stettler et al., 2022)

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Expressive play	Conversational play, such as sitting on play equipment and chatting with known peers or friends, telling stories and jokes, laughing together, doing an artistic performance (singing or dancing) on a stage, perform risky maneuvers on play equipment	9 (Burke, 2012; Caro et al., 2016; Czalczynska-Podolska, 2014; Jansson, 2008; Jeanes & Magee, 2012; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Prellwitz & Skär, 2007; Truong & Mahon, 2012)
Digital play	NA	
Bio play	Laying in hammock and observing the sky	1 (Goodenough et al., 2021)
Restorative play	Sitting or laying and resting on equipment; laying in shade by play equipment; laying in swings or hammocks; hiding by, on, or in play equipment; enjoying the view from a high point up on play equipment, such as climbing or tree houses; watching other children's play	11 (Birkner et al., 2021; Goodenough et al., 2021; Jansson, 2008, 2015; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Obee et al., 2020; Prellwitz & Skär, 2007; Refshauge et al., 2015; Stanton-Chapman & Schmidt, 2021)
Nonplay	Walking around play equipment	2 (Czalczynska-Podolska, 2014; Stanton-Chapman & Schmidt, 2021)
Others[a]	Play equipment was used to get in proximity to other children or being close to other children (e.g., sitting together, knowing a spot that was popular to get in contact and find someone to play with, seeking peers to play with), getting social approval from peers through playing in small groups, opportunities to be with peers away from adults	7 (Bourke & Sargisson, 2014; Burke, 2012; Jansson, 2008; Jansson et al., 2016; Nunma & Kanki, 2022; Prellwitz & Skär, 2007; Veitch et al., 2020)
Themed and suggestive play features (play structures and components) afford play other than play equipment category. Play opportunities afforded by recognizable and less recognizable play structures or components on the one hand *inspire children to create play* that the *theme suggested* (Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Loebach & Cox, 2022; Luchs & Fikus, 2013; Nunma & Kanki, 2022; Prellwitz & Skär, 2007) and on the other hand *inspire children to create an own play idea by repurposing the themed play structure or*		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
component (Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2023; Prellwitz & Skär, 2007). Either way, studies emphasised that children use themed and suggestive play features by applying their own rules within their play. Recognizable and less recognizable play structures also afford new physical challenges such as using the structure for climbing (Prellwitz & Skär, 2007; Refshauge et al., 2015). Themed and suggestive play features can also be small and enclosed spaces (Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2023; Prellwitz & Skär, 2007) or small objects that are attached but movable like a wheel (Ripat & Becker, 2012)		
Physical play	Climbing on top of a themed play structure	3 (Jansson, 2008; Prellwitz & Skär, 2007; Refshauge et al., 2015)
Exploratory play	Explorative opportunities by opening, closing, sliding, turning things in playhouses to play with	2 (Czalczynska-Podolska, 2014; Ripat & Becker, 2012)
Imaginative play	Sociodramatic and fantasy play, such as soldier and enemy play, driving play by a truck shape, an attached wheel and pretending to be on a ship, princess play by a castle shape, loosely shaped playhouses affording a variety of play such as store, family, post office, bakery, school, jail, or monster and witch play	7 (Burke, 2012; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Luchs & Fikus, 2013; Prellwitz & Skär, 2007; Ripat & Becker, 2012; Sandseter et al., 2020)
Play with rules	Conventional games such as tag or chasing,	1 (Cetken-Aktas & Sevimli-Celik, 2023)
Expressive play	Performative play such as singing or dancing by a stage-themed play structure, making graffiti in playhouses and three houses	4 (Goodenough et al., 2021; Loebach & Cox, 2022; Luchs & Fikus, 2013; Nunma & Kanki, 2022)
Digital play	NA	
Bio play	NA	
Restorative play	Hiding in a themed play structure, enjoying being inside somewhere and looking out	3 (Goodenough et al., 2021; Refshauge et al., 2015; Ripat & Becker, 2012)
Nonplay	NA	
Others[a]	NA	

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Spaces on the edges are *areas adjoining more busy zones* on the playgrounds. These spaces might have no distinct boundary, *bordering or wrapping* around other spaces (e.g., corners, nooks, and staircases adjoining open spaces, paths and walkways, designated sports areas, play equipment, or themed and suggestive play features and in more naturalized spaces). These were described as *less busy, less interrupted, more quiet and still, meaning less hectic for slower play affordances* (Aminpour, 2021; Aminpour et al., 2020; Dyment & O'Connell, 2013; Loebach & Cox, 2022). Furthermore these areas where described as *being overlooked by supervising adults* (Aminpour, 2021; Aminpour et al., 2020; Lerstrup & van den Bosch, 2017; Prellwitz & Skär, 2007).		
Physical play	NA	
Exploratory play	NA	
Imaginative play	NA	
Play with rules	NA	
Expressive play	Allowing conversational play by being in a less supervised and more private space	1 (Prellwitz & Skär, 2007)
Digital play	NA	
Bio play	NA	
Restorative play	Watching other children from a distance (e.g., by the edges of more busy areas, daydreaming, relaxing)	4 (Aminpour, 2021; Aminpour et al., 2020; Dyment & O'Connell, 2013; Loebach & Cox, 2022)
Nonplay	Waiting to get a turn in play	1 (Caro et al., 2016)
Others[a]	Getting together and socializing with peers	3 (Aminpour et al., 2020; Dyment & O'Connell, 2013; Prellwitz & Skär, 2007)
Features not purpose-built for play *are supporting features of the playground* that were not particularly built for the purpose of play, but children still utilisedthem for play. These features can be defined as *human built and fixed* and included fences (Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Luchs & Fikus, 2013; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Pitsikali & Parnell, 2019), lower raised boundaries (e.g., to indicate new activity zones or as a protection around natural environments; Aminpour, 2021; Aminpour et al., 2020; Bourke & Sargisson, 2014; Wishart et al., 2019), any type of seating area with tables and/or benches (Aminpour et al., 2020; Bourke & Sargisson, 2014; Loebach & Cox, 2022; Moore et al., 2021; Prellwitz & Skär, 2007; Veitch et al., 2020), columns and poles, lamp posts (Aminpour et al., 2020; Caro et al., 2016; Fahy et al., 2021; Jansson et al., 2016), staircases (Aminpour et al.,		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
2020; Caro et al., 2016), water fountains (Jansson et al., 2016; Sargisson & McLean, 2012), window blinds (Moore et al., 2021), and shelters (Norðdahl & Einarsdóttir, 2015).		
Physical play	Climbing on fences or poles, jumping over fences, balancing on fences, jumping on or from benches, running around supporting features	9 (Aminpour et al., 2020; Cetken-Aktas & Sevimli-Celik, 2023; Fahy et al., 2021; Moore et al., 2021; Nunma & Kanki, 2022; Pitsikali & Parnell, 2019; Refshauge et al., 2015; Sandseter et al., 2021; Wishart et al., 2019)
Exploratory play	Building and constructing steps to further climb over the fence, using the water from water fountains in play	2 (Cetken-Aktas & Sevimli-Celik, 2023; Sargisson & McLean, 2012)
Imaginative play	Incorporate low raised boundaries into their sociodramatic play (e.g., afford to playhouse, family, fences used to play animal in the care play).	5 (Aminpour, 2021; Aminpour et al., 2020; Moore et al., 2021; Pitsikali & Parnell, 2019; Refshauge et al., 2015)
Play with rules	Chasing play between built structures such as poles or staircases, hide-and-seek games using built environmental structures	3 (Aminpour et al., 2020; Caro et al., 2016; Jansson et al., 2016)
Expressive play	Conversational play by sitting and talking with peers on benches, tables	2 (Loebach & Cox, 2022; Prellwitz & Skär, 2007)
Digital play	NA	
Bio play	NA	
Restorative play	Resting, recovering, and observing by sitting on benches or boundaries and walls; hiding opportunities; sitting and laying	5 (Bourke & Sargisson, 2014; Caro et al., 2016; Fahy et al., 2021; Loebach & Cox, 2022; Prellwitz & Skär, 2007)
Nonplay	Eating and having picnics or barbecue	2 (Veitch et al., 2020; Wenger et al., 2021)
Others[a]	Seeking opportunities to be with peers hanging out on top of built structures	1 (Nunma & Kanki, 2022)
Manufactured tools and toys can be described as *graspable, detached,* and *portable objects.* Manufactured tools and toys were either brought to the playground from home (Czalczynska-Podolska, 2014; Lynch et al., 2020) or provided on the playground, such as when playground was on school grounds (Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Obee et al., 2020; Wishart et al., 2019). Affordances of manufactured		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
tools and toys need to be understood in relation to where they are used. For example, vehicles such as bikes, scooters, wagons, tricycles, wheelchairs, or sleds were used in combination with space affordances such as topography like hills and slope, path and walkways, or more open areas with sufficiently solid surfaces (Bourke & Sargisson, 2014; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sandseter et al., 2020, 2021; Veitch et al., 2020; Wishart et al., 2019). Similar toys such as hula hoops, plastic crates or blocks, balls, frisbees, elastics, rackets and bats, foam circles, toy boats, and disks were used in open spaces, hills, or creeks (Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Fahy et al., 2021; Loebach & Cox, 2022; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Obee et al., 2020; Pitsikali & Parnell, 2019; Sargisson & McLean, 2012; Stanton-Chapman & Schmidt, 2021; Truong & Mahon, 2012; Wenger et al., 2021; Wishart et al., 2019). Functional qualities of balls included the hardness and bounceability and functional qualities of toys needed to have some resistance to potential damage (Caro et al., 2016). Other manufactured tools and toys (such as bowls, buckets, funnels, shovels, wheelbarrow) are utilisedin accordance with other material properties (sand, mud, earth, water) or loose parts (Loebach & Cox, 2022; Sargisson & McLean, 2012; Wishart et al., 2019). Furthermore, movable, rigid, and durable objects such as tires, ropes, and crates (Obee et al., 2020) are part of this category.		
Physical play	Jumping and skipping play using hula hoops, rubber bands, driving or riding vehicles, jumping over bumps, sledding using sleds, pulling wagons, carrying loads around, throwing, balancing on movable wood planks, chasing and hitting each other with foam blocks, ball play, play fighting and pushing each other from higher points	20 (Bourke & Sargisson, 2014; Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Fahy et al., 2021; Hayward et al., 1974; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Lynch et al., 2020; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Obee et al., 2020; Pitsikali & Parnell, 2019; Sandseter et al., 2020, 2021; Veitch et al., 2020; Wenger et al., 2021; Wishart et al., 2019)
Exploratory play	Building or constructing with blocks, damming flowing water and manipulating toy boats, manipulating materials such as and and/mud, rolling discs down the hill, looking at spinning disks, stirring, hammering, transporting material around	13 (Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Fahy et al., 2021; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sandseter et al., 2020; Sargisson & McLean, 2012; Truong & Mahon, 2012; Wishart et al., 2019)
Imaginative play	Sociodramatic play, such as being a pilot while playing with toy boat, playing captain by a steering wheel, doll play	3 (Loebach & Cox, 2022; Lynch et al., 2020; Ripat & Becker, 2012)

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Play with rules	Ball play, kicking, throwing, frisbee play	10 (Caro et al., 2016; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Pitsikali & Parnell, 2019; Sargisson & McLean, 2012; Veitch et al., 2020; Wenger et al., 2021)
Expressive play	Arranging, sorting	1 (Lerstrup & van den Bosch, 2017)
Digital play	Play on cell phone or on a digital device while sitting somewhere	2 (Caro et al., 2016; Loebach & Cox, 2022)
Bio play	NA	
Restorative play	Building something to hide in	1 (Obee et al., 2020)
Nonplay	Fighting over play objects	1 (Stanton-Chapman & Schmidt, 2021)
Others[a]	Meeting friends or peers	1 (Lynch et al., 2020)

Fixed natural features is a broad category that could be described as naturalized areas and the natural features integrated *within the playground design or surrounding the playground and made available and inviting to play in, on, and with* and including any kind of vegetation, such as high-grown grass, shrubs, bushes, and bush walks or hedges but also natural elements such as trees and boulders. These environmental features were mostly described as being utilisedin play and not just decorative elements of the playground.

Most often a connection to trees with was found (19 studies) that described children's play *by, on, under, surrounding, or between specific trees or amounts of trees together forming a forest area* (Aminpour, 2021; Bourke & Sargisson, 2014; Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2008, 2010, 2015; Lerstrup & van den Bosch, 2017; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Pitsikali & Parnell, 2019; Refshauge et al., 2015; Sanderud et al., 2020; Sargisson & McLean, 2012; Veitch et al., 2020, 2021; Wenger et al., 2021; Wishart et al., 2019), with 12 studies play involving *bushes, shrubs, and undergrowth* (Aminpour, 2021; Aminpour et al., 2020; Caro et al., 2016; Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2008; Jansson et al., 2016; Luchs & Fikus, 2013; Moore et al., 2021; Obee et al., 2020; Refshauge et al., 2015; Veitch et al., 2020; Wishart et al., 2019), 3 studies involving play in *high-grown grass* (Jansson et al., 2016; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015), and 5 studies involving play with *boulders and rocks* (Dyment & O'Connell, 2013; Loebach & Cox, 2022; Sargisson & McLean, 2012; Veitch et al., 2020; Wishart et al., 2019).

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Regarding trees, the studies described using certain parts of the trees that were *available to and reachable* by children. These tree parts included branches, roots, stems or trunks, leaves, bark, and fallen trees that were utilisedin play (Aminpour, 2021; Aminpour et al., 2020; Goodenough et al., 2021; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022). Environmental qualities of these natural elements were *dense leaves thick undergrowth, or low-hanging canopies* (Aminpour, 2021; Moore et al., 2021), as well as *low-hanging branches* (Aminpour, 2021; Goodenough et al., 2021) or *trees grouped circularly* together (Aminpour, 2021; Jansson, 2008). Four studies found the quality of needing *many trees* (Goodenough et al., 2021; Jansson, 2010; Moore et al., 2021; Veitch et al., 2020), and tree studies point to the importance of the *maturity of trees*—"big, massive, and old" trees (Aminpour, 2021; Goodenough et al., 2021; Moore et al., 2021). Furthermore, sensory qualities included *soft textures* children wanted to touch (Aminpour, 2021; Jansson et al., 2016; Loebach & Cox, 2022) or *unique shapes* (e.g., roots) that children use in their play (Aminpour, 2021; Goodenough et al., 2021). Natural environments provided shaded areas (Aminpour, 2021; Jansson et al., 2016; Loebach & Cox, 2022), reduced temperatures (Aminpour, 2021), or cooled the air in combination with wind (Nunma & Kanki, 2022). Natural environment was described as being more at the edges or surrounding the playground (Jansson & Persson, 2010; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Refshauge et al., 2015; Sandseter et al., 2020; Veitch et al., 2021) and was described as less busy, calmer, restorative, and peaceful (Aminpour, 2021; Horton & Kraftl, 2018; Moore et al., 2021; Veitch et al., 2020). Studies pointed to the importance of natural environments not being overgrown (Aminpour, 2021; Aminpour et al., 2020; Sargisson & McLean, 2012; Veitch et al., 2020) but also not cut back too much (Jansson et al., 2016).		
Physical play	Climbing trees, boulders, shrubs, branches; balancing on roots or stumps; running along a bush walk; rolling on the forest floor; jumping off somewhere; swinging on tree branches; chasing and tag play	24 (Aminpour, 2021; Aminpour et al., 2020; Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2008, 2015; Jansson et al., 2016; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Pitsikali & Parnell, 2019; Refshauge et al., 2015; Sandseter et al., 2020, 2021; Sargisson & McLean, 2012; Veitch et al., 2020, 2021; Wenger et al., 2021; Wishart et al., 2019)
Exploratory play	Constructing and building, often in combination with loose parts (e.g., dens), ripping bark, touching plant materials, observing and exploring	14 (Aminpour, 2021; Aminpour et al., 2020; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2008, 2010; Jansson et al., 2016; Loebach & Cox, 2022; Lynch et al., 2020;

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
	surrounding nature, natural elements such as holes in trees or wildlife, walking barefoot in forest floors, hiding and find-ings something, shaking and rattling twigs	Nunma & Kanki, 2022; Refshauge et al., 2015; Sanderud et al., 2020; Sandseter et al., 2020)
Imaginative play	Sociodramatic play, such as kitchen, making food, office play, house, sleeping play on a tree trunk, war battle play; fantasy play such as being a dragon, superhero play, being an animal	9 (Aminpour, 2021; Aminpour et al., 2020; Cetken-Aktas & Sevimli-Celik, 2023; Dyment & O'Connell, 2013; Goodenough et al., 2021; Jansson, 2008; Jansson et al., 2016; Loebach & Cox, 2022; Moore et al., 2021)
Play with rules	Playing tag or chasing, hide and seek, ball play such as soccer (e.g., tree trunks as goal posts)	9 (Aminpour, 2021; Aminpour et al., 2020; Caro et al., 2016; Dyment & O'Connell, 2013; Jansson, 2008; Jansson et al., 2016; Loebach & Cox, 2022; Moore et al., 2021; Veitch et al., 2020)
Expressive play	Chatting with friends, singing, dancing, leaving marks like drawings, shadow play	4 (Aminpour, 2021; Goodenough et al., 2021; Jansson et al., 2016; Loebach & Cox, 2022)
Digital play	NA	
Bio play	Observing, looking for, and caring for wildlife, touching and smelling plant parts, listening to birds	7 (Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020; Yates & Oates, 2019)
Restorative play	Enjoying an outlook (e.g., from a tree); hiding and not being seen; sunbathing; laying; sleeping; reading; resting or relaxing not specified; sitting in nature; daydreaming	10 (Aminpour, 2021; Aminpour et al., 2020; Dyment & O'Connell, 2013; Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Loebach & Cox, 2022; Moore et al., 2021; Obee et al., 2020; Veitch et al., 2020)
Nonplay	Having a picnic, doing homework, walking somewhere	4 (Aminpour, 2021; Jansson et al., 2016; Loebach & Cox, 2022; Refshauge et al., 2015)
Others[a]	Being with friends, gathering with friends	2 (Aminpour, 2021; Goodenough et al., 2021)
Loose natural parts are described with qualities such as *graspable, portable, collectable (countable)* that offer some *flexibility of repurposing or shaping them into new affordance* (e.g. building a den). They include a variety of plant parts that have *different sizes and weights,* including branches, sticks, fruits, grass, leaves, wood, bark, pinecones,		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
flowers, and others (Aminpour, 2021; Aminpour et al., 2020; Bourke & Sargisson, 2014; Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Fahy et al., 2021; Goodenough et al., 2021; Hayward et al., 1974; Horton & Kraftl, 2018; Jansson, 2010, 2015; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Ripat & Becker, 2012; Sandseter et al., 2020; Sargisson & McLean, 2012; Truong & Mahon, 2012; Veitch et al., 2020; Wishart et al., 2019). Additionally rocks and stones, ice chunks, and shells were included in this category (Caro et al., 2016; Cetken-Aktas & Sevimli-Celik, 2023; Jansson & Persson, 2010; Luchs & Fikus, 2013; Norðdahl & Einarsdóttir, 2015; Sanderud et al., 2020; Sargisson & McLean, 2012; Veitch et al., 2020). The functional qualities of loose natural parts and materials include that they are more open ended and offer multiple affordances, and they can be repurposed and adopted in children's play (Aminpour, 2021; Aminpour et al., 2020; Goodenough et al., 2021; Jansson, 2010; Jansson et al., 2016; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Truong & Mahon, 2012). Loose natural parts are often first sourced and gathered (looking for, collecting, picking), then shaped and changed by children with the intention of using them in further or new affordances, often imaginative play of some type, such as "collecting sticks to constructing a den to playing house." This shows the dynamic transaction between the child and the loose natural parts and materials. In addition, loose natural parts are utilisedin conjunction with other environmental categories, such as utilizing open spaces (Cetken-Aktas & Sevimli-Celik, 2023), using loose natural parts in combination with manufactured tools and toys (Loebach & Cox, 2022; Moore et al., 2021; Wishart et al., 2019) or in combination with provided materials for play (Czalczynska-Podolska, 2014; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015), as well as using them with fixed natural features such as dense leafy areas, trees, and shrubs or bushes of the playground (Goodenough et al., 2021).		
Physical play	Play fighting using sticks; pushing, carrying, and transporting heavy objects; picking up and throwing ice chunks, acorns, stones, snowballs; throwing leaves in air	8 (Caro et al., 2016; Fahy et al., 2021; Goodenough et al., 2021; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Moore et al., 2021; Sargisson & McLean, 2012; Wishart et al., 2019)
Exploratory play	Collecting; picking something; constructing and building dens, forts, dams, walls, or nests; digging for, filling holes with, and hitting ice with a stick; searching for and poking with a stick; drawing with; grinding; hiding something; stirring with something; ripping off;	18 (Aminpour, 2021; Aminpour et al., 2020; Cetken-Aktas & Sevimli-Celik, 2023; Goodenough et al., 2021; Hayward et al., 1974; Jansson, 2010, 2015; Jansson et al., 2016; Jansson & Persson, 2010; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Lynch et al., 2020; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Ripat & Becker,

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
	tearing apart; smelling flowers; tasting herbs, fruits, or ice; touching or feeling soft textures of plant materials; looking through a piece of ice	2012; Sanderud et al., 2020; Sandseter et al., 2020; Sargisson & McLean, 2012)
Imaginative play	Playing Harry Potter with wand-sticks, play fighting using sticks as swords, making monster traps with leaves and sticks, imagining sticks as monsters, making food out of loose parts, playing selling things, playing town or village, playing war, playing eating ice cream	9 (Aminpour, 2021; Aminpour et al., 2020; Fahy et al., 2021; Goodenough et al., 2021; Loebach & Cox, 2022; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Sanderud et al., 2020; Truong & Mahon, 2012)
Play with rules	Competing to find the biggest stick, snowball fights	2 (Caro et al., 2016; Goodenough et al., 2021)
Expressive play	Arranging patterns; sorting; drawing with charcoal or burned stick; drawing on stones or branches; playing with own shadow; writing on a piece of wood	7 (Cetken-Aktas & Sevimli-Celik, 2023; Goodenough et al., 2021; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Sanderud et al., 2020)
Digital play	NA	
Bio play	Aesthetic appreciation of a piece of ice,	1 (Sanderud et al., 2020)
Restorative play	Observing and enjoying the loose natural parts, resting in cool grass, enjoying flowers and plants	3 (Goodenough et al., 2021; Loebach & Cox, 2022; Moore et al., 2021)
Nonplay	NA	
Others[a]	NA	
Wildlife-friendly habitats includes green and blue spaces (e.g., shrubs, grass, flowers, forest, ponds, creeks) close to or integrated within the play space design that provide for or attract wildlife such as insects (bugs, spiders, snails, butterflies, amphibians, reptiles, fish, bunnies, and birds (singing birds, ducks, chicken; Aminpour, 2021; Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015), pets (dogs; Veitch et al., 2020), or animals domestically kept in fenced-in or caged-in areas (Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015). Examples of wildlife-friendly habitats include flowering vegetation and water features such as ponds and creeks (Aminpour, 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020; Yates & Oates, 2019). Other functional qualities describe the size of smaller wildlife as important for children (Cetken-Aktas & Sevimli-Celik, 2023;		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020). A unique functional quality of wildlife is that they move (crawl, fly, jump, swim) and make sounds (e.g., singing birds) and afford unique functional qualities of following, observing, and catching (Cetken-Aktas & Sevimli-Celik, 2023; Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015). Affordances around play with wildlife include manufactured tools and toys to capture, closely observe and take care of them (Lerstrup & van den Bosch, 2017; Norðdahl & Einarsdóttir, 2015).		
Physical play	Playing fetch and running with pet dog	1 (Veitch et al., 2020)
Exploratory play	Searching for, touching, following around, observing, watching, listening to, chasing animals away, catching animals, collecting animals, picking animals up	7 (Cetken-Aktas & Sevimli-Celik, 2023; Goodenough et al., 2021; Horton & Kraftl, 2018; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Norðdahl & Einarsdóttir, 2015)
Imaginative play	NA	
Play with rules	NA	
Expressive play	NA	
Digital play	NA	
Bio play	Caring for, feeding, looking under objects for animals, looking for, close observation (e.g., animal behavior)	6 (Cetken-Aktas & Sevimli-Celik, 2023; Horton & Kraftl, 2018; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Norðdahl & Einarsdóttir, 2015; Veitch et al., 2020)
Restorative play	NA	
Nonplay	NA	
Others[a]	NA	
Malleable materials are *shapable, malleable, portable, and mixable.* Materials are provided ether purposefully or found in more natural areas. Purposefully provided materials are usually found in certain areas on the playground, such as sandpits, water play areas or mud kitchens, or a combination (Birkner et al., 2021; Chen et al., 2020; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Luchs & Fikus, 2013; Moore et al., 2021; Norðdahl & Einarsdóttir, 2015; Nunma & Kanki, 2022; Refshauge et al., 2015; Ripat & Becker, 2012; Sandseter et al., 2020; Sargisson & McLean, 2012; Truong & Mahon, 2012; Veitch et al., 2020, 2021; Wishart et al., 2019), but they can also be surface materials of different kinds such as		

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
wood chips, mulch, sand, and gravel (Aminpour et al., 2020; Jansson, 2015; Loebach & Cox, 2022; Nunma & Kanki, 2022; Sargisson & McLean, 2012; Wishart et al., 2019). Materials found in and by nature consist of earth, mud, soil, clay, sand, gravel, water, snow, frost, and tree sap (Aminpour, 2021; Aminpour et al., 2020; Caro et al., 2016; Goodenough et al., 2021; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sanderud et al., 2020; Yates & Oates, 2019). Materials unfold their functional qualities in terms of their properties and textures. Properties of materials change their functional qualities *depending on the weather and temperature that affect* moistness, for example, sand, mud, clay, and earth are dry compared with wet or water changes from liquid to frozen (Aminpour, 2021; Aminpour et al., 2020; Caro et al., 2016; Goodenough et al., 2021; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Lynch et al., 2020; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sanderud et al., 2020; Yates & Oates, 2019). Textures of materials afford children's exploration of their sensory qualities through touching, described as soft compared with rough, that caused "getting hurt" (Loebach & Cox, 2022; Moore et al., 2021; Ripat & Becker, 2012). Materials are often used in combination with the category of manufactured tools and toys such as funnels, buckets, bowls, shovels, small cars, figures, and others (Czalczynska-Podolska, 2014; Jansson et al., 2016; Loebach & Cox, 2022; Wishart et al., 2019). Tools and toys are integrated into the playground design (Sargisson & McLean, 2012) or when used with play equipment in combination such as applying materials on slides or merry-go-around (Hayward et al., 1974; Jansson, 2015; Sargisson & McLean, 2012). Furthermore, 5 studies pointed to the importance of available and accessible diversity of materials, loose natural parts, and tools and toys in combination (Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Jansson et al., 2016; Loebach & Cox, 2022; Sargisson & McLean, 2012). Provision of these combinations afforded manipulation and shaping of the materials to make use of their properties.		
Physical play	Clambering slippery slope, scooping up and picking up materials, jumping over sandpit, skiing, sledding on snow-covered slopes, sliding down, throwing snow, transporting materials	6 (Caro et al., 2016; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Norðdahl & Einarsdóttir, 2015; Obee et al., 2020; Sanderud et al., 2020)
Exploratory play	Walking barefoot in sand, sweeping materials into mounds, building and constructing, molding, damming water, digging, extracting, filling, floating, bury-ing, forming snow, searching for buried objects, making tracks or footprints in snow, stirring, pouring, splashing,	17 (Aminpour, 2021; Aminpour et al., 2020; Birkner et al., 2021; Cetken-Aktas & Sevimli-Celik, 2023; Czalczynska-Podolska, 2014; Dyment & O'Connell, 2013; Jansson, 2015; Jansson et al., 2016; Lerstrup & van den Bosch, 2017; Loebach & Cox, 2022; Luchs & Fikus, 2013; Lynch et al., 2020; Moore et al., 2021; Nunma & Kanki, 2022; Refshauge et al., 2015; Sanderud et al., 2020; Sargisson & McLean, 2012)

Play Types (TOPO)	Play Occupations Afforded by Environment	No. of Supporting References and Citations
	mixing, sieving, exploring properties by touching, smearing	
Imaginative play	Pretending making food with materials, playing house, making monster traps, playing making food/cooking, playing mum and dad, playing house, playing restaurant, playing making sand cakes	5 (Aminpour, 2021; Aminpour et al., 2020; Dyment & O'Connell, 2013; Loebach & Cox, 2022; Truong & Mahon, 2012)
Play with rules	NA	
Expressive play	Shaping snow into figures	1 (Sanderud et al., 2020)
Digital play	NA	
Bio play	Watering flowers or animals	1 (Truong & Mahon, 2012)
Restorative play	Observing and enjoying the water	1 (Loebach & Cox, 2022)
Nonplay		
Others[a]	NA	

Note. NA = not applicable; TOPO = Tool for Observing Play Outdoors.

[a]Play that was more about a social aspect. TOPO, which is designed for observation, might not capture this, so data often came from qualitative verbal accounts, thus highlighting the need for multiple methods of data gathering.

Appendix 20. *Examples of Play Occupations: Forms and Environmental Functional Qualities, Associated Categories, and Supporting References*

Example Play Occupation (TOPO)	Various Forms of Play Occupations	Functional Qualities of the Environment Supporting This Play Occupation	Environmental Categories Associated With Play Occupation	Supporting References
Building and constructing (exploratory play)	• Building structure for further climbing on • Constructing tepees, forts, dens, secret places • Building water dams • Constructing with sourced materials and loose natural parts • Building sandcastles, sand cakes • Stacking objects • Building a fire • Building bridges • Creating things • Making a nest • Building a train • Scooping things into mounds	• Availability of diverse graspable, portable and countable loose parts and/or malleable material (in combination) to create something or alter the physical environment to shape new play affordances • Availability of manufactured tools and toys used in building and constructing • Spaces that afford further building, such as under trees • Materials that have the right properties (e.g., snow is formable; sand, mud, or soil is moist enough) • Inspiring themed or natural environments that afford extension of building ideas (flowing water, mature trees, inviting paths into nature)	• Loose natural parts • Materials • Fixed natural features • Enclosed and bounded spaces • Manufactured tools and toys	Aminpour (2021); Aminpour et al. (2020); Cetken-Aktas & Sevimli-Celik (2023); Chen et al. (2020); Czalczynska-Podolska (2014); Dyment & O'Connell (2013); Fahy et al. (2021); Goodenough et al. (2021); James et al. (2022); Jansson (2008, 2010, 2015); Jansson et al. (2016); Lerstrup & van den Bosch (2017); Loebach & Cox (2022); Norðdahl & Einarsdóttir (2015); Obee et al. (2020); Refshauge et al. (2015); Sandseter et al. (2020); Sargisson & McLean (2012); Truong & Mahon (2012)
Resting as play (restorative play)	• Recovering • Relaxing • Sitting on (e.g., boulders)	• Quiet spaces that afford withdrawal from busy areas often in more natural environment • Spaces that are scaled for being alone or in smaller groups of peers (swings, picnic	• Open space • Enclosed and bounded spaces	Aminpour (2021); Aminpour et al. (2020); Birkner et al. (2021); Bourke & Sargisson (2014); Caro et al.

	• Laying in shade or sun • Resting and chatting with friend • Staring at trees • Laying in hammock • Leaning on (e.g., poles) • Standing and observing • Quietly observing other children from the side • Daydreaming • Sitting in (e.g., swing) • Cooling down in the grass	blanket, corners, huts, cubbies, in shrubs and bushes, in high-grown grass nest) • Spaces that are overlooked by supervising adults • Spaces shaded by trees (cooling down) • Sunny spaces (sunbathing) • Grassed open spaces where children want to lay down • House-like or room-like spaces • Natural or built features that afford siting on, laying on	• Features not purpose-built for play (e.g., seating, walls, and boundaries of varying shape and sizes) • Fixed natural features (e.g., mature trees) • Play equipment • Spaces on the edge	(2016); Dyment & O'Connell (2013); Goodenough et al. (2021); Jansson et al. (2016); Lerstrup & van den Bosch (2017); Loebach & Cox (2022); Luchs & Fikus (2013); Moore et al. (2021); Obee et al. (2020); Pitsikali & Parnell (2019); Prellwitz & Skär (2007); Sargisson & McLean (2012); Veitch et al. (2020)
Playing tag and catch (play with rules)	• Running around or after • Running and hiding • Playing tag with commonly known or agreed-on rules • Playing cops and robbers • Playing you're going to catch me • Competing with peers in catching	• Flat ground surface with no tripping hazards (such as bulky tree roots) that afford fast running • Enough space to fit the size of a group engaging in tag play • Natural or built features surrounded by an open area—play anchors (a mature tree with soft bark perceived as a safe haven in a catch-me play accessible from all sides, a dry patch of worn-out grass, a play hut perceived as a jail where caught peers would be locked in) • At least two children but typically a small group up to bigger groups	• Open space • Features not purpose-built for play • Fixed natural features • Themed and suggestive play features • Malleable materials • Fixed natural features	Aminpour (2021); Aminpour et al. (2020); Cetken-Aktas & Sevimli-Celik (2023); Czalczynska-Podolska (2014); Dyment & O'Connell (2013); Fahy et al. (2021); Jansson et al. (2016); Obee et al. (2020); Stanton-Chapman & Schmidt (2021); Truong & Mahon (2012); Veitch et al. (2020); Wenger et al. (2021)

Playing domestic scenarios (imaginative play)	• Playing house • Playing family • Playing mum and dad • Playing making food or cooking	• Available mud kitchen or sand play area with material, loose natural parts, and containers • Enclosures and bound spaces providing house-like or room-like qualities, such as tree canopies that hang lower to the ground, circular arranged trees, play huts, themed and suggestive play features repurposed (e.g., a ship-themed play structure) • Unique and novel natural features such as mature old trees with bulky roots • Often played when several children get together (such as small groups of children) • Siting opportunities (human constructed or natural fixed features)	• Loose natural parts • Materials • Fixed natural features • Enclosed and bounded spaces • Themed and suggestive play features • Manufactured tools and toys • Features not purpose-built for play	Aminpour (2021); Aminpour et al. (2020); Cetken-Aktas & Sevimli-Celik (2023); Fahy et al. (2021); Loebach & Cox (2022); Prellwitz & Skär (2007); Ripat & Becker (2012); Stanton-Chapman & Schmidt (2021); Truong & Mahon (2012)
Play with wildlife (bio play)	• Searching for (bugs), finding • Following • Catching and capturing • Picking up or collecting and gathering several of the same animal • Closely observing • Watching • Learning about • Touching and petting • Listening to (birds) • Caring for • Feeding ducks • Chasing away	• Natural features that attract animals and form a habitat for animals (e.g., trees for birds, flowering plants for bugs and birds, water features for fish and birds); children indicate knowing where to find the animals • Movement of animals representing a unique quality children utilise when they watch, follow, search, catch, capture, and pick up animals • Containers used to capture animals, observe them closely, and take care of them by feeding or giving water • A natural environment with natural features that is quieter, affording active observation, listening to animals • Children often talk about smaller animals, including butterflies, bugs, birds, fish, and other	• Wildlife-friendly habitats • Loose natural parts • Open space • Fixed natural features • Manufactured tools and toys	Aminpour (2021); Cetken-Aktas & Sevimli-Celik (2023); Goodenough et al. (2021); Horton & Kraftl (2018); Jansson et al. (2016); Lerstrup & van den Bosch (2017); Loebach & Cox (2022); Norðdahl & Einarsdóttir (2015); Veitch et al. (2020); Yates & Oates (2019)

	• Playing fetch with pet dog	• Grassy open space affording engagement with pet dogs		

Note. TOPO = Tool for Observing Play Outdoors.
*TOPO compact version (Loebach and Cox, 2021) was used to organize the play affordances

Appendix 21. Email Confirmation Minor Revisions Study 3 (Paper III)

Von: [redacted]
Betreff: CYE paper
Datum: 27. September 2024 um 19:55
An: Thomas Morgenthaler 121101888@umail.ucc.ie
Kopie: sina@zhaw.ch, Pentland, Duncan dpentland@qmu.ac.uk, h.lynch@ucc.ie, XXXmorh@zhaw.ch

Thomas, Helen, Janet, Duncan, Anders and Christina

First things first - please accept my sincerest apologies for the extended delay in arranging the reviews for your paper.

The good news is that both referees were very complimentary about the work, with both agreeing that it should be published subject to only very minor revisions. I include both reports.

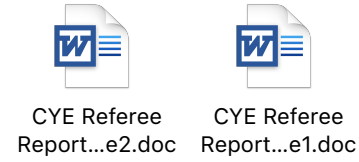
If you could address these minor points and return the manuscript to me, we can process for publication (which will progress when the remaining papers and field notes in the collection are ready to progress)

Well done again, and thank you all for what is an excellent contribution to the collection.

Best wishes,

[redacted]

[redacted]



Note. Name, affiliation and email address of editor are blacked out for protection of anonymity

Appendix 22. *Playground Play Value and Usability Audit Tool (Version 3)*

The intended construct of play value

Play value is the underlying construct intended to be evaluated by the Playground Play Value and Usability audit tool (PVUA). The construct 'play value of a playground' represents the value that built and natural environments, as well as objects (loose parts), bring to children's experiences of play. We consider play experiences as multifaceted including fun, intensive sensory and motor play, having suitable challenges, having choices, having permission to self-direct play, having opportunities to play alone, or in small and big groups. Children want to feel secure and welcome, and to play on playgrounds that they find beautiful where they feel they belong to their community and to the space. A playground that has high play value provides a variety diverse play opportunists supported by environmental features and their environmental qualities. Play experiences are experienced during children's engagement in play opportunities what is understood as a transaction between the environment and the child(ren). The level of analysis in this audit focuses on this potential play opportunities (or potential affordances for play) and supporting environmental characteristics for this play opportunities.

How play value will be investigated:

The PVUA attempts to go beyond just providing a checklist of the presence and number of environmental features (e. g. how many swings). The PVUA attempts to provide environmental characteristics (or qualities) that potentially support play opportunities (e. g. opportunities to swing in groups, to swing high or to swing in multiple directions) by looking at the two domains (1) **supporting ecological setting** that support play value to evolve and (2) **immediate physical environment** affording play opportunities.

Domain 1: Supporting Ecological Setting Dimension of Play Value

The contextual and physical environment will be investigated by environmental characteristics in two subdomains: (i) "*physical: supporting features of the playground"* (e. g. amenities, fencing, seating, or signage) and (ii) "*contextual: supporting considerations of the playground"* (e. g. character of playground, location of playground in community, management, and maintenance, climate-, weather- and season adaptability, rules of the playground). Both these physical and contextual environmental characteristics indirectly support play opportunities. Indirectly refers to a *potential* relationship between physical and contextual environmental characteristics on play opportunities that support play value of a

playground to evolve.The contextual considerations of the playground might need a knowledgeable person who is familiar with the community where playground is located as well as the history of the playground (e. g. how it was designed when it was built).

(1) Domain 2: Immediate Environmental Dimension of Play Value

The immediate physical environment (that affords play opportunities) will be investigated by **observable physical and physical-social environmental characteristics** in three subdomains (i) *play opportunities by spaces* (e. g. topography, natural environment, paths), (ii) *Play opportunities by loose parts and materials* (e. g. loose materials like sand to build) and *Play opportunities by play equipment* (e. g. climbing and hanging on opportunities). Physical-social environmental will be investigated in by characteristics that offer possibilities to engage with, being close to other children or afford be alone.

We further anticipate that play value has a subjective component. For example, a playground that is experienced as the most fun or the most challenging, or a playground that offers a child play experiences that they want to engage in, might have the highest play value for this child. This might vary between individuals. Complimentary to the audit children's questionnaire that will be developed in a future research project will evaluate this aspect.

Other aspects of the audit

The audit contains items throughout all content areas which will be further explored in another research study. These items refer to following potential subdomains:

- **Usability of the playground:** The audit includes items throughout all content areas that consider a playground's usability. Usability refers to using the playground, play equipment and other features on the playground and their equitability to all children regardless of ability. Equitability refers to the same or similar play opportunity made available to children with disabilities (e. g., experiencing elevation and height is made available through a sufficiently surfaced and low inclined and ramped hill, or the main attraction of this playground is made available to all children).Usability of the playground will be evaluated by certain items representing environmental characteristics that have been identified in research to enable all children equitable play opportunities.

- **Sociability of the playground** is evaluated throughout the audit tool by items that refer to play opportunities that afford playing with or close to other children, playing alone and away from others and experiencing quiet and seclusion, and opportunities to socialise with others.
- **Flexibility/Changeability of the playground** is represented in items that refer to changing qualities of a playground such as novelty of the playground, how playground is management and maintenance in a way to provide new play opportunities, how the weather, climate, and season afford new opportunities to explore or play with as well as play opportunities that range from prescribed to more open ended (e. g. loose parts offer more open-ended play).
- **Evolving Play Complexities of playground** is represented in first the diversity of play opportunities and if play opportunities considered graduated challenges, built for children with different abilities and ages.

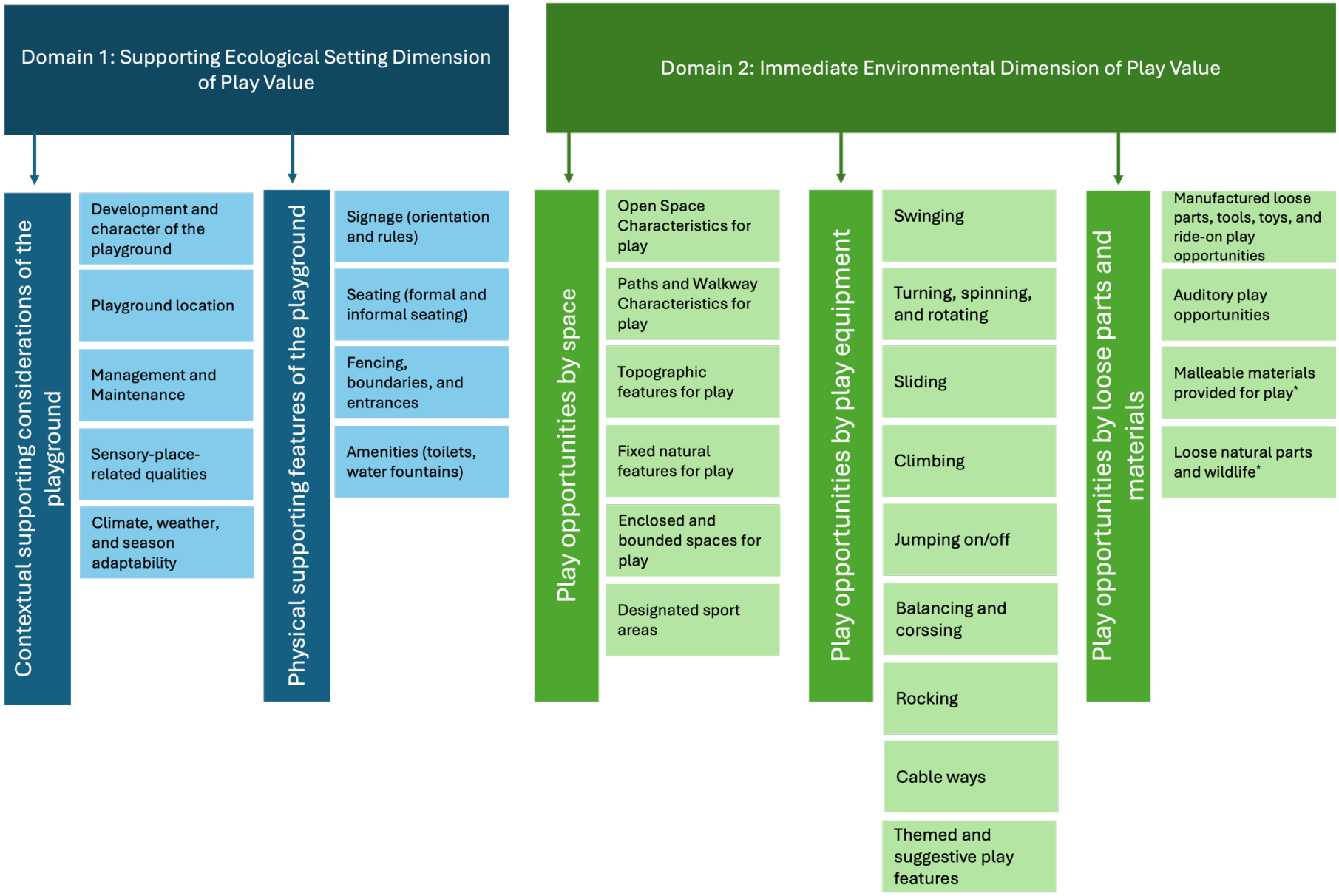
Scoring
The PVUA is considered as a descriptive tool.
Most item will be scored on a three-point rating scale:

- 2 = YES, characteristic is considered to great extent
- 1 = PARTIALY, characteristic is considered to some extent
- 0 = NO, characteristic is not considered

Some items are only rateable on a Yes or No basis.:

- 2 = YES, characteristic is considered to great extent
- 0 = NO, characteristic is not considered

Play Value and Usability of Playgrounds



The Playground Play Value and Usability Audit tool

Description of the playground

Observer(s) Name:	Observer Profession(s):

Name of playground or address:			
Country:		City/town/village:	
Location (urbanization)	□ Inner city	□ Suburban	□ Rural
Type of Playground	□ Public Playground	□ School Playground	□ School Playground with public access

Describe the size of the playground

□ Destination playground (Big Playground, Users may travel longer distance to visit this playground)	□ Neighbourhood Playground (Medium playground)	□ Pocket Playground (Small playground)

For what age group is this playground built? (Signage might indicate this)

□ For Children below 5 years	□ For children 5-11	□ For children 11 and above

Observation details at time of the audit

Date of audit (Day/Month/Year):	__ __ / __ __ / 2 0 __ __				
Time of audit	Start of the audit: __ : __		End of the audit: __ : __	Total amount of observation time in minutes	
Season at the time of audit	□ Spring	□ Summer	□ Autumn/Fall	□ Winter	
Weather condition at the time of audit	□ Sunshine	□ Cloudy	□ Windy	□ Inclement weather	Temperature: ◦Celsius/Fahrenheit
Users on the playground at the time of audit		□ Adults	□ Children	□ Children with disabilities	
Estimate the age of the children who is using playground now.			□ Under 5 years of age	□ Between 5 and 11	□ 11 and older

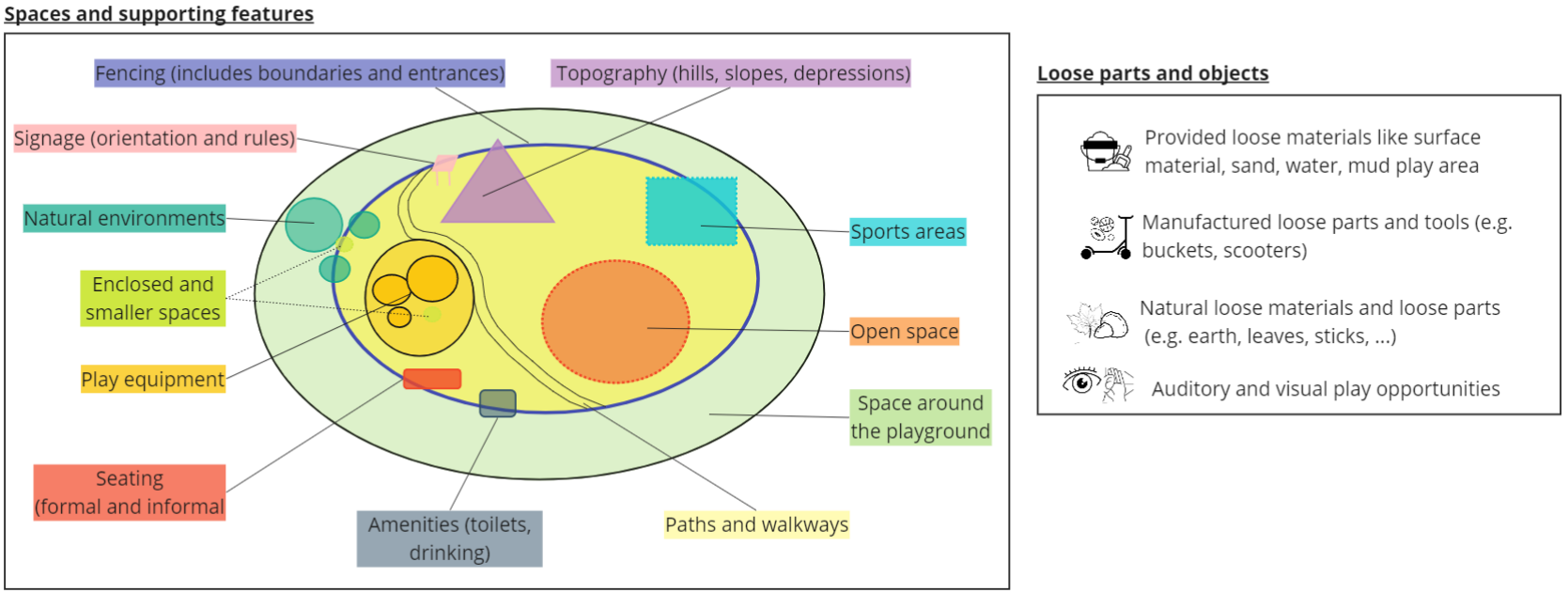
Getting familiar with the playground - Screening

Instructions*: This infographic represents a schematic playground that visualises potential* ***Spaces and Supporting features*** *and* ***Loose parts and Objects*** *of a playground. Get familiar with the playground you want to audit. The screening helps to narrow down what category of space and objects will be included in the further evaluation.*

1. *Walk around the playground and compare to playground infographic.*
2. *Identifying what categories of spaces and supporting features and loose parts and objects are provided on the playground you want to evaluate. Not every playground provides all kinds of spaces and objects.*
3. *Then check þ categories that you identified.*

By checking one category, the category will be added to a customized audit tool to evaluate the playground.

Playground infographic



Note: The infographic is not a design template for a playground

Instructions: *Check þ spaces and loose parts that you identified.*

Categories of spaces and supporting features	
□	Open Spaces

Categories of loose parts and objects	
□	Play equipment

□	Paths and walkways
□	Topography (hills, slopes and depressions)
□	Enclosed and small spaces (in the natural and built environment, fully or partly enclosed, have clear boundaries e. g. playhouse, den)
□	Natural environments (includes vegetation, high grass, spaces with trees and bushes, woodlands and forest close to the playground or integrated into playground design)
□	Sport areas (designated specific sport e. g. basketball court, soccer field)
□	Seating (formal and informal)
□	Fencing (includes boundaries and entrances)
□	Amenities (toilets, water fountains)
□	Signage (Information boards, Maps, Rules of the playground)

□	Purposefully provided loose parts (includes surface sand or water, mud, surface material, and others)
□	Manufactured play objects and tools (e. g. scooters, funnels, buckets, building blocks, and others)
□	Natural loose materials and objects (found in natural environment e. g. flowers, leaves, stones, sticks, small animals, and others)
□	Auditory and visual play opportunities

Contextual supporting considerations of the playground (Character of the playground, Playground location in the community, Management and Maintenance, Sensory-Space related qualities, Climate/weather and season adaptability

Development and character of the playground Development and character of the playground describes aspects of a playground that offers opportunities for users to connect with the	YES	PARTIALY	NO	N/A

	playground. These aspects relate to local history/heritage/art/stories, community events hosted on the playground and if the playground was designed and built for certain populations or community events. *Instructions: Observe the playground and rate the following characteristics. This playground*	characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable (*I do not know*)
1	… was developed and designed by involving users of the playground (children) in the design of the playground		Black out		
2	… involves users of the playground (children and/or adults) in maintenance activities (e. g. landscaping, painting, adults living nearby appointed to keep an eye on the playground, …)				
3	… is staffed by adults who is known by the community and has knowledge about children's play and provides regularly new play opportunities				
4	… reflects cultural and historical aspects of the community (e. g. local art/stories/heritage is represented, locally sourced materials are used, …)				
5	… was designed specifically to provide play opportunities for one or more known underserved population such as children with disabilities, girls, minorities, or older children's play, …				
6	… regularly hosts community events that offer users new play opportunities (e. g. announced on an information board on the playground)				
7	… has unique play opportunities only found on this playground that may be attractive to children and family. This playground is special (e. g. specifically naturalized playground, a large playground, a playground that can be shaped and manipulated by children)				
Describe one or more recommendations to improve the overall character of the playground:					

Playground location	YES	PARTIALY	NO	N/A

A playground's location is about how the playground is integrated into the locality, if other play and leisure opportunities are available, as well as how users access the playground. Instructions: *Observe the location of the playground and rate the following characteristics. This playground's location:*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable (*I do not know*)
1 new	… is near to housing (can you identify housing from the playground?)				
2	… is near to other public opportunities that might be interesting/important to children and families (e. g. park space, community centre, library, amenities, community gathering places, museums, community garden, nature areas)				
3 new	… is near to schools/kindergartens				
4	… is near to other commercial opportunities (e. g. other commercial possibilities are close like shops, places to eat something, coffee places)				
5	… has no dangerous roads (heavy traffic) close by				
6	… is accessible through walking or biking paths				
7	… has accessible car parking				
8 new	… has accessible bike parking				
9	… is accessible through public transport (e. g. can you identify a bus stop)				
10	… has information about the playground provided (e. g. online and signposted information about opening hours, accessibility, …)				
Describe one or more recommendations to improve "playground location" characteristics of this playground:					

Management and Maintenance	YES	PARTIALY	NO	N/A

Management and maintenance describe considerations that cater for safe and playable environment. Instructions: *Observe the playground and rate following characteristics. This playground:*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… has a recent, up-to-date safety certificate for the play equipment				
2	… is in good repair (not broken, damaged, rotten, no rough wood causing splinters or peeling paint that might be hazardous)				
3	… has enough litter bins in relation to the playground size (e. g. on each entry point, by table and seating areas)				
4	… is mostly clean (look for graffiti, cigarette butts, litter, or other dangerous litter such as such as glass, syringe, animal faeces) consider all areas of the playground (natural environment, water sand play area, toilets, small spaces)				
5	… is maintained in a way that promotes play opportunities (e. g. branches from trees, fallen leaves and non-toxic fruit are intentionally left to be play with for a while, vegetation and shrubs are not cut too much)				
6	… is landscaped to provide access for play (e. g. tunnels are cut out in vegetation, low branches and boulders are left to climb on, tall grass provides small spaces to play in, willow tunnels are provided)				
7	… is maintained in a way that controls dangerous hazards like the presence of dangerous animals as much as possible (poisons animals, ticks, …), includes warning signs when sighted.				
Describe one or more recommendations to improve management and maintenance?					

Sensory-place-related qualities Sensory-place related qualities focus on the playground and it's immediate surrounding and include visual, auditive and olfactory aspects. Instructions*: Observe the playground and consider to what extent this playground provides the following characteristics. This playground:*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… has some colour and does not appear dull				
2	… has no unpleasant smells (e. g. urine, check small spaces)				
3	… has no periodic and consistent noise pollution (e. g. heavy traffic, trains, regular ambulance, or helicopter, …)				
4 new	… has places for children to get away (withdrawal) from periodic loud noise source (e.g., small spaces or nature)				
Describe one or more recommendations to improve sensory-place-related qualities?					

Climate, weather, and season adaptability Climate, weather, and seasons provides new play opportunities and is also linked to environmental qualities that support an enjoyable playground visit (e. g. shade provision). Instructions*: Observe the playground and consider to what extent this playground provides the following characteristics. Consider how appropriate these characteristics are for the geographical location of the playground. This playground:*	YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable

1	… provides shade and sun throughout the day. Shade is provided 50% by trees, shrubs hilly terrain (consider movement of sun)				
2	… has shade partly provided in sand and water area				
3	… has seated areas with some shade and provide rest opportunities				
4	… considers suitable positioning of play equipment that is affected by weather conditions (e. g. slides out of metal or plastic not in direct sunlight the whole day)				
5	… has appropriate lighting for geographic location, local weather and community to ensure feeling of safety (e. g. electronic lighting suitable for winter months, evenings or changing weather conditions, or lit paths to the playground)				
6	… has appropriate shelter that protects from driving rain or wind (consider from where local weather hits most often?)				
7	…has appropriate drainage suitable to local weather conditions				
8	… is adapted to local weather such as for rain or snow for play opportunities (e. g. dips, puddles, dry creek paths that offer new play opportunities after/during rain, or hills or slopes for snow play after snowfall)				
9	… has natural elements allowing children to experience seasonal changes (leafy trees, evergreen trees, trees with fruits like chestnuts, flowering plants, ponds for ice, gardens, fruits and herbs)				
10	… has opportunities to attract wildlife (e.g. plants, flowering plants that attract insects, bird feeders in wintertime, insect hotels, depressions in rocks for bird baths)				
Describe one or more recommendations to improve climate, weather, and season adaptability of this playground?					

Physical: Supporting features of the playground (Signage, Seating, Fencing and boundaries, Amenities)

Signage (orientation and rules) Signage is a supporting feature of the playground that may provide orientation to the playground, information about how to navigate the playground and/or guidelines about what to do or how to use the playground. Every type of play is allowed on this playground. Instructions*: Observe the playground and rate the following characteristics. This playground:*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… has a map for orientation at the entrances, in appropriate height for a child using a wheelchair and which is illustrated in a child friendly way using symbols, colours, and pictures				
2	… has a map that gives ideas about how to navigate through the playground, and gives ideas about how to use play opportunities				
3	… has augmented communication boards with most relevant pictograms for a playground context and other everyday needs like (toilet, hunger)				
4	… has accessible ways to provide information about the playground including Braille and/or digitally accessible by QR-code				
5	… has colour-contrast that signals tripping hazards to users e. g. surface changes when a new play equipment zone starts (e. g. for swings which move)				
6	… does not restrict certain type of play or behaviour (e. g. being loud, ball play, bringing wheeled play equipment on the playground bringing sleds on the playground, …) Every type of play is allowed on this playground.				
7	… does not restrict certain age groups on the playground (e. g. older children, …) All ages are welcome on this playground.				

8	… does not restrict children's access by requiring adult supervision (caregiver supervision is not mandatory – meaning children can independently access the playground)				
9	… prohibits smoking, illicit drug use, dog waste / fouling, drinking alcohol, littering				
Describe one or more recommendations to improve signage (orientation and rules) of the playground?					

Seating (formal and informal seating) Seating is a supporting feature of playgrounds. More formal seating might be used more by adults who want to supervise children. More informal seating might be used by children for resting, sitting, observing others, linger or socialize with peers but also afford evolving of creative and imaginative play (examples of informal seating: platforms, tree logs, stumps, steps, low raised boundaries, rocks, picknick tables, seating in smaller spaces and in nature …) Instructions: *Observe the formal and informal seating and rate the following characteristics. This playground has seating that…*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… are diverse affording various opportunities to sit and gather in smaller to larger groups (e. g. circular arranged, arranged facing each other, in a non-busy area, in smaller spaces)				
2	… is adjoining popular play areas or on edges of more busy areas for ease of parental supervision				
3	… has multifunctional use e. g. structures that afford sitting/resting and affords children's' play on them				
4	… has a variety of accessible tables and seating including backrests, armrests and different heights affording a transfer from mobility device to seating				
5	… provides a space for the wheelchair/stroller/buggy/pram on the solid surface to sit close by /alongside other seating				

6	… scattered across the playground including seating in small spaces and natural environments and provide options to choose from				
Describe *one or more* recommendations to improve the formal and informal seating:					

Fencing, boundaries, and entrances Fencing, boundaries and entrances are supporting features of a playground. Fencing and boundaries are defined as clear borders that indicate to children the area of a playground or the area of new activity zones. Entrances are defined as the areas where people enter and exit playgrounds sometimes through gates. Not every playground needs fencing depending on where the playground is located and what is close to the playground (e. g. hazards in proximity). Fencing and lockable gates may contribute to the ease of caregivers by knowing their children are in a safe space to play (e. g. for families with younger children or children with disabilities). Boundaries may also be natural elements such as trees, bush walk, shrubs. Instructions: *Observe the fencing, boundaries and entrances and rate the appropriateness of following characteristics. This playground …*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… has fences that are only provided to separate playground from hazards such as traffic or deep and flowing water features e. g. (rivers, ponds), no fences are provided when no hazards are close		X		
1.1	***This and the next item will pop up when a playground has no fencing provided!*** … if this playground does not provide fencing: Is there another playground in the community that provides fencing, with at least tow lockable entrances		X		

2	… has natural boundaries such as bush walk, hedges, landscaped mounds of earth that are grassed, landscaped rock formations or boulders, trees or shrubs that indicate a boundary but also afford to play with				
3	… has boundaries that prevent balls falling or being thrown into other play area that might interrupt other children's play				
4	… has fences that incorporate play opportunities within the fence design (e. g. musical elements, integrated seating, …)				
5	… has fences made from material that is see-through by design (visually permeable)				
6	… has clear visual cues indication the start of a different activity space by movable play equipment (e. g. low boundaries/hedges around or visual markers in the surface)				
7	… has entrance(es) that are visually identifiable (a different colour is provided in colour contrast)				
8 new	… has lockable gates that easily could be opened by adults with limited grip strength				
9	… has no fencing around specialized play equipment that separate their users from other users (e. g. fenced in wheelchair swings)				
10	… has multiple gates for access (e. g. feeling of security being able to flee)				
Describe one or more recommendations to improve the fencing, boundaries, and entrances:					

Amenities (toilets, water fountains)	YES	PARTIALY	NO	N/A

Amenities are supporting features of a playground, contributing to making the playground more attractive and comfortable especially families, children with disabilities, girls). Instructions: *Observe amenities and rate the following characteristics. This playground …*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… has clean toilets that are open to the public (not locked away or needing payment, represent gender inclusivity)				
2	… has drinking water fountains that are intuitive to understand and provided in variety of heights on accessible surface				
3	… has toilets usable for people using mobility devices (are accessible, big enough to fit two people and have an adult sized changing table with transfer system)				
Describe one or more recommendations to improve amenities:					

Play opportunities by space

Open Space Characteristics for play An open space is defined as an integrated area within or surrounding the playground with no play equipment, other built structures and no	YES	PARTIALY	NO	N/A

planting. Open spaces are multipurpose areas and are used flexibly, affording a diversity of opportunities such as running, walking, loose parts play (balls, hula hoops or natural elements and others), sitting or relaxing, picnics, playing in groups, … Instructions: *Observe the open spaces identified on the playground and rate the following characteristics. This playground has open space that…*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… is mostly flat without incline affording ball play, play in groups and loose parts play				
2	… has seamless transitions between the different surfaces that are found on the playground area				
3	… has partly sufficiently solid surfaces to allow wheeled devices such as scooters or wheelchairs to be used				
Describe one or more recommendations to improve the open space:					

Paths and Walkway Characteristics for play Paths and walkways are supporting features of the playground. This tool differentiates between primary and secondary paths. Primary	YES	PARTIALY	NO	N/A

paths might loop through the whole playground and provide access to different areas of the playground. Secondary paths might incorporate components for play like curves, dips, bumps, tunnels, and others to drive/run/roll/walk over. Instructions: *Observe the paths and walkways and rate the following characteristics. This playground*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… has primary paths leading to each play opportunities/areas/components/amenities which are solid, and level surfaced providing accessibility for all users (adults or children)				
2	… has primary paths that have clearly defined edges (colour contrast) allowing the location of the pathway to be easily discerned				
3	… has paths that are linked and allow children to drive/run/walk in loops				
4	… has secondary paths that provide features meant for play like waves or bumps affording children to drive/run/walk/jump over them				
5	… has winding paths that provide opportunities to drive/run/walk straight and curved				
6	… has secondary paths that include fully enclosed features like tunnels or are partly enclosed like shrub-lined paths				
7	… has paths that are wide enough allowing people to drive/run/walk side by side				
8	… has no paths and walkways that invite cutting through activity areas that children want to use primary for other play (e. g. through a space used for ball play, areas to hang out, …)				
Describe one or more recommendations to improve the paths and walkways:					
Topographic features for play (includes hills, slopes, and depressions for play)		YES	PARTIALY	NO	N/A

Topography is identified as hills, slopes, and depressions in the terrain. Topography affords a variety of play such as running, rolling down, rolling things down, driving, climbing, balancing, sledding, sliding, enjoyment of an outlook and experience hights, jumping/diving/rolling in/over puddles, …) Instructions: *Observe the topography and rate the following characteristics. This playground*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… has overall varied topography with a different type of grounds including natural grassy slopes, smooth surfaces, and solid surfaced (e. g. pavement) (different surfaces afford different kind of play such as sliding and coasting down, rolling themselves down, driving up and down)				
2	… has an overall variety topography including inclines, heights and lengths of hills and slope				
3	… has topography that includes obstacles on the slope meant for play (e. g. bump) to drive/run/walk/roll over				
4	… has topography that provides depressions (e. g. dips, puddles, rain channels) that potentially collect water after rain and opportunities to play with/drive/run/walk/roll over				
5	… has topography that includes purposefully provided tunnels that afford to drive/run/walk/roll through				
Describe *one or more* recommendations to improve the topography:					

Fixed Natural features for play Natural features can either be close to the playground (e. g. surrounding the playground such as a park space) or integrated into the playground. Natural environments include vegetation, shrubs, high grass, areas with trees, bushes, boulders, and rocks. Natural features afford a variety of play opportunities, including physical active play (e. g., climbing), exploring, sensory play, manipulating, and creating their own play (e. g., socio-dramatic play or imagination), resting, being alone, or gathering with other children. Instructions: *Observe the natural environment and rate the following characteristics. This playground's natural environment …*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… is high in biodiversity and includes diverse large-scale vegetation (e.g., trees), small-scale vegetation (e.g.. shrubs bushes, long grass) or hardscape features (e.g., bounders) and is ment to play with and not just decorative purposes				
2	… is incorporated within the playground design and support access for users (fencing does not prohibits getting into natural environments)				
3	… surrounds the playground and affords children to play in the natural environment and get in contact with small wildlife				
4	… has some areas with more dense bushes affording playful hiding (disappearing from others)				
5	… has climbing opportunities (e. g. climbing trees or boulders)				
6	… has sufficiently solid and level paths into the natural space				
7	… is not too overgrown so as to hinder access and not too cut down				
8	… afford opportunities to sit in quiet, be still and look at nature				
9	… afford opportunities to be and play alone				

10	… has plants that afford to smell, taste, touch, visually observe (herbs, fruits, flowers, plants, colours) which are non-toxic and prickly/thorny				
Describe *one or more* recommendations to improve the natural environment:					

Enclosed and bounded spaces for play Enclosed and bounded spaces are defined by a clear boundary and are fully or partly enclosed. Enclosed and smaller spaces are found in the natural and built environment. Examples include nooks, crannies, low raised boundaries framing a smaller space, play huts, dens, elevated above ground small spaces, ...). Enclosed and smaller spaces afford children to be by themselves, be with a small group of children to socialize, experience hiding, and being away from adults or feeling away from adult eyes. Enclosed and small spaces afford creative and imaginative play. Instructions: *Observe the enclosed and smaller spaces and rate the following characteristics. This playground has enclosed and smaller spaces that…*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… afford sense of enclosure (hose-like, room-like) that are fully enclosed with a ceiling (such as playhouses, huts, dens, tree houses, enclosed small spaces formed by trees/shrubs, …)				
2	… that have low raised boundaries providing a smaller space in a space (e. g. small niches, nooks, room-like character …)				
3	… have look-outs into a more open space (provide outlook)				
4	… include different sizes so as to accommodate a range of children from one to a group				
5	… are provided on ground level accessible by a solid and levelled path and some are provided in elevated areas				
6	… afford opportunities to withdraw and be alone (a small spaces are in a less busy zone quieter)				

7	…are spread on several locations of the playground, that afford retreat and withdrawal				
8	… have permeable enclosures (multiple ways in and out, allow to flee)				
Describe one or more recommendations to improve the natural environments:					

Designated sport areas Designated sports areas are defined as areas that afford children a certain kind of play, such as soccer, basketball, and (table) tennis. These sport areas are sometimes separate from the playground. If sports areas are close or incorporated into the playground, include them in the audit. Instructions: *Observe the designated sports areas and rate the following characteristics. This playground …*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… has sport areas that have clear solid boundaries to prevent balls being rolled thrown/kicked into other areas of the playground (e. g. low to high raised boundaries)				
2	… has sport areas that are flat and open				
3	… has sport areas with surfaces that are suitable for intended activities like grass or pavement for soccer or basketball etc.				
4	… has sport areas with varying sizes affording small to a big group play				
5	… has sport areas that have equipment for the activity such as markings on the floor, goal posts, basketball baskets, …				
Describe one or more recommendations to improve the designated sports areas:					

Screening of play opportunities by play equipment

Instructions*: Get familiar with the available play equipment provided on the playground. Then check* þ *the category of play opportunities you identified. The screening helps to narrow down what category of space and objects will be included in the further evaluation.*

Categories of play opportunities by play equipment	
□	swinging
□	turning, spinning, and rotating
□	sliding
□	climbing (and hanging on)
□	jumping on/off
□	balancing and crossing
□	rocking
□	cable ways
□	recognizable and less recognizable play structures and fixed objects (e. g. themed play structures)

Note that this category is looking at all for the purpose of play provided play equipment sometimes made of human-made materials like plastic or metal sometimes made from natural materials like rocks or wood (tree stumps, logs)

Swinging opportunities Number of swinging opportunities: _____	YES	PARTIALY	NO	N/A

Instructions: Observe if swinging opportunities and rate following characteristic. *This playground's swinging opportunities:*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… afford smaller and bigger ranges of swinging (going high and not so high)				
2	… afford going in different directions: hung on two anchors (going linear back and forth), swings that are hung on one anchor (going circular), swings that are hung on three or more anchors (staying even but going in all directions)				
3	… afford use in diverse body positioning such as: sitting, standing, laying				
4	… afford body support for children with different needs (e. g. baby seat, seat with straps, seat with wide base, seat with full body support seat				
5	… afford children to position themselves comfortably. Are materials used comfortable to sit/lay in?				
6	… afford transition in and out of the swing by providing higher and lower seating height				
7	… afford making sounds when in use for play and/or to alert people with visual impairment, layout discourage or boundaries prevent running in front of swing				
8	… afford swinging alone by single-user swings				
9	… afford swinging in proximity to other children by swings arranged in line or in a circle				
10	… afford swinging together in small groups of children on the same swing				
11	… afford purposefully slow movements (e. g. hammocks)				
12	… afford use with mobility devices (e.g. not fenced in, be used with other children and without adults needing to assist)				
Describe one or more recommendations to improve the swinging opportunities:					

Turning, spinning, and rotating opportunities Number of turnings, spinning and rotating opportunities: _____ Instructions: *Observe the turning, spinning and rotating opportunities and rate the following items. This playground's turning, spinning, and rotating opportunities…*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… afford children control of speed (e. g. are control wheel or breaks provided)				
2	… afford simple use without adults needing to push it (are smooth and has no friction)				
3	… afford the opportunity for the child to experience gravity while spinning by a tilted design (from flat to slanted)				
4	… afford use in diverse body positioning (e. g. standing, sitting, laying, support for head for children with limited core strength)				
5	… afford holding on by a variety of handrails and grips (consider height and grip sizes)				
6	… afford both: being on while spinning/rotating and being off while pushing others				
7	… afford use alone and with other children				
8	… afford playing in proximity of others are arranged next to each other				
9	… afford use with mobility devices				
Describe one or more recommendations to improve the turning, spinning and rotating opportunities:					
Sliding opportunities Number of sliding opportunities: _____		YES	PARTIALY	NO	N/A

Instructions: Observe the sliding opportunities and rate the following items. This playground's sliding opportunities:		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… afford experiencing speed by provision of different lengths and/or inclinations (shorter to longer, even to steeper)				
2	… afford experiencing elevation by provision in different heights (e. g. using topography - embankment slides against the slope)				
3	… afford experiencing different sliding directions (straight to curved to spiral)				
4	… afford experiencing different movements (a just straight or a bump in the wave)				
5	… afford sliding in pairs, in groups and alone and with accompanying adults, by slides that have different width (narrow to wide)				
6	… afford experiencing different closures (open to enclosed e. g. tunnel slide or open)				
7	… afford experiencing different sliding mechanism e. g. solid slides, slides with rolling cylinders (roller-slides), pole slides				
8	… afford supportive transfer by transfer systems at start and exit points (e. g. enough space to transfer onto/off slide, grips, platform and extended horizontal run out in the end)				
9	… afford access by providing multiple ways from easy to more difficult (e. g. ramp, steps, climbing net, embankment access)				
10 new	…do not built-up static electricity (e. g. stainless steel, roller-slides can be used by children with medical devices like insulin pumps and cochlear implants)				
Describe one or more recommendations to improve the sliding opportunities:					

Climbing and hanging opportunities Number of climbing opportunities: _____	YES	PARTIALY	NO	N/A

	Instructions: Observe the climbing opportunities and rate the following items. *This playground's climbing opportunities:*	characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
2	… afford different climbing inclinations (vertical, tilted, and horizontal)				
3	… afford different climbing lengths (short to long)				
4	… afford different distances between climbing steps (short to wide)				
5	… afford different stability in the climbing structure (stable to moving elements)				
6	… afford different climbing directions (side to side, up and down, diagonal)				
7	… afford overhead and upper body play experiences (monkey bars, hanging on, gymnastic play)				
8	… afford simple use by different sized handrails hand grips, provided for different size hands and different abilities				
9	… afford resting points between climbing (e. g. platforms)				
10	… afford children to climb next to each other by enough space				
11	… afford social gathering for at least two children (e. g. in between or endpoints) by spaces				
12	… afford access by ground level and go horizontal climbing opportunities (these opportunities should have solid surfaces)				
13	… afford children to choose climbing opportunities regarding their abilities by having several difficulty levels from very simple to more complex climbing opportunities provided on the same climbing structure (including a ramp provide easier access)				
14	… afford children to reach a high point and something to play is provided on the top and not just a slide down opportunity (no dead end)				

15	… afford children to go in loops on an elevated point such as platform structure or topography (no tag trap)				
Describe one or more recommendations to improve the sliding opportunities:					

Jumping on/off opportunities Number of climbing opportunities: _____ Instructions: *Observe the jumping opportunities and rate the following items.* *This playground's jumping opportunities:*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… afford jumping-off points from variety of heights (ground level to more elevated)				
2	… afford different distances to jump (short distances to longer distances)				
3	… afford jumping at ground level such as trampolines, jumping play on floor (drawings) are provided				
4	… afford jumping routes ranged circularly or linearly (e. g. tree stumps arranged circular)				
Describe one or more recommendations to improve the sliding opportunities:					

Balancing opportunities (includes bridges and crossing) Number of balancing opportunities: _____	YES	PARTIALY	NO	N/A

Instructions: *Observe the balancing and crossing opportunities and rate the following items.* *This playground's balancing and crossing opportunities:*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… afford different inclinations in surfaces (even to uneven/steep balancing)				
2	… afford experiencing elevation (on ground level to elevated levels)				
3	… afford simple use by provision of handrails for different sized hands and raised edges that prevent to roll off				
4	… afford experiencing stability from stable to unstable balancing/bridges (e. g. moving bridges and still bridges)				
5	… afford crossing bridges leading to another play opportunity and do not result in a dead end				
6	… affords balancing in routes that are circular and straight				
7	… afford crossing or balancing together with peers by bridges that are wide enough to play next to each other				
Describe one or more recommendations to improve the balancing opportunities:					

Rocking opportunities Number of rocking opportunities: _____	YES	PARTIALY	NO	N/A

Instructions: *Observe the rocking opportunities and rate the following items.* *This playground's rocking opportunities:*		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… afford different rocking movements (back and forth, side to side, and circular)				
2	… afford different rocking heights in seesaws (going up high and staying low)				
3	… afford playing alone (single user) and playing in pairs/small groups (multiplayer, side by side)				
4	… afford simple use by provision of different hand grips for different size hands and different hights				
5	… afford simple use by including features that allow for different body positions (e. g. a seat that fully supports your entire body, footrest).				
Describe *one or more* recommendations to improve the rocking opportunities:					

Cableway opportunities Cableway or in other cultural contexts this might be named as zip-lines or flying fox.	YES	PARTIALY	NO	N/A

Number of cableway opportunities: _____ Instructions: *Observe the cableway opportunities and rate the following items.* This playground's cableway opportunities:		characteristic is considered to great extent	characteristic is considered to some extent	characteristic is not considered	not applicable
1	… afford experiencing different lengths (shorter and longer)				
2	… afford experiencing combined movements of going linear and some swing-spinning at the same time				
3	… afford simple use by provision that supports different body positions (e. g. full body support to sit in, easy to grasp and hold on)				
4	… afford play alone or using in pairs/small groups (e. g. two cableways running parallel)				
5 new	… afford supportive transfer by entry and exit points accessible through ramps/slopes with enough space to transfer onto/off transfer systems at start and exit points (e. g. enough space to transfer onto/off slide, grips, platform and extended horizontal run out in the end)				
6 new	… slows down with an extended horizontal run out in the end of the cableway				
Describe one or more recommendations to improve the cableway opportunities:					

Recognizable and less recognizable play structures and fixed objects Play structures and fixed objects can be more or less recognizable. Both recognizable and less recognizable objects might be used differently by different users. Fixed play objects include more and less recognizable fixed objects like wheels to turn, windows to open, buttons to push, switches to move. Less recognizable objects might be loosely shaped structures that allow children to unfold their own play ideas. Instructions: *Observe the play structures and fixed objects and rate the following items.* *This playground:*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… has un-prescribed or loosely shaped play structures that afford children opportunities to unfold their own play ideas e. g. just a frame, ambiguous structures, room-like-structure				
2	… has recognizable small play elements like a steering wheel, a window to open and close, things to push, slide, turn open and close that afford children potential idea what to play there				
Describe one or more recommendations to improve the cableway opportunities:					

Play opportunities by loose parts and materials

Manufactured loose parts and tools and ride-on play opportunities Manufactured loose parts and tools are human made play objects, sometimes provided in the playground but sometimes brought to the playground (e.g. loosely shaped loose parts, go-carts, balls/frisbees or other toys, sand/mud/water play toys) Instructions: *Observe the manufactured loose play parts and tools and rate the following items.* This playground:		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… has a variety of open-ended loose play parts such as tyres, tubes, boxes or others are provided				
2	… has tools provided that afford loose materials to be manipulated (sand, water, mud) such as shovels, funnels, buckets, hammers				
3	… has storage area for loose parts and tools				
4 new	… affords manipulation of the manufactured loose parts in collaboration with other children by bigger and heavier loose parts.				
Describe one or more recommendations to improve the opportunities afforded through manufactured play parts and tools:					

Auditory play opportunities Auditory play opportunities include any kind of sounds and musical play opportunities on the playground. Instructions: *Observe the auditory play opportunities and rate the following items.* This playground's sound making play opportunities:		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… afford noise making, be loud or musical (e. g. musical benches, musical steps, drums, glockenspiel, swings that make tones, rattles, hollow pieces of wood)				
2	… are provided at various heights and are easy to reach				
3	… afford exploring own voice and communication with others (e. g. talking tubes)				
4	… afford children playing next or opposite to each other that arranged close to each other				
5	… afford experiencing natural sounds (e. g. wind is captured by sound, bird sounds, flowing water sounds)				
6	… provide vibrations that allow for the experience of feeling sounds through lower tones				
Describe one or more recommendations to improve auditory play opportunities:					

Malleable materials provided for play Loose materials provided for play include materials such as sand, water, mud, or surface materials that are purposefully provided for children to play with. These materials afford sensory opportunities and to mixing, digging, transporting, filling and emptying, building, … Instructions: *Observe the provided loose materials for play and rate the following items.* This playground:		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… has specific areas that afford play with loose materials provided (sand, water, mud)				
2	… has specific areas that afford to play with any kind of loose materials (sand, water, mud) and allow children to mix provided materials up (can you find play traces that indicate mixing e. g. sand and water is mixed)				
3	… has water controlling features that afford children to manipulate water flow (damming, switch on and off, pumping)				
4	… has water controlling features that are easy to understand and positioned in a low height reachable to children				
5	… has surface materials like sand, woodchips, gravel available that children can opt to combine and mix (Can you find play traces that indicate use? e. g. mixed up surface material with other materials)				
6	… has other loose parts (e. g. sticks, stones, pinecones, grass, …) available and children can opt to combine and mix with the provided sand/water/mud (can you find play traces that indicate use?)				
7	… has sand/water/mud tables that are integrated into the same area of the sand/water/mud play areas, consider a central spot in these areas and are reachable through is sufficiently solid surfaced paths				
8	… has sand/water/mud play opportunities that afford collaborative play for at least two children (e. g. transporting buckets to an elevated level or water switch on providing water for another child)				

9	… has sand that is smooth enough (feels pleasant)				
10 new	… has water fountains ment to play with (e.g. jets start and finish at unpredictable times)				
Describe one or more recommendations to improve auditory play opportunities:					

Loose natural parts and wildlife Natural loose materials, parts and wildlife are found in natural environments and include materials like earth, mud or any natural parts like leaves, flowers, sticks, stones, cones, and others. Natural loose parts afford children to collect, arrange, create, built, dig, mix, explore, and are used them in socio-dramatic and creative play. Wildlife offers opportunities to watch and observe, take care, explore and find. Instructions: *Observe the natural loose materials and*		YES characteristic is considered to great extent	PARTIALY characteristic is considered to some extent	NO characteristic is not considered	N/A not applicable
1	… are available and accessible (e. g. fencing does hinder access to natural materials)				
2	… are available in variety (such as sand, gravel, earth, mud, tree sap, snow)				
3	… are available from small to medium sizes including plant materials such as leaves, grass, bark, flowers, pinecones, seeds, sticks, branches				
4	… are available from medium to bigger sizes including wood, branches, stones				
5	… include wildlife such as insects, snails, frogs, fish, birds that afford children to explore/observe/collect and take care of them				
6	… afford children to mix different materials together, (e. g. children have mixed sand with water, earth with water, stick in the sand) Can you find play traces that indicate use?				

7	… afford children the opportunity to transport natural loose parts elsewhere (e.g., when children have built something with natural materials and objects). Can you find play traces that indicate use?"				
8	… afford different textures to touch (soft, smooth to rough)				
Describe one or more recommendations to improve play opportunities with natural loose parts:					

Appendix 23. *Proposed Items for a Play Value Analysis Based in Children's Lived Experiences*

Number	Question/Statement	Underlaying play experience extracted from (Morgenthaler, Schulze, et al., 2023a)
1	Do you think this playground has fun things to play with. Most fun thing on this playground is…. Why is this most fun? What would make this playground more fun? What things are fun besides the play equipment? Why?	fun
2	Do you like this playground? if so, what do you like about it?	fun
3	Do you think this playground is boring/crap/useless. The most boring thing on this playground is… Why is boring? What would make it less boring?	fun
4	Do you think this playground is adventurous/exciting for you? If yes, why if no, why? what does an adventurous playground need to have for you to have more fun?	fun
5	Do you always have things to do on this playground? if so, what do you do?	fun
6	Is there a place on this playground where you can go up really high?Where?	fun , intensive play, challenge
7	Is there a place where you can go really fast? Where?	fun, challenge, intensive play
8	Can you try out new things on this playground that you never have done before? What do you like to try out?	fun, challenge, intensive play
9	Is it okay to get dirty (touch things) on this playground if you want to? Where?	fun, intensive play
10	Is it okay to be loud and laugh on this playground if you want to? Why (not)?	fun, intensive play
11	Does this playground have places where you never played but would like to? Where show me	being challenged
12	Does this playground have places where you want to try hard to do something? Where?	being challenged
13	Does this playground have places where it is difficult for you to get to? Where?	being challenged
14	Does this playground have special things to play that are not on any other playground? This are…? Why are they special?	novelty and uniqueness

15	Can you do everything you want to do on this playground? What is that? Tell me more about …	self-directed
16	Are there too hard/difficult play things for you? Which one are those? Why are the too hard/difficult?	usability
17	Do your parents (or teacher) always need to help you to play on this playground? Where? With What?	usability
18	Can you play here without the help of adults (your parent/mum/dad/teacher)? Why is that?	usability
19	Does this playground has a place where you can just sit and watch others if you want? Where?	usability
20	Can you play here on the same things as everyone else. Where is that?	usability
21	Can you get to everything in this playground? Where can you not get yet?	usability
22	Are there some things that you would like to do in this playground but can't? Which are those?	usability and challenge
23	Does this playground have playthings for younger and older children? What is for young children? What is for older children?	usability and challenge
24	Is this playground for all ages? Why (not)?	usability
25	Can you reach the highest point on this playground? Where is the highest point?	achievement
26	Are there places you can play with other children? Where is the best place to play with other children?	social opportunity
27	Is there a place where you can be alone if you want? Where is the best place to be by yourself?	social opportunity
28	Are there places where you can hide from others and be by yourself if you want to? Where?	social opportunity
29	Are there places here to play in a group of children? Where?	social opportunity
30	Can you find animals to play with somewhere here? Where?	social opportunity
31	Are you meeting your friends on this playground? Who are your friends? How often do you meet?	social opportunity
32	Does this playground have rules you have to follow? What rules do you not like?	self-direction, permission
33	Do you think this playground is beautiful and pretty? Why(not)?	aesthetic experience
34	Do you think this playground is clean? Where not?	aesthetic experience
35	Do you think this playground has enough litter bins?	aesthetic experience
36	Do you think this playground is not too busy and not too quiet?	Sensory experience
37	Do you think this playground has enough nature that you can play with? Where?	aesthetic experience
38	Do you think this playground has enough colours? If not: What need more/less colour? What colour?	aesthetic experience

39	Do you think you live close to this playground?/Do you live nearby? /Can see your house from this playground?	belonging to playground
40	Do you think you can easily walk to this playground? How else do you get here?	belonging to playground
41	Do you think you come to this playground often? How often do you come? (Everyday, Once a week, Once a month)	belonging to playground
42	Do you have several playgrounds close to your house? How many?	belonging to playground
43	Do you feel safe to play on this playground? Where do you (not) feel safe? Why?	feeling safe
44	Do you feel welcome to play on this playground? Why (not)?	feeling welcome
45	Now that we have discussed all these things about the playground, the final question is there something you want to change on the playground? What would make this playground the best place to play? If you had a magic wand, what would you change about this playground.	participatory