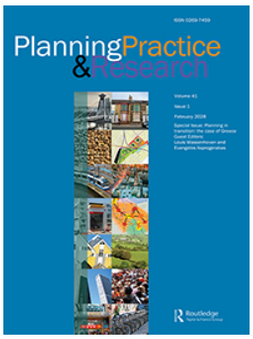

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Exploring factors that impact playground design decisions and the effect on children's physical activity and health: a qualitative case study of stakeholder experiences in Rugby, UK

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ABSTRACT

The design and structure of public playgrounds can influence opportunities for children to be physically active. Playground design can impact children's movement. Decisions regarding playground design are made by playground design stakeholders, a population that is rarely examined in research. Seven design professionals involved in the creation of a large playground in Rugby, UK, were interviewed to understand this gap. Findings showed six key factors (playground owner, personal experiences, user demographics, risk/safety, finance and aesthetics) that impact playground design. Children's physical activity was not a contributing factor, and therefore, improvements could be made by considering previous research and user preferences.

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KEYWORDS
Park; designers; play; destination playground; physical activity

1. Introduction

The World Health Organisation (WHO) has released guidance to advise on the physical activity (PA) of the population, highlighting that children should engage in 60 min of moderate-to-vigorous PA a day (World Health Organisation, 2020). However, there are numerous factors that impact PA engagement (Khalilollahi *et al.*, 2023). Socio-ecological models of health attempt to understand PA from a multifaceted perspective including biological, psychological, cultural and environmental elements to better understand PA engagement (Pelletier *et al.*, 2024). One of the many socio-ecological models that exists is the Ecological Model of Four Domains of Active Living created by Sallis *et al.* (2006). The model focuses on four areas; intrapersonal, perceived environment, behaviour settings and policy environment. Research suggests changes in PA engagement must consider each of these four areas to be effective.

One location that is designed to encourage children to be physically active and play is the local playground (Chaudhury *et al.*, 2019; Parker & Al-Maiyah, 2022). Research has reported that up to 64% of children in England visit their local playground at least once a week (Natural England, 2023). Considering how

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frequently some children visit playgrounds, they could be opportune spaces that allow children to play and be active (Schipperijn *et al.*, 2024). However, only 45–50% of UK children reach the WHO recommended PA levels a week. This suggests that despite playgrounds being free resources specifically designed for children to be active and a number of children visiting playgrounds frequently, these spaces do not necessarily encourage children to be active (Pearce *et al.*, 2019; Duncan *et al.*, 2022). Therefore, more research needs to explore why children are not engaging in intense PA in these spaces.

When applying the Ecological Model of Four Domains of Active Living to playground environments, there are several factors that could impact how a child engages in PA. The intrapersonal aspect of the model refers to the immediate factors unique to each child such as biology, psychosocial, and demographics. Therefore, factors such as a child's age, BMI, physical ability, cognitive development, etc., may impact how a child plays and engages with a space (Duncan *et al.*, 2022). For example, a child's ability and belief that they can climb may impact if they engage with a climbing frame or not. This somewhat relates to the next level of the model, the perceived environment, and how factors such as safety, attractiveness and accessibility impact playground usage. Previous research suggests that these factors are more likely to impact visitation to a playground and the use of equipment, with positive perceptions resulting in greater visitation/PA whilst negative perceptions result in reduced visitation/PA (Lapham *et al.*, 2016). For instance, if a piece of equipment is believed to be unsafe then an individual will not interact with it. Another element of the model is the policy environment, which refers to factors such as health and safety regulations and risk management (Brunelle *et al.*, 2016). How these policies are implemented can likewise impact PA engagement. For example, policy dictates how far apart certain pieces of equipment must be installed from each other. If these pieces are spread out as far as possible then children are likely to spend time travelling from one piece of equipment to another rather than engaging with the equipment itself. Therefore, the PA performed is more likely to be locomotor whilst the equipment might encourage a wider variety of PA such as climbing, pushing or pulling. The final level of the model, behaviour setting, refers to factors such as the availability of equipment. When applied to playgrounds this can mean the equipment installed and the impact that it has upon PA (Pawlowski *et al.*, 2016). For example, football/soccer pitches tend to lean towards more intense levels of PA being performed due to running and sprinting during play. Whereas structures such as small houses or dens have less intense PA but greater imaginative play (Stanton-Chapman & Schmidt, 2021).

Research has reported that the structure and layout of a playground impacts the PA (e.g. running, climbing, walking) and type of play (e.g. symbolic or functional) that occurs (Czalczynska-Podolska, 2014; Reimers & Knapp, 2017; Cohen *et al.*, 2020). Decisions regarding playground arrangement and features are often made by playground design professionals (e.g. architects and designers) (Young *et al.*, 2023). However, research on design professionals responsible for constructing playgrounds is scarce (Veitch *et al.*, 2020). This is surprising because such professionals (e.g. designers, developers and architects) play a pivotal role in ensuring a playground's effectiveness (Chaudhury *et al.*, 2019). To date, there is little research on professional perspectives working on playground design and their impact on playground design for promoting play and PA in children (Veitch *et al.*, 2020).

Therefore, this study aims to use a case study approach, incorporating interviews and photo elicitation, to gather the experiences and perspectives of English-based playground design professionals who collaborated to design a playground in Rugby, UK. By identifying factors that impact playground design, and how they correlate to the various aspects of the socio-ecological model, this research will be able to provide insights about how design and structure may impact upon the opportunities for children to play and be active.

2. Materials and method

This manuscript was written following the consolidates criteria for reporting qualitative research (COREQ) checklist guidelines (Tong *et al.*, 2007) (see Appendix, Table A1).

2.1. Ethics

This study was approved by Coventry University Research Ethics Committee (P146758). Verbal and written informed consent was gained from the participant prior to data collection.

2.2. Place

The company in charge of developing and implementing a large playground in Rugby (UK) was approached to understand how the collaboration between playground design professionals impacted the playground's construction. This particular playground was selected as a case study because it is designated as a high-quality neighbourhood area of equipped play (NEAP) (serving an affluent neighbourhood population (Index of Multiple Deprivation Decile score = 7)).

Playground types in England vary based on nearby housing development scale and population living there (Fields in Trust, 2015). This is due to 'The Six Acre Standard' created in 1992, that dictates what space should be made available for UK children and the requirements of that space, which depend upon the nearby population that it will serve. There are four types of playgrounds; LAP (local area of play), LEAP (local equipped area of play), NEAP (neighbourhood equipped area for play) and destination playground. A LAP provides space (100 m^2) and equipment needed to provide for families living in 5–10 houses; a LEAP provides greater space (400 m^2) and equipment (minimum six play experiences) roughly a 5-min walk from nearby homes; NEAP provides for 501+ houses, spanning a minimum of 1,000 spm, caters to various age groups within a 15-min walking distance of homes (Fields in Trust, 2015). Additionally, there are destination playgrounds, defined as playgrounds that require visitors to travel beyond 15 min to reach, and the facilities and space often exceed those offered by a NEAP (Stanton-Chapman & Schmidt, 2021). The playground incorporated in this study is classified as a destination playground.

The playground is split into six areas, through the use of pathways and mounds, featuring 12 pieces of equipment catering to different types of play and age groups (see Figure 1 for images of equipment and areas). There is a large climbing frame consisting of three towers, with multiple access points, connected by different types of bridges and a slide. There is also a swing area, in which the swings are arranged in a hexagonal shape,

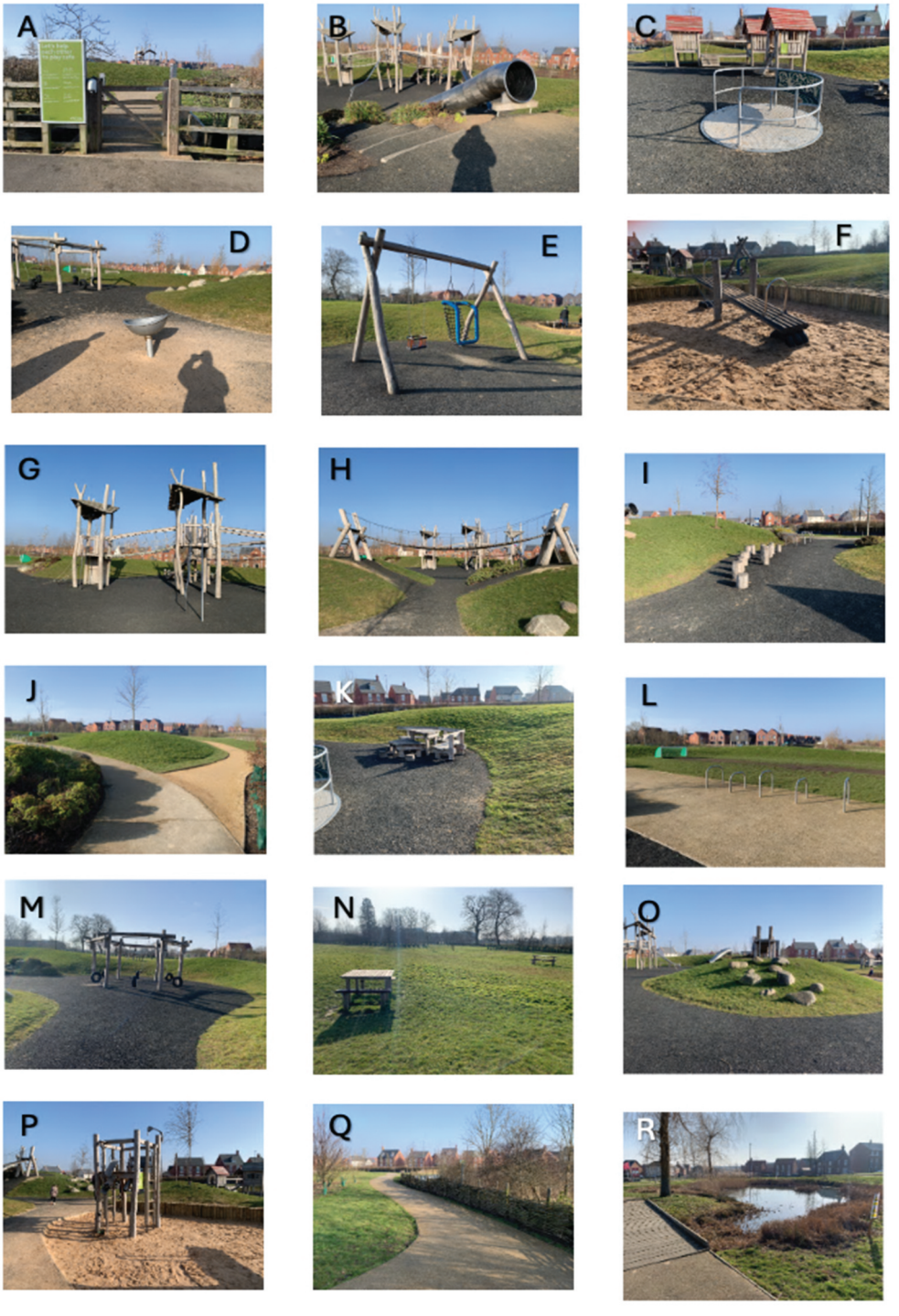

Figure 1. Photos of the playground used in the photo elicitation. *Note: A = entrance to playground, B = Tunnel slide, C = Roundabout, D = Metal spinner, E = Swing for young children and those with disabilities (basket swing), F = large seesaw, G = Climbing frame, H = Large bridge, I = Stepping posts, J = Path around the playground, K = Sitting area next to younger children's play equipment, L = Football pitch with bike rack next to it, M = Swings, N = Picnic area, O = Large rocks leading up the large bridge, p = Sand play tower, Q = Path leading round the playground with natural fencing and R = Small pond with bridge crossing.*

and a sizeable wooden bridge, with stepladder access at either end, which allows a pathway to go underneath. The playground also includes a large seesaw (that can fit several children on at once) and a smaller climbing frame that has various chutes and pulley systems to allow sand play. Lastly, the playground includes a disability-friendly roundabout, two swings (one disability-friendly and the other a cradle swing), a small slide, and several small house-like structures connected. To the side of the playground is a small football pitch with two goals.

2.3. Participants

The playground was developed and built in collaboration between four UK-based companies: a housing development company, a playground design company, a landscape architecture company and a local authority. Participants were identified by the company overseeing the playground's creation. These professionals were involved in discussions, planning and implementation from the outset of the project. Our objective was to recruit participants with diverse expertise and perspectives, who had participated in this particular playground design and development, to allow for greater insight. Consequently, purposeful sampling was conducted to recruit playground designers that created this playground in Rugby, UK (Creswell & Clark 2018).

Participants were contacted directly via email and asked if they would like to take part in this study. The company responsible for the playground's creation acted as gatekeeper to the participants work email addresses. The initial email included an introduction to the research and provided participant information sheets that were signed and returned to the researcher prior to data collection. Eight participants were approached to take part and seven agreed (see Table 1 for further information). The participant who did not take part was unable to do so due to job role commitments precluding attendance at data collection. For the purposes of this study, the participants in Table 1 and their various job roles are collectively referred to as 'design professionals' in the discussion.

Participants were invited to take part in an online video call ($n = 5$) or in-person ($n = 2$) semi-structured interview, at a time and location convenient for the participant. In-person interviews were conducted in an office (an unused office at the company the individuals worked at), without the presence of others. Online interviews were conducted in spaces where both the interviewer and participant were alone and in a quiet, non-distracting space. There were some external interruptions (e.g. phone ringing or an individual not realising that the interview was taking place), at which point the interview was paused and continued once the interruption had ended. Questions were piloted and adjusted following feedback from fellow researchers with experience conducting interviews (questions were changed to

Table 1. The job role, gender and parental status of the participants.

Participant	Job role	Gender	Is participant a parent?
Participant 1	Landscape architect	Male	Yes (2 children)
Participant 2	Landscape architect	Female	Yes (2 children)
Participant 3	Local authority parks and grounds manager	Male	Yes (2 children)
Participant 4	Playground designer	Male	Yes (2 children)
Participant 5	Playground designer	Female	Yes (2 children)
Participant 6	Playground designer	Female	No
Participant 7	Housing developer	Male	Yes (2 children)

allow for more rapport at the start and additional prompts were added to encourage greater depth from participants). No repeat interviews were conducted.

2.4. Data collection

Rapport was built prior to data collection in accordance with guidelines for obtaining rich and meaningful data when using interviews as a research method (Johnson & Rowlands, 2012). Whilst this may have introduced bias, the aim was to make the participants comfortable with the interviewer, reiterate the interview procedures, highlight the aims of the interview and emphasise their rights as a participant (that any information would be kept confidentially and anonymously and that they had the right to stop the interview at any point and withdraw, no questions asked). The interviewer had a previous working relationship with some of the playground design professionals (n = 4), in which the interviewer spent two days in each of the four playground design professionals' organisations (six days total). This was undertaken prior to interviews and consisted of a shadowing role, observing practice and the environment in which the design professionals worked as a means to better understand the context and contextual issues which the professional's faced day to day. This was in recognition that the interviewer did not come from a background in design or planning and such context would be useful in understanding the perspectives of playground design professionals. The other interviewees (n = 3) were introduced to the researcher and study via email and then in-person prior to the interview starting. This meeting entailed a short information session recapping the purpose of the research, participant information sheet and giving participants the opportunity to ask any questions. All participants were informed of the lead researcher's current work, the aims of this study and how it would contribute to the researcher's overall work.

One-on-one, semi-structured interviews (ranging from 35 min to 1 h, average 55 min long), were used to collect information. All interviews were conducted by the lead researcher (female, PhD Researcher with previous interview and analysis experience), audio recorded (Garmay digital voice recorder upgraded 1536KBPS), and field notes were taken by the interviewer to ensure accuracy.

Photo elicitation (using photos of the playground in this study) was used as a prompt during the semi-structure interviews to generate discussion and gain deeper insight into some of the unique features at the playground (Epstein *et al.*, 2006). Photo elicitation involves sharing images relevant to the topic of the interview to aid in conversation and act as a discussion point (Epstein *et al.*, 2006). Please see Figure 1 for the photos included in the elicitation. Participants were asked to share their experiences and opinions in the following four areas in relation to their knowledge and understanding of several topics and the playground implemented: 1) designing and building various features, 2) how the playground is used, 3) understanding the user experience, 4) children's PA. Participants were shown photos (see Figure 1) of the playground to serve as a reminder of the features, layout and structure. Participants were invited to comment on the various playground photo's sharing information that is pertinent to their fields of expertise and their experiences of designing and creating that space. The maximum sample was reached as seven out of eight of the individuals involved in the design and implementation of this particular playground took part, therefore a representative sample was reached

specific to the development of the playground which was the focus of the present study (Malterud *et al.*, 2016).

2.5. Analysis

Audio recordings were transcribed verbatim and reflexive thematic analysis was conducted following the six phases outlined by Braun and Clarke (2006) to ensure a systematic and rigorous approach (Braun & Clarke, 2019). Participant transcripts were assigned a pseudonym, e.g. participant 1, so that individuals could not be identified. Similarly, any references to a company name or significant piece of work completed by a company were removed from the transcripts and replaced with a description or reference. For example, if a participant said that they completed a project for Microsoft, the company name was replaced with "international software company." Following familiarisation, each transcript was inductively coded by identifying meaningful key words, phrases and reflections. This allowed for rich and in-depth exploration of the factors that influence playground design and structure.

The identified codes were refined and reviewed using critical friends ($n = 2$) who were part of the research team (Smith & McGannon, 2018). Member checking (of transcripts) and reflections were conducted by sharing a summary of the findings with the participants, inviting their feedback and validation of the interpretations made (Birt *et al.*, 2016). Adjustments were made following feedback (i.e. highlight the importance of demographics in playgrounds more). This process enhanced the trustworthiness and credibility of the analysis by providing an opportunity for the participants to confirm the accuracy of the identified themes.

Reflexive thematic analysis using an explorative and inductive approach was used to develop themes and sub-themes pertinent to playground design and the experiences of the design professionals (Braun & Clarke, 2019). This approach was used because there was no pre-determined thematic structure when approaching this research. Therefore, to allow for greater exploration of the topic and for themes to be analysed from the narratives given by the participants, reflexive analysis was utilized. Acknowledging the value of the subjective researcher, the coding of themes and the reflection of these allows for deeper engagement with the data.

Throughout the analysis, reflexivity was maintained by critically reflecting on biases and preconceptions (Townsend & Cushion, 2021). Field notes were regularly documented, capturing the researcher's reflections and observations during the data collection and analysis process. The use of reflexivity allowed for greater understanding of the researcher's influence on the analysis process.

3. Findings

Six key themes (the client, personal experiences of the design professionals, who is using the space and how, risk and safety, cost and maintenance, and the impact of aesthetics) were identified from interviews with playground design professionals. It was highlighted that playground design is complicated due to the interplay of these themes, with none operating independently. For example, the available budget shapes material choices, which impacts the aesthetic and atmosphere of a space, which influences visitation

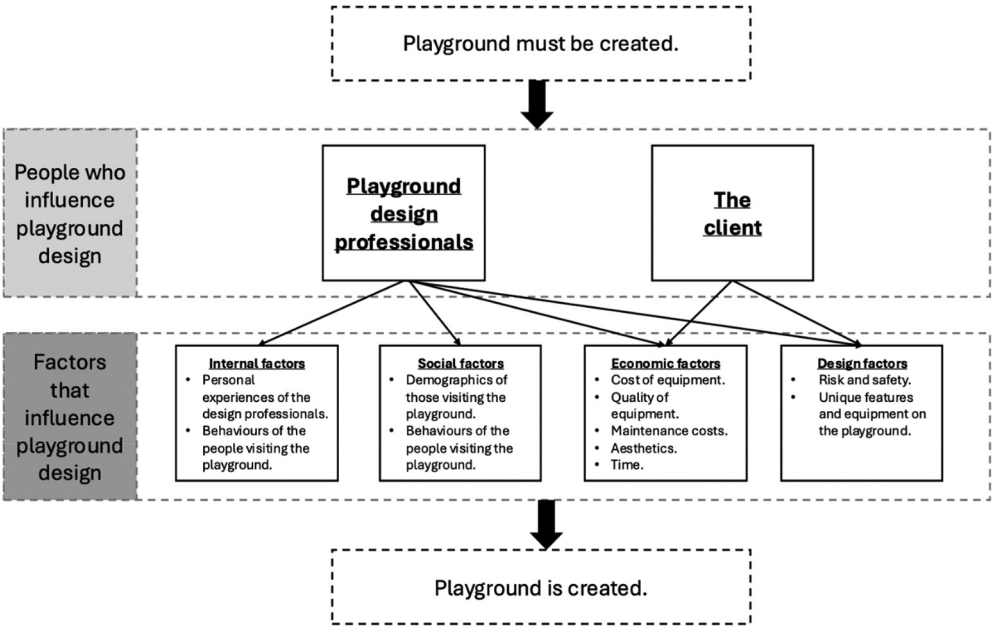

Figure 2. Practical depiction of the process and factors that influence playground design and implementation.

frequency and length, consequently impacting children's opportunities to play and be physically active. The identified themes continuously influence and impact each other throughout the process of a playground being designed and implemented. Figure 2 illustrates the multifaceted factors and the process that must be navigated for successful playground construction.

This complicated interplay of influencing factors is similar to the findings of Levinger *et al.* (2021). The authors reported that local government, policy and community expectations are all elements that influence space design and that successful implementation requires strategic planning and community engagement. Research conducted by Stanton-Chapman and Malone (2024) also highlighted similar complexity when reflecting on designing a playground for children with developmental/special educational needs. Therefore, it could be considered that the intricate balancing of these influencing factors throughout the design process determines the success of playground implementation. Early collaboration between the various design professionals may help this process by agreeing key decisions such as budget, equipment, safety, etc., early in the process.

The findings of this research highlighted that the creation of a playground is primarily affected by the client and the playground design professionals. Factors that can influence how a playground is structured and organised include personal experiences of the designers, behaviours of those visiting the playground, demographics of those visiting a playground, cost of equipment, quality of equipment, maintenance costs, aesthetics, time, risk and safety and unique features on a playground. These varying factors have been grouped into four categories: internal, social, economic and design factors. Internal factors refer to elements that are unique to each individual, be that the designers or those

using a space. Social factors refer to elements that impact the social and PA behaviours of those that visit a playground for instance, demographics. Economic factors refer to aspects that impact playground design from a cost and management perspective. Finally, design factors refer to aspects of designing a playground that impact the planning and implementation of a playground, such as health and safety. In order for a playground to be built, it must go through several stages (e.g. commission, tender, funds, design and implementation) in a continuous progression known as the design process which ensures transition from concept to completion. Despite the linear nature of the design process, influential factors (user demographics and activities, risk and safety, cost and maintenance, the impact of aesthetics) complicate matters as they are continuously balanced to meet the client's brief. The personal experiences and knowledge of the designers and planners underpin this balance, influencing the outcome. Further information about each theme can be found on Section 3.2 onwards.

3.1. Ecological model of four domains of active living

Figure 2 highlights how the various factors align with each other when a playground is designed. However, these factors can also be mapped onto the Ecological Model of Four Domains of Active Living (see Figure 3). The internal factors, such as personal experiences and behaviours of those designing and/or visiting the playground, fit well within the intrapersonal factors of the Ecological Model of Four Domains of Active living as these are inner, unique factors that impact how an individual interacts with space. In the case of the design professionals, these internal factors impact how they design a space and for those visiting the playground these behaviours are influenced by characteristics such as physical ability.

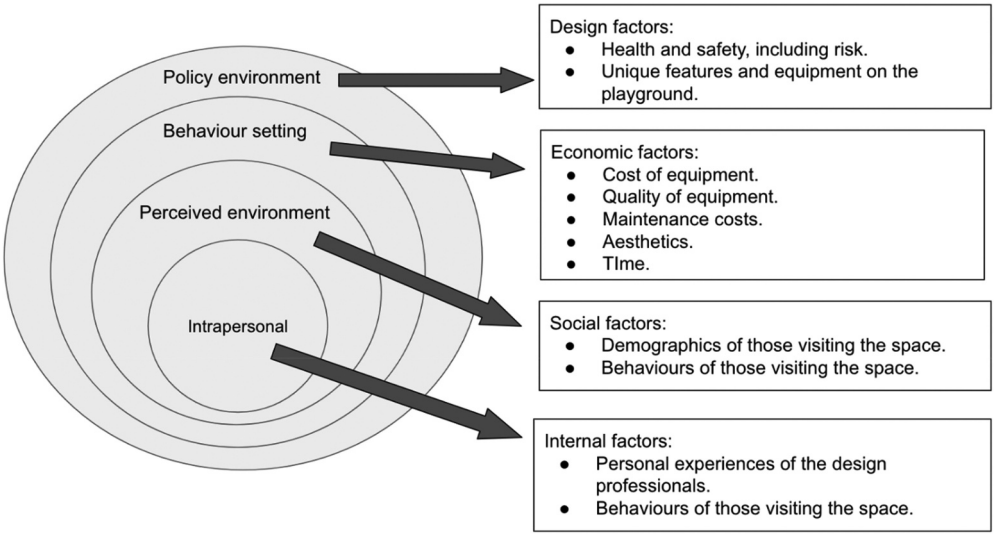

Figure 3. Figure exemplifying how the findings fit into the Ecological Model of Four Domains of Active Living.

The social factor, such as demographics and behaviours of those visiting the space, fit into the perceived environment due to individual perceptions and societal norms. Different demographics will perceive a playground in a different manner which will therefore impact how they engage with that space. For example, the manner in which a parent perceives a space will differ to that of a child. Parents may be more concerned with elements of safety whilst children may want to explore, play and be active (Jerebine *et al.*, 2022). The behaviour setting of the Ecological Model can refer to the playground environment itself but also the elements that contribute to its layout which are often impacted by economic factors. For instance, if the maintenance costs associated with upkeep of water play equipment is deemed too expensive, then it will not be installed therefore it is not a feature that children will be able to interact with. Decisions such as this directly impact on the type of activity a child can engage in as water play would no longer be an option. Finally, design factors such as health and safety and playground equipment can fall into the policy environment section of the Ecological Model because of the standards and safeguards that are put in place to dictate them. For instance, the Royal Society for the Prevention of Accidents dictates policies that impact the type of material that a playground surface must be, the height at which equipment can be installed, the distance between pieces of equipment, etc. Each policy that must be adhered to impacts the design and layout of a playground which in turn impacts the manner in which a child can interact and be active in that space. Figure 3 highlights how the various factors fit into the Ecological Model whilst Figure 2 highlights how the factors interact with each other more directly. Section 3.2–3.7 below give further explanation how the factors impact children.

3.2. The client

The client is the person or company in charge of creating a playground. For example, this could be a local council, or a housing developer. The client dictates the brief, budget, theme, risks, etc., whilst managing any agreements (e.g. those made to local government, nearby residents or governing bodies (such as Sport England or Wildlife Trust)) and meeting policy standards. Participants 6 and 1 highlighted that the client has the largest impact on playground design and their 'openness' to various factors impacts what is designed and implemented.

> . . . whoever the client you're designing for, how open minded is huge thing . . . and that's the biggest challenge. To be fair, you're like this is great (referring to the playground in this study) but unless you've got an open-minded client with a big budget, it's really hard to bring this into a smaller playground and that's where the real challenge is. (Participant 6)

> . . . with a lot of lessons learned . . . you can't ever rule out what the client wants. Normally the client has different aspirations to say what policy dictates or what play dictates, so sand is quite an unusual one because not a lot of clients want to put sand play areas in [because] there's a higher maintenance regime that needs to in place . . . So, sand doesn't always happen and there needs to be an appetite from the client to have sand and then they need to have an understanding that there is an increase in management requirement for that . . . (Participant 1)

The client is a crucial determinant in playground design as they have penultimate decision on all playground elements. Consequently, the client's openness to different factors impacts the way in which children can play and be active. Similar findings were reported by Levinger *et al.* (2021) during the creation of an outdoor exercise space for older adults, in which client preferences informed many design decisions that consequently went on to impact activity levels. The client responsible for the playground included in this study, had a large budget and was open to the suggestions of the various individuals involved. The design professionals suggested that this was unusual in playground design but arguably led to higher-quality provisions compared to standard playgrounds. For instance, participant 1 noted the inclusion of unconventional play equipment (sand and sand play equipment), typically avoided due to associated risks (animal excretion) and maintenance costs (frequently replacing/returning sand to location after children's activity or weather conditions). In this example, the participant noted that choices of the client, made partly because of larger available budget and receptiveness to suggestions, directly impact available provisions and consequently shape the type of play and PA children can engage in. Therefore, educating the client on playground design factors that impact PA is vital due to the influence the client has over playground design and implementation. However, it is acknowledged that such conditions (large budget and receptiveness to suggestions) are not always available to all designers/clients. In such instances, it is suggested that agreements on factors (e.g. budget, timeline, policy and agreements) could be made early in commissioning process and that the needs to the users are prioritised as much as possible within the factors available.

3.3. Personal experiences of professionals

Most of the playground design professionals in this study are parents and observations of their own child(ren) and how they interact with a space within a playground impacts what they incorporate into playground design. For example, participant 2 explained how observing their child's prolonged engagement with a challenging piece of equipment, which may have impacted their design decisions.

> . . . So now as a parent watching my children play . . . When they were tiny my daughter spent, I'll never forget, she spent a good 45 minutes going up and down a little ramp, getting in and out of this little pavilion building. Up she went and she came down and then she went back up again, and she loved the changing level and just the sort of sense achievement . . . Little bridges which feel different, have different textures, different sounds, feels like this is a little sense of danger but you're perfectly safe. (Participant 2)

The observations of the playground design professional's child interacting with specific equipment and understanding the appeal for the child may influence the professional's decisions and justifications for other playground designs. This may be seen with the playground utilised in this study which features a large bridge that the professional identified as appealing to their child, potentially influencing this design choice for this playground. Similarly, another playground design professional (participant 7 below) mentioned their children becoming bored at a different playground due to a lack of varied equipment, potentially influencing

decisions for the playground in this study to provide a variety of equipment. However, design choices influenced by personal observations may not align with the behaviours and experiences of the broader population using playgrounds (Moore et al. 2022b).

> I think I went to Battersea Power station for a little while ago. And there you have a play area there. And it's got really cool slides, and you know, it's great stuff, but it, but they just have the features and then nothing else. And actually, I notice the kids get bored more quickly. (Participant 7)

Moore et al., (2022a) highlighted that playground design professionals have limited knowledge regarding the creation of spaces that are accessible to all, thus playground design is often influenced by other factors such as personal experiences. Some of the professionals in this study acknowledged that this is perhaps not the most accurate way to design a playground (participants 2 and 4 below). Design professionals highlighted that whilst they design and incorporate different equipment and features for children, their understanding of why children engage in specific types of activities is potentially missing and, therefore, the creation of spaces often draws upon personal experiences rather than those of the population they are designing a space for. This is also exemplified in the section below.

> . . . I don't know why they like those things. I'm kind of reluctant, cuz slides and swings to me feel quite pedestrian and I think well maybe we should be making more sort of natural spaces- again I don't know that's because I'm an adult and I'm looking at things from more of a sort of aesthetic or visually aesthetic perspective. And thinking swings and colourful swings aren't as pretty as fallen logs and little dens and all that kinda stuff so . . . yeah, I never know whether it's my prejudice or my perceptions, my feeling . . . (Participant 2)

> Hmm, it just made me wonder if people do use it as a as a bike rack and I'd be interested to know that. The pitch (see picture L in Figure 1) is interesting as well because obviously it's super muddy, which must mean it's really well used which is lovely. And there's like that mound on the back of that and I'm wondering if that's quite a nice place to sit and watch people play and yeah. (Participant 4)

Information regarding how different demographics interact with playgrounds is increasing and the professionals in this study highlighted how they give substantial consideration as to how to cater to different demographics. However, the empirical knowledge and understanding of different demographic behaviours to support decision-making is still unknown by some professionals. This could be considered concerning because spaces arguably cannot be designed to fully support children's social, emotional and physical needs if designers of spaces do not have this knowledge (Brown *et al.*, 2021).

One approach to understanding children's behaviours and gaining more empirical knowledge may be to consult with the children (Krishnamurthy & Van Wesemael, 2019). Previous research has attempted to do thisfor instance, Veitch *et al.* (2021). The authors conducted a survey with 272 children asking them to rank (from 1 to 10) playground equipment ($n = 42$ features) regarding how much each piece of equipment would make them want to be active and visit the playground. Results showed that children were most enthusiastic about adventure playgrounds, giant slides and obstacle courses. These findings could be useful to inform future playground designs that meet the wants and needs of children.

When not drawing upon experiences as parents, playground design professionals rely upon their own childhood experiences to inform playground decisions (participant 1 below). It was highlighted that positive experiences are incorporated into playground designs whilst negative ones are excluded. For instance, participant 2 (quote below) explained how equipment spread out over a large space felt intimidating and was a negative experience for them. However, they enjoyed how playgrounds could be sectioned into different areas to explore and look aesthetically pleasing, potentially influencing the design of the playground utilised in this study. Despite its size, the playground in this study is not widely dispersed and includes areas for children of different ages, potentially reflecting the design professional's preference for segmented exploration and aesthetic appeal.

> . . . the playground that we did used to go to, it was just a big field, and it had it had like five things in it scattered at different corners of this big field. So, we had to run from the seesaw and then had to run over to the slide, and it was miles away. And that was my experience of the playground . . . it just it wasn't that much fun. And the times that I remember enjoying spaces were when they were more intimate you know? . . . I loved Hidcote gardens because what they've done there is create different rooms, different spaces, you come upon different things . . . . And I loved going there as a child because it felt kind of my scale somehow. I didn't like this big open playing field you know . . . maybe I felt quite intimidated being with big boisterous kids that are just taking over, running around . . . So, for me, the creation of space should foster inclusivity, that's really sort of important to me . . . (Participant 2)

3.4. Behaviours of playground visitors

While playground design professionals might have limited empirical knowledge of how children use and interact with playgrounds, there is substantial consideration given to meeting the needs of diverse demographics which consequently informs playground design (see participant 1 below). For instance, younger children often have adult supervision; therefore, the playground included in this study incorporated benches for adults to use in the areas designated for younger children.

> . . . So, understanding who's going to come to the space-to the play space is really important. Is it that you're looking at a lot of 12 plus children, where they are likely to be there without parental supervision or is it that actually you're always going to have parental supervision and they're going to be younger group. (Participant 1)

Playground design professionals acknowledged that accommodating the needs of specific age groupsin particular, older children and teenagers, is more challenging (see participants 1 and 7 below). These comments reflect previous literature in which designing spaces for pre-teens and teenagers is different as they engage with spaces in unique ways (Porter *et al.*, 2020). One avenue to address this uncertainty may be to ask older children what they want in a playground (Mertens *et al.*, 2019; Rivera *et al.*, 2021).

> . . . So, 12 plus grouping is a really difficult to design for. There's not a lot of play equipment out there for 12 plus and it tends to be focused more on the social side of things rather than sort of the actual playable element. (Participant 1)

> . . . the sort of 10 upwards age range. You know, sort of young teenagers . . . . It's quite a difficult age group to accommodate sometimes I think . . . (Participant 7)

In addition to accommodating different demographics, specific behaviours or activities can also be influenced, to some extent, by the materials and equipment implemented. For instance, preventing children from engaging in risky behaviours, such as running next to a slide or attempting to climb onto it, can be achieved by planting flora next to slide to act as a natural barrier or deterrent, as exemplified by participant 4 below (see picture B in Figure 1). These examples highlight how understanding how a playground is used and by whom can impact the design to either support or prevent certain behaviours.

> And this quite interesting use of planting here with a slide . . . Generally, a slide needs to have a metre on each side of it or free space, not so much on a tube slide . . . but they've put planting in there anyway which protects around the slide . . . (Participant 4)

> In so many instances in a public park there's so much fear around water and so yeah, you could easily get it fenced off because of concerns that the kids are gonna fall in and drown (Participant 6)

These quotes also exemplify how health and safety influence how a playground is designed and implemented, which can in turn expand or limit the features that children have the opportunity to interact with.

3.5. Risk and safety

The professionals emphasised that a playground must adhere to various health and safety standards which influences the design of a playground. For example, the exchange between participant 4 and the interviewer below, highlights how specific guidelines impact what can or cannot be built near a slide for health and safety reasons. In this instance, designers mitigated the risk associated with forced movement by installing a tube slide rather than an open slide.

> P: . . . this is a tube slide, but generally a slide needs to have a metre on each side of it or free space, not so much on a tube slide . . . but they've put planting in there anyway which protects around the slide . . . .
>
> I: Why do they need that space? If it was an open slide?
>
> P: Because someone, it's what's called forced movement. So, if a child was on a slide, they're not in control of their movement. So, if someone, if they put their arm out, someone could interact with that. So, you're not allowed an obstacle in the free space around it. Does that make sense?
>
> I: Yes. Is that a, a ROSPA* guideline?
>
> P: It's a it's it's a European standard guideline, yeah. (Participant 4)

*ROSPA – The Royal Society for the Prevention of Accidents.
P = Participant, I = Interviewer.

Risk in playgrounds and spaces for children is a highly researched topic, with current trends highlighting that there is some benefit to children engaging in risky play (Brunelle *et al.*, 2016). However, organisations such as local authorities and school boards are increasingly risk adverse due to negative consequences should injury occur (Jerebine *et al.*, 2022). In contrast to this trend, however, the client in charge of the playground in this study was

rather open to the management of risk. This is reported by participant 7 below, where the professional discussed the risk management of a nearby pond (see photo R in Figure 1) and how water is not normally provided on/near playgrounds due to the associated risks that clients often aim to avoid. Consequently, the variety of features that children can interact with is expanded, providing more opportunities to engage in play and PA through exploration and discovery in areas and on equipment that might otherwise be off-limits.

> . . . I think you have to be a little bit brave as well because it's the modern age, and with open water it's very easy to say 'No, we're not gonna do that'. And I'm glad we did. It's quite shallow, it's not deep. So, it is designed to be as safe as possible, and you can just see a health and safety warning sign in just the right of the photo. But yeah, I think, yeah, yeah. I think there's other companies who might not do might not do something like that. (Participant 7)

> What's interesting about Houlton and the pictures (Figure 10) we're looking at here is that exposure to risk. Now all of our play spaces get ROSPA inspected so they have to be compliant with a lot of their kind of policies and things. And even when you've got those sign offs (from ROSPA) a lot of it comes down to who is going to manage that space whether it's for client or management company and how comfortable they are with exposure to risk . . . (Participant 1)

Therefore, it could be interpreted that whilst there is a multitude of legislation and guidance on health and safety in playgrounds, the interpretation of risk and how to manage it is, to some extent, determined by the client. The client's openness to risk and its management influences the diversity of provisions in a playground, consequently impacting children's experiences.

3.6. Cost and maintenance of a playground

The different features that contribute towards a playgroundfor instance, the equipment installed, and the materials used on the playground surface, present different implementation and maintenance costs. Participant 7 highlighted how these factors are a part of the decision-making process:

> . . . the budget for these things and how much they cost and how much they cost to maintain. That is a big part of decision making, you know. That's just the world we live in. (Participant 7)

> Yes, there's some maintenance costs around this sort of stuff (picture F in Figure 1). But as long as you're prepared to deal with the maintenance, it's fine . . . . (Participant 3)

The decision to include certain features was highlighted as primarily influenced by cost. For example, participant 4 (below) suggests that the use of cheaper materials is more cost effective on larger areas than using more expensive materials. However, surfaces made of gravel may not support activities like cycling as effectively as bonded surfaces do, limiting the types of PA that can take place in those areas. Consequently, how well cost and budget are managed, can impact children's play and PA as the number of features/equipment available impact opportunities for children to interact with. This was likewise highlighted by Levinger *et al.* (2021) when designing an outdoor activity space for older adults. The authors highlighted how the cost and budget of the space had to be adjusted to incorporate a shaded area and had this change not be made then the equipment would not have been used as effectively.

> And the material choice again just using a looser gravel on the long-extended pathways and obviously more much more cost effective than using the resin bonded and pathway which is used for the smaller areas . . . . I think you have less maintenance costs, I think it looks nicer, it looks a more finished and surface, whereas this is a more, much more natural, much rougher kind of surface area. (Participant 4)

> One piece of equipment might cost 10 grand with one play value, but another might cost 10 grand, but it's got 6–7 play value bits attached to it. So, it's something you have to consider as well as the cost . . . . (Participant 3)

3.7. The impact of aesthetics on a playground

Design professionals highlighted that the visual appeal of a playground is important because it impacts the perception of safety. Previous literature has shown that if a playground provides a sense of safety, and then individuals are more likely to visit (Lapham *et al.*, 2016). Factors such as creating clear sightlines, providing facilities for litter management and ensuring proper lighting can contribute to making a playground feel secure and inviting.

> . . . Again, clear sightlines. If there was something happening down there a bit unsavoury, you could see it before you got to it so you could keep well clear of it, which makes the whole space safe. (Participant 3)

> The issue we have is money in this country, especially around local government and stuff like that. But it's not beyond the wit of man to change that and we should be changing it. Cause it's not acceptable that in 2023 girls don't feel safe in a park. For simple things like the park keeper cutting the shrubs down by the entrance so they can look in, see if it's safe . . . (Participant 6)

4. Strengths and limitations

This study is the first to explore playground design professional perspectives to understand how playground design can influence the PA of children. We took the specific approach to use a newly built destination playground in Rugby, UK as a case study. Therefore, the findings may not be generalisable nor representative of other similar situations. However, utilising a case study offered rich and deep insights, where we engaged 100% of the designer roles involved in the creation of the playground in question. Additionally, the equipment present on the playground can be found on other play spaces so some comparisons can be made. Furthermore, COREQ guidelines were used to report relevant information regarding the research team, study setting, methods and interpretation of findings in this study to highlight areas where bias may occur. The use of photo elicitation as a data collection method is also a strength as photo elicitation has shown to trigger memories, highlight perspectives and build rapport during the interview process (Epstein *et al.*, 2006). However, photo elicitation may have introduced the participants to bias, as the researchers' selection of photographs and the order in which the photographs were shown, may have influenced the discussions and subsequent analysis. Nevertheless, such criticism applies to all studies that use photo elicitation.

5. Practical implications

Playground design is complicated, impacted by a multitude of interconnected factors, and for successful implementation there needs to be agreement between all stakeholders on these factors. The greater the agreement, the more successful the playground design and instalment. Primarily, the more open the client is to suggestions and the larger the budget, the greater the opportunities for more diverse play equipment and designs that can engage children in PA in a variety of ways. However, this is not always achievable. Therefore, in instances where budget and client agreement is limited, priority should be given to consulting the users or planned users of the playground, i.e. children, their families and nearby residents/users. Consequently, the design of the playground will be informed by those who will benefit most from its creation. The design of playgrounds is often dictated by adults with their own personal opinions and experiences. Whilst this is not necessarily wrong, there should be consideration given to other avenues of information that could inform playground design, such as research which could inform more PA inspired decisions or children's preferences which would indicate current trends and needs.

6. Conclusion

This study is the first to explore designer perspectives on the process of playground design and the impact on children's PA. Our findings highlight that designing and implementing a playground is a complex process influenced by multiple factors. Key results revealed that the client, personal experiences of the design professionals, who is using the space and how, risk and safety, cost and maintenance, and aesthetics, all impact how a playground is designed. Additionally, how well these factors are balanced also influences the implementation of a playground. The client is one of the most influential factors as they dictate budget and brief, and the personal experiences of the professionals underpin many of the decisions regarding risk and safety, the aesthetics of a space, and catering for different demographics. To create playgrounds that support children's PA there needs to be agreement between design professionals early in the implementation process regarding budget and other influencing factors (such as risk management), as these factors impact what is built and installed, which in turn impacts the PA children can engage in. Within the design process, much thought is given to who will interact with a space and how designs can support certain behaviours. However, little consideration is given to consulting with those individuals predicted to interact with those spaces.

Disclosure statement

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

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Appendix

Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Table A1. A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

No. Item	Guide questions/description	Reported on Page #
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Inter viewer/facilitator	Which author/s conducted the interview or focus group?	7
2. Credentials	What were the researcher's credentials? e.g. PhD, MD	7
3. Occupation	What was their occupation at the time of the study?	7
4. Gender	Was the researcher male or female?	7
5. Experience and training	What experience or training did the researcher have?	7
Relationship with participants		
6. Relationship established	Was a relationship established prior to study commencement?	7
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	6/7
8. Interviewer characteristics	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	7
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	8
Participant selection		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	6
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	6/7
12. Sample size	How many participants were in the study?	6
13. Non-participation	How many people refused to participate or dropped out? Reasons?	6
Setting		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	6/7
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	6
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	6
Data collection		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	6–8
18. Repeat interviews	Were repeat inter views carried out? If yes, how many?	6
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	6

(*Continued*)

Table A1. (Continued).

No. Item	Guide questions/description	Reported on Page #
20. Field notes	Were field notes made during and/or after the inter view or focus group?	6
21. Duration	What was the duration of the inter views or focus group?	6
22. Data saturation	Was data saturation discussed?	6
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	6
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	6
25. Description of the coding tree	Did authors provide a description of the coding tree?	6
26. Derivation of themes	Were themes identified in advance or derived from the data?	7
27. Software	What software, if applicable, was used to manage the data?	N/A
28. Participant checking	Did participants provide feedback on the findings?	6
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	12 onwards
30. Data and findings consistent	Was there consistency between the data presented and the findings?	9 onwards
31. Clarity of major themes	Were major themes clearly presented in the findings?	9 onwards
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	9 onwards

Developed from: Tong A, Sainsbury P, Craig, J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care. 2007. Volume 19, Number 6: pp. 349 – 357.