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RESEARCH

Recess in German Schoolyards from the Perspective of Children and Adolescents Who Use Wheelchairs – An Exploratory Interview Study at Special Needs Schools for Physical and Motor Development

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Summary
In the German school system, recess in schoolyards constitutes a central space for informal learning and social interaction among children and adolescents. Yet, empirical insights into their usage and accessibility particularly for children and adolescents with disabilities remain scarce. This study addresses the research question: "How do children and adolescents who use wheelchairs experience and interpret their recess in the schoolyard?" Nine students (4 female, 5 male; aged 8–15 years, M = 11.0 years; 4 powered wheelchairs, 5 manual wheelchairs) from special needs schools for physical and motor development in Hamburg, Germany, participated in guided interviews conducted on-site. Data analysis employed a pragmatic application of Grounded Theory Methodology strategies and coding procedures. The identified categories and areas of tension include – with a focus on the activities of the target group in question: (a) Finally chatting, letting off steam, resting, and playing extensively; and with a focus on the physical and spatial conditions and their accessibility: (b) Between no-go areas and favorite places; (c) Consciously limited vs. above all doubts; (d) With a careful eye on their schoolmates; and (e) Realistic ideas for improvement vs. fantasies. The research contribution expands existing research on inclusion in playgrounds, highlights activities and potential material and spatial barriers in schoolyards, and, taking into account the expertise of the respondents, generates knowledge on how to create greater accessibility.

Keywords Accessibility · Participation · Playground · Physical and Motor Disability · Physical Activity

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In Germany, recess in the schoolyard is an important informal space of learning and socialization for children and young people (Klika, 2020). It is a space where young people can interact with their peers, play creatively (together), experience nature, relax, or be physically active (Derecik, 2011). At all-day schools, students spend up to ten hours a week in this space – an enviable amount of time for some subjects, with a wide range of potential, including health promotion (Bikomeye et al., 2021; Lateef et al., 2024). However, what exactly happens during recess in German schoolyards remains largely unexplored (Osnabrück Research Group, 2016; Klika, 2020). There is agreement, however, that the physical and spatial conditions can influence the activities that are pursued and that accessibility in the design of spaces must be taken into account to ensure that people with disabilities can participate (Bükers, 2022, 2023; Degenhardt, 2018, 2020). While a recent Germany-wide study (Aktion Mensch, 2023) on publicly accessible playgrounds rates accessibility as often inadequate – and particularly disadvantageous for children and young people who use wheelchairs – schoolyards remain largely unnoticed in this regard (Bükers, 2023; Bükers & Heemsoth, 2022).

This article addresses both of these needs by examining both the activities of the target group in question and their assessment of the physical and spatial conditions with regard to accessibility.[1] First, the article focuses on the German tradition of the so-called 'Hofpause,' which translates to 'recess in the schoolyard' – a practice in which recess and schoolyard are understood as closely intertwined. This recess period typically occurs twice daily, lasts an average of 15–20 min, and constitutes a fundamental structuring element of the school-day rhythm across nearly all school types in Germany. After deriving the significance of accessibility in the context of movement spaces and outlining the current state of research on the accessibility of playgrounds and schoolyards (Sect. 2), the focus shifts to the question "How do children and adolescents who use wheelchairs experience and interpret their recess in the schoolyard?" The approach (Sect. 3) and results of a qualitative exploratory interview study with nine children and adolescents who attend special needs schools for physical and motor development are presented (Sect. 4). Finally, the opportunities, limitations, and methodological extensions of the approach are discussed. Furthermore, specific practical implications are being considered (Sect. 5).

Theoretical Background

Informal Learning During Recess

The so-called "Hofpause" – literally translated as "recess in the schoolyard" – is firmly embedded in the school's institutional framework and represents a special break in the German school day; because of the close connection between the use of the space and a break from class, it is very popular among students (Derecik & Menze, 2017). Recess in the schoolyard provides a space where learning processes can take place

[1] This article is taken from the project "Ab in die Pause!" (Bükers, 2022).

outside of formal guidelines (Klika, 2020). Informal learning is understood as an interactive process between adolescents and their environment (Derecik, 2011). However, despite the mentioned presence in everyday German school life, the structures and processes of recess in the schoolyard have not yet been sufficiently researched (Osnabrück Research Group, 2016). Most recently, Derecik (2011) described a series of activities carried out by students in schoolyards, based on qualitative analyses of schoolyard situations during recess at 21 German schools across grades 1–10, which primarily promote informal learning through movement and social interaction. These include rhythmic games such as rubber band jumping and rope skipping on paved surfaces in play areas, as well as dynamic chase games in which girls chase boys and vice versa. The activities also include rolling with equipment, various climbing, swinging, and sliding activities on playground equipment, as well as resting and chatting on seating such as benches or steps. These are supplemented by hide-and-seek games in plantings or free role-playing games on green spaces. These findings alone suggest that the physical design of the schoolyard can influence the activities of its users. Research findings also show that greening playgrounds has an influence on physical activity and thus on health (Bikomeye et al., 2021) or, on another level, that students can develop a more positive attitude toward their school if the quality of the schoolyard is enhanced, for example, by high-quality equipment (Lateef et al., 2024). Against this background, the question of accessibility and usability – or barrier-free access – of schoolyards also appears to be central (Bükers et al., 2020), because if this is not achieved, the positive potential described above will remain unexploited.

Significance of Accessibility

Based on a relational understanding of space according to Löw (2016), this means that spaces should be understood not only as physical locations, but as structures of material and social relationships. Informal learning can therefore be promoted particularly where both physical and social accessibility are given – i.e. when people can be included in spatial, social and symbolic terms. In this context, accessibility is a central aspect, as it is a fundamental prerequisite for people with disabilities to be able to appropriate space (Imrie, 2012; Trescher & Hauck, 2017). The concept of accessibility is closely linked to the international social debate on equality and inclusion of people with disabilities. In Germany, the term "Barrierefreiheit" – literally translated into English as "freedom from barriers" – as a guiding principle enshrined in law and education policy (Bundesministerium der Justiz und für Verbraucherschutz, 2002/2018; Kultusministerkonferenz, 2011), describes much more than a technical or architectural feature. Rather, it refers to enabling active participation in social, cultural, and educational processes (Heck, 2012). Although the topic has been extensively discussed in architecture and construction practice and has been largely standardized, the educational science debate on material and spatial accessibility has remained rather marginal to date (Bükers, 2022). Empirical analyses that systematically examine the relationship between accessibility and school participation are rare. Similarly, despite some scientifically grounded initiatives (Degenhardt, 2020), there is still no consensus in Germany on basic criteria for determining the fundamental

accessibility of school learning environments and, for example, for standardizing these criteria within the framework of school development or evaluation processes (Tegge, 2020). One reason for this is the interdisciplinary nature of the topic: issues of spatial design are often dealt with outside the field of education, for example in the field of architecture (Degenhardt, 2018). Added to this is the conceptual complexity of the term accessibility itself. Barriers are not purely objective structures, but are relational and context-dependent; they always operate in relation to individual circumstances, needs, and intentions (Heck, 2012). As a result, there may be different, sometimes contradictory requirements for accessibility (Kastl, 2016), and accessibility is considered a necessary but not sufficient aspect for achieving full participation (Frerichs et al., 2024; Giese & Ruin, 2024). These ambiguities make it difficult to define and operationalize the term uniformly and contribute to the fact that empirical, especially quantitative, research approaches have been used only rarely to date, which in turn suggests a qualitative, exploratory approach such as the one presented here (more on this in Sect. 3) (Bükers & Wibowo, 2020).

Accessibility of Playgrounds and Schoolyards

The complexity of determining accessibility becomes particularly clear when considering playgrounds and schoolyards. The question of how to design accessibility here inevitably leads to tensions between accessibility and educational requirements (in terms of play, sports and exercise). On the one hand, all users should be able to use spaces for exercise and play in a self-determined manner; on the other hand, it is important to retain design features that offer motor and cognitive challenges and thus open up learning and development potential. It seems just as inappropriate to forego certain play or exercise options in favor of complete accessibility as it does to adopt a design logic that ignores diversity and heterogeneous needs. What is needed instead is the development of differentiated design strategies and criteria that strive to strike a balance between usability and challenge (Brown et al., 2021; Bükers et al., 2020).

A prerequisite for an informed professional discussion is knowledge about potential barriers – not only among planners, but also among educators (Bükers, 2022; Seemüller et al., 2025). One approach to generating such knowledge is offered by the international cooperation project LUDI, which aims to promote the equal participation of children and young people with disabilities in play and thus establishes an independent field of research (Besio et al., 2015). A central focus of LUDI is dedicated to barriers and accessibility on playgrounds. In addition to systematic reviews (Moore & Lynch, 2015; Lynch et al., 2018), the studies mainly rely on qualitative methods: interviews capture the experiences and interpretations of children and young people (Wenger et al., 2021) as well as parents (Prellwitz & Skär, 2016) in order to precisely identify barriers. Key findings include physical obstacles such as unfavorable surfaces (e.g., sand, grass, uneven ground), narrow entrances, and inaccessible paths, which primarily prevent children with limited mobility from accessing playgrounds; wide, level, solid paths and barrier-free entrances are considered essential. These design features are also highlighted in a corresponding scoping review (Brown et al., 2021). Another common feature of the various research projects is a unanimous call for in-depth (qualitative) research from the user's perspective – in line with the

credo: “Nothing about Us without Us” (Charlton, 1998). Accordingly, participatory and inclusive research approaches are becoming increasingly common in German-language discourse (Buchner et al., 2016).

The latest multi-method study (Aktion Mensch, 2023) on 1,000 public playgrounds in Germany – although less participatory – confirms this: only 21.3% have inclusive features, most of them only partially. Barrier-free access, accessible paths, shock-absorbing and accessible floors, and sensory-oriented offerings are often lacking, especially for children with mobility or visual impairments. Existing inclusive spaces are used intensively, serve as meeting places, and are highly valued by families with and without disabilities. Nevertheless, children and young people who use wheelchairs remain particularly disadvantaged, for example by the common use of sand as fall protection.

In conclusion, it must be stated that in Germany, schoolyards and, more specifically, their physical design and connections to learning represent a research gap. The extent to which accessibility or inclusion can currently be assessed or is actually present in German schoolyards remains largely unclear. How students with disabilities, and especially those with mobility restrictions or physical and motor impairments who use wheelchairs, actually use space remains largely unclear. However, recent studies show that various barriers limit the physical activity of children and young people who use wheelchairs (Seemüller et al., 2025), and research findings on playgrounds also suggest that these students are potentially hindered in their appropriation of space by inadequate material and spatial conditions.

Research Methodology

In line with the essence of the current state of research, an exploratory qualitative approach was chosen, which allowed for openness towards the unexplored subject area. Although existing playground research provided theoretical sensitivity, its findings could not be directly transferred to schoolyards. In Germany, public playgrounds and schoolyards are institutionally distinct: public playgrounds are accessible to all, whereas schoolyards are part of the school premises and generally not open to the public. Moreover, schoolyards are often equipped with specific apparatus tailored to their respective school type. For instance, special needs schools may feature explicitly barrier-free equipment such as wheelchair-accessible swings or carousels. Given these differences, schoolyards must be understood as socially constructed informal spaces embedded in the institutional framework of the school. This distinction argued against applying standardized forms of content analysis and instead favored an approach based on Grounded Theory Methodology (Strauss & Corbin, 1998). The target group – students who use wheelchairs – and the field of research – special needs schools for physical and motor development – were chosen for several reasons: Playground studies show that these users are severely disadvantaged by inadequate material and spatial conditions, which is why their perspective is explicitly important for identifying barriers. In addition, schoolyards at special needs schools offer valuable insights into accessibility measures that students subjectively experience as positive. This makes them particularly well suited for exploratory studies. Impor-

tantly, this perspective not only highlights potential barriers but also enables the identification of concrete measures that effectively promote barrier-free access and participation. The sample currently under consideration and the associated research methodology were part of the broader Project XY, in which a total of 56 students with diverse needs in the areas of physical-motor and cognitive development from six different schools participated.

Data Collection

Guided interviews (according to Flick, 2007) were chosen for data collection to ensure that the focus was not solely on material and spatial conditions, but that fundamental activities related to recess could also be reconstructed. In addition, it was recognized that reflective discussion about a material space is facilitated by situational embedding. So-called *go-along* or *walking interviews* are considered particularly productive in the context of social space research (Kühl, 2016; Kusenbach, 2003): they combine conversation with walking through the space and focus on situational practices such as rhythms, objects, and affects rather than purely descriptive perceptions. Compared to interviews conducted while sitting in a room, for example, they overcome methodological limitations by enabling the observation of actual actions and spontaneous comments; pilot studies confirm their greater relevance and depth of data (Kusenbach, 2003). Based on this, the approach used can be understood as *a guided rolling interview* in the (respective) schoolyard, in which 9 interviews lasting 9 to 25 min ($M = 18{:}29$ min) were conducted. The interviews were recorded as audio files, and the audio data was transcribed for data analysis. The interview guide included the following opening question: "What do you usually do in the schoolyard during recess?" If the interviewee did not already go to the relevant spot in the schoolyard on their own, the interviewer would ask them to show it. This was followed by a question about what made that spot special. The interviewees were also asked, "Are there any other things you do here in the schoolyard, or a spot you'd like to show us?" This gave the interviewees the opportunity to actively steer the rolling interview, both in terms of the verbal content and in terms of the physical tour. In each interview, the following question was also asked: "Is there a spot in the schoolyard that you avoid?"

Overall, the interviews proved to be fruitful, a result the authors attribute to various factors. First, the interviews were conducted by individuals who, based on their many years of practical experience in (special education) schools as well as their involvement in numerous research projects with children and adolescents with disabilities, can be considered experts in this field and of accessible communication. Related to this, prior communication with the schools—specifically with the homeroom teachers—should be viewed as a crucial foundation. Through this communication, both sides were able to identify and circumvent potential barriers in the interview process. For example, based on the preliminary discussion of the interview guide, tools for assisted communication were prepared. This included individual aids, such as iPad-based talkers, as well as communication cards, such as a green thumbs-up signifying "accessible" and a red thumbs-down signifying "not accessible." These supportive materials were introduced in advance by the school's regular staff, so that the inter-

viewers only had to ensure the students' understanding immediately before the survey. In two interviews (SM5 and SF2), communication was hesitant. That's when the talker in question came into play, and the interviewers weren't always able to frame the answers in a way that satisfied the students. In these cases, familiar members of the school's regular staff were able to help create a better atmosphere, allowing these interviews to be successfully completed as well.

All data collection was conducted in accordance with research ethics standards. Participation was voluntary, and informed consent was obtained from both parents/guardians and students. Finally, this must also be noted as a limiting or potentially exclusionary benchmark, since it remains unclear whether other students might have been willing or ready to participate in the interview but were prevented from doing so by third parties. Personal data was pseudonymized so that no conclusions could be drawn about individual participants. The research project was deemed "ethically unobjectionable" by the Ethics Committee of the Faculty of Education at the University of Hamburg.

Sample Description

The sample comprised nine students (4 female, 5 male) aged between 8 and 15 ($M = 11.0$ years) who used wheelchairs in everyday life (4 powered wheelchairs, 5 active wheelchairs). At the time of the survey, all of them attended one of the four special needs schools for physical and motor development in Hamburg (Germany) and had additional special educational needs (see Table 1). Although not statistically representative, the sample reflects a particularly relevant constellation of support needs within this heterogeneous school population. In a large-scale survey in Rhineland-Palatinate, 81.2% of students attending such schools were reported to have an intellectual disability and 74.7% were taught according to the curriculum for intellectual development (Scholz et al., 2016).

Data Analysis

The evaluation was based on a pragmatic use (Corbin & Strauss, 2008; Krieger, 2016) of the strategies and coding procedures of Grounded Theory (Strauss & Corbin,

Table 1 Overview of interviewees

ID	Gender	Interview duration	Age in years	School	Additional special educational needs	Type of wheelchair
SM1	m	19:20 min	13	I	Learning disability	Active wheelchair
SM2	m	09:10 min	13	IV	Learning disability	Powered wheelchair
SM3	m	17:05 min	15	IV	Intellectual disability	Active wheelchair
SM4	m	23:32 min	9	IV	Intellectual disability	Powered wheelchair
SM5	m	25:24 min	10	III	Learning disability	Powered wheelchair
SF1	f	18:42 min	8	II	Learning disability	Active wheelchair
SF2	f	15:48 min	14	I	Learning disability	Active wheelchair
SF3	f	19:21 min	9	I	Learning disability	Powered wheelchair
SF4	f	18:06 min	8	I	Learning disability	Active wheelchair

1998). The aim was to systematically identify the structures of meaning contained in the material and to consolidate them in a theory-driven manner. The research process took place in a communicative exchange within the research team, with a particular focus on tensions and contradictions in the data material, which were reflected upon jointly. This iterative analysis process allowed different perspectives to be brought in and interpretative meanings to be continuously reviewed. The evaluation was based on the principles of open and axial coding in order to identify central categories and connections. Selective coding was not used, as the axial coding already achieved a sufficient density in the results. The analysis was computer-assisted using MAXQDA software (VERBI Software GmbH, 2024), which supported the structured organization, coding, and comparative evaluation of the data.

Results

The identified categories and tensions are explained below and illustrated and interpreted using anchor examples.[2] These examples particularly express how the interviewed children and adolescents who use wheelchairs experience and interpret their recess, in particular, what activities they are pursuing and the material and spatial conditions of the schoolyards with regard to their accessibility. Both of these topics were identified above as research gaps with a focus on Germany. Both areas were successfully addressed in the interviews. Nevertheless, it must be noted that the interviewees themselves repeatedly brought the latter – the physical accessibility of the environment – into focus.

The following presentation therefore begins with a description of the category that, among other things, provides insight into the fundamental activities from the students' perspective, before four additional categories clearly take center stage in the context of the results presentation, focusing on the physical and spatial conditions.

a) Finally Chatting, Letting Off Steam, Resting, and Paying Extensively

The students interviewed often saw recess as a welcome break from class. It allows for social interaction and conversation as well as rest – in bad weather, this can also take place in special indoor rooms such as the so called Snoezelraum (a multi-sensory room), mainly outside of wheelchairs or in supported positions. Resting was also described in some cases as a solitary activity without other children. Games were played on foosball tables and ping-pong tables, and tag games were initiated – usually with mutually agreed rules, such as no child using higher levels that are inaccessible to wheelchair users. When discussing play options, the availability and use of specially adapted, barrier-free equipment became clear, such as wheelchair carousels, wheelchair seesaws, or – as seen in the anchor example 1 – wheelchair-accessible sandboxes.

[2] As part of the presentation of the results, the anchor examples for improved reading flow were slightly adapted linguistically.

It is worth mentioning explicitly that, within this small sample, different tendencies in playing style and use were also apparent between girls and boys: boys focused heavily on soccer (e.g., the position of goalkeeper), fast carousel rides, and water games. Girls, on the other hand, reported role-playing games (playing horses), sandbox games (baking cakes), and tag, mostly with friends or smaller groups. This is also evident in the following anchor example:

Example 1 **SF1, 8 years old, active wheelchair user (pos. 1).**

I: I would like to ask you what you do in the schoolyard during recess.
SF1: Playing horses with my friend.
(…)
I: And how does that work when you play horses?
SF1: We make it up with our wheelchairs. The horses are our wheelchairs.
I: That's great. And does your friend have a wheelchair too?
SF1: Yes.
I: Okay. And where do you do that?
SF1: In the schoolyard. In the backyard.
I: And what's in the backyard?
SF1: (…) A sandbox, a high sandbox for wheelchairs.
I: How does that work with wheelchairs and the sandbox? Can you explain that to me?
SF1: You can roll down and then play with the sand.
I: Oh, I see! (…) And do you sometimes play there?
SF1: Only very rarely.
I: Okay. And do you like playing horses best?
SF1: Yes.
I: Do your horses have names?
SF1: It varies (.) my horse used to be called Star. STAR.
I: Star, that's a great name. And are adults allowed to play too, or do you only play as a pair?
SF1: Just the two of us. Sometimes we do an obstacle course.
I: An obstacle course (?) What does the obstacle course look like?
SF1: With tires.
I: Hoops? Explain that to me. So you ride through them?
SF1: Yes, around the hoops (…).

The girl describes "playing horses" as a central recess activity that she initiates together with a friend in the schoolyard. Their wheelchairs are not seen as aids or "replacements" for walking, but are transformed into an imaginative world of play: they become horses. This symbolic appropriation shifts the perspective from disability to movement, speed, and self-efficacy. The wheelchair becomes part of an imaginative game that emphasizes mobility and togetherness rather than difference. It can therefore be assumed that the schoolyard, at least in parts, offers a movement area characterized by little (or less) rolling resistance, as otherwise the game described would only be possible to a very limited extent. It is also noteworthy how the child quite naturally mentions other spatial and material conditions, such as the "high sand-

box for wheelchairs." This description implies that barrier-free design elements such as a wheelchair-accessible sandbox are part of everyday school life for the child. They are experienced as an integral and usable part of recess space. This demonstrates an internalized sense of belonging and usability, which points to successful aspects of participation in everyday school life. The "obstacle course with tires" that the children sometimes set up further illustrates the active, physically creative use of the space. This is a playful extension of the use of the schoolyard that integrates movement experiences, dexterity, and rules of play.

In summary, the interviews provide clear insights into the activities students experienced during recess in the schoolyard from their perspective. The students themselves often draw connections to the physical and spatial aspects of these experiences, and this resulting tension thus sets the stage for a corresponding focus in the presentation of the remaining findings. The following four categories of results reflect spatial relationality and the associated (in)activities of the users:

b) Between No-Go Areas and Favorite Places

During the interviews, the students frequently described similar phenomena that reveal the tension between fear and safety. To reflect the extremes of this tension, one pole was named "*no-go areas*" in an everyday understanding, which in (urban) spatial sociology are considered territories where extreme forms of insecurity are observed (Mohring & Rolfes, 2020). In contrast to this are the children's favorite places – places that they experience as carefree and visit often. Key features of such places are level ground with low rolling resistance and sufficient space to allow freedom of movement and maneuvering with a (powered) wheelchair.

Example 2 **SF2, 14 years old, active wheelchair user (item 117).**

No-go areas.

I: Okay, and is there any place where you would like to go?

SF2: At our schoolyard there's this big red swing (.) there's a sandpit around it. I've seen it happen before, where a wheelchair drove up to the corner of the sandpit and then tipped over into it.

I: Just tipped over?

SF2: Well, he tipped right into the sandpit. I'd really like something to be done about that, like rubber mats or something. So that you can't tip into it anymore, because he drove over the corner and then tipped right in. (…) I drive there from time to time. Well (.), when I have to (.) And I'm very careful not to get my wheelchair near the corner so I don't tip over into that sandpit.

It is fear that comes to the fore here in view of the adverse physical and spatial conditions. Whether this is fear of physical injury or shame-related fear – lying more or less helpless in the sandpit– remains speculative. However, it is clear that the fear experienced – as a product of non-barrier-free material and spatial conditions and spatial synthesis (Löw, 2016) – leads to certain areas of the schoolyard becoming places that the student avoids as much as possible. " I drive there from time to time.

Well (.), when I have to". The student does not speak of voluntariness; part of the schoolyard thus becomes a no-go area.

As mentioned, this negatively connoted experience of insufficient material and spatial conditions is counterbalanced by places that are experienced in a correspondingly positive light, as the following illustrative anchor example makes clear:

Example 3 **SF3, 9 years old, powered wheelchair user (pos. 32).**

Favorite place.
I: And where do you play these games (tag) in your schoolyard?
SF3: Back there in (unintelligible).
I: I see, and is there any equipment there, or what does it look like?
SF3: There's just a bench and a sandbox.
I: And how do you feel about there not being much equipment there?
SF3: Good.
I: Can you explain that to me in more detail?
SF3: If there are too many pieces of equipment, then I don't have as much space(!) and so on (.).

The student describes a place where she likes to play tag, which is characterized by a reduced density of objects – "just a bench and a sandbox" – and thus offers plenty of space. Her reasoning ("If there are too many pieces of equipment, then I don't have as much space") reveals a pronounced perception of space, in which the symbiosis of body and wheelchair as an extension actively shapes the space – confinement is experienced as a restriction on maneuverability and autonomy, as it contradicts the body schema. Favorite places can thus also be understood as places of possibility.

Such a sophisticated understanding – or awareness – of which physical and spatial conditions enable (one's own) independent action, or conversely, prevent or hinder it, was frequently observed in the interviews and associated with corresponding emotions. Likewise, some interviews revealed that the interviewees, at the very least, underestimated the individual implications of non-accessible design. This tension is described in detail below.

c) Consciously Limited vs. Above All Doubts

When interview situations came to a standstill, this could be traced back to underlying tensions. It often happened that the conversation revealed a disability phenomenon and the interviewee experienced themselves as "consciously limited" – which they sometimes also expressed emotionally (see examples 4 and 6). In another case, however, the interviewee (SM5) seemed to be above all doubts: despite objectively visible barriers to use, he assured us that "I can do everything" (in the schoolyard) or quickly bypassed those places in favor of a space that was accessible (to him). This suggests manifestations of coping strategies that could be interpreted as at least positively resilient or critical of perceived disability phenomena. With regard to the main question, however, the focus here is on the interpretation of conscious limitations in order to reconstruct concrete barrier potentials.

Example 4 **SM5, 10 years old, powered wheelchair user (item 41).**

Consciously restricted.
I: Can you use all of the things that are there?
SM5: No.
I: What can't you use?
SM5: Well (.) the slide, the net swing, and the cable car. (.)
I: And can you use them with help?
SM5: No, not with help either.
I: You could use the net swing with help if someone lifts you in (.) or not?
SM5: Yes, but not the other things.
I: And would you like to use them?
SM5: Yes.
I: How do you feel when you can't use something?
SM5: It's a bit annoying, but yeah (.).

The 10-year-old boy describes a conscious exclusion dynamic that results from the interaction between the powered wheelchair and the spatial design: play equipment such as slides, nest swings, and cable cars are positioned in such a way (Löw, 2016) – the physical positioning of objects for walking bodies – that they remain inaccessible to him, even with assistance. His reflective synthesis is striking: he consciously perceives the arrangement, links it to his possibilities for appropriating space, and evaluates it emotionally ("a bit stupid"), while at the same time articulating almost longingly ("Yes, I would like to"). The child synthesizes object + own wheelchair + experience into a selective space of marginalization. His acceptance thus shows not passivity, but active space production – an internalized perception of boundaries that reveals normative schoolyard design as structurally exclusive and underscores the need for barrier-free spacing.

And although the tension described above highlights significant differences in the perception of potential barriers on the school playground, it is striking that, in turn, some of the interviewees do not focus solely on themselves and their individual situations during recess in the schoolyard, but also keep a close eye on members of their peer group. This phenomenon is highlighted in the following category.

d) With a Careful Eye on their Schoolmates

Most of the students seem to be aware of their schoolmates' preferences and know their possibilities for appropriating space. They have knowledge of potential dangers for their schoolmates (see also anchor example 2 on *no-go areas*) as well as useful ideas for the adequate design or redesign of the material and spatial conditions.

Example 5 **SF4, 8 years old, active wheelchair user (item 214).**

I: And when you think about your dream schoolyard again, are there any specific pieces of equipment that the schoolyard should have?
SF4: Yes, sports equipment for my friend, a treadmill.
I: A treadmill, okay. And what does a treadmill look like?

SF4: It's big and the floor moves and it has handles. And a screen. And I'll press the highest setting so she flies away. (laughs loudly) (…) Just kidding!

I: (Laughs) (…) You're funny. And would you like another piece of equipment (…) for yourself, perhaps? Anything you'd like to have?

SF4: Only for my friends.

In this excerpt, the student shows remarkable attention to her schoolmates. She translates her knowledge of her friend's spatial adaptation needs into a concrete design proposal: a barrier-free treadmill with supportive handles and a screen. So she not only knows her friend's preferences, but also plans the necessary technical adaptations for her. This exemplifies the "careful gaze." The humorous comment ("so she flies away") underscores the lightheartedness of this empathy. The fact that she does not want anything for herself can be interpreted as selfless, but it is also possible that she lacks knowledge about specific devices that are particularly accessible for her.

In any case, the creativity and ease of thinking about ways to improve the schoolyard, as evident in this example, were evident in nearly all of the interviews. What seems particularly noteworthy, however, are the differences in practical feasibility, as illustrated by the tension in the last category.

e) Realistic Ideas for Improvement vs. Fantasies

The students express numerous wishes that, in their view, would improve accessibility and appear technically feasible and sensible, such as replacing floor coverings with high rolling resistance or installing seat belts on special play equipment to increase safety. At the same time, there are more imaginative and significantly less realistic ideas, ranging from a pink castle with unicorns to a cable car for wheelchairs, a swimming pool, a gym, and an ice cream and kebab shop in the schoolyard. A more detailed description, using anchor examples and interpretation, is omitted in order to focus on the key question.

Example 6 **SF2, 14 years old, active wheelchair user (item 190).**

I: Is there anything else that you would say poses a potential risk, so to speak?

SF2: If you go behind the container, there's a sandy area behind the pavilion on the left, and my friends often go there. And I think it's stupid that I can't go there because of the sand. And especially now in autumn, when I get stuck in the mud and stuff, I don't think that's so great. Maybe they could put some tar down there or something. Just so that you can get there in a wheelchair. Yes, because there's also a corner where you can get between the fence and the pavilion (…), but it's too narrow for my wheelchair (…).

I: Yes, it's annoying when they hang out there (…).

SF2: Especially since there's asphalt in one place and not in another. And I can't get to the place without asphalt (*shows the spot*).

I: Yes, and with asphalt it's too narrow (?).

SF2: Exactly, or rather, from the asphalt to the sand, I can't get there because there are two trees and it's too narrow.

I: Ah, okay, like that. Yes, I can understand that. That would annoy me too.

SF2: And, as I said, maybe they could put down some tar or rubber mats or something. So that wheelchair users can get there too.

The student formulates realistic suggestions for improvement that are precisely aimed at technically feasible accessibility measures: replacing sand surfaces with tar, asphalt, or rubber mats to eliminate high rolling resistance and narrow spaces. Her description shows detailed spatial knowledge – she differentiates between paved and unpaved areas, identifies bottlenecks ("between the fence and the pavilion," "two trees") and marks transitions ("from asphalt to sand") as critical. The desire does not stem egocentrically from her own disadvantage ("I think it's stupid"), but from relational logic ("friends go there," "they chill out"). She plans this way so that spending time together is possible. The student moves beyond personal frustration ("getting stuck," "not so cool") to constructive alternatives that conceive of accessibility as a social space for peer relationships.

Concluding Discussion

Keyfindings

Parallel to the findings of Derecik (2011) on the dynamics of break activities (rhythmic games, chase games, climbing, rolling) and the Osnabrück research group (2016) on the insufficiently researched break potential at all-day schools, the results of the present study reveal a diverse spectrum of informal learning processes: social exchange, creative play, recreation, and physical activity. It is particularly noteworthy that the wheelchairs are not perceived exclusively as a means of mobility, but – in the sense of an extended body schema – are creatively integrated into children's play worlds, for example as "horses" in role-playing games or in obstacle courses with tires (Sect. 4; example 1). The findings indicate that participants sometimes incorporated their wheelchairs into play as active means of movement, expression, and interaction rather than treating them merely as mobility devices. However, ambivalent areas of tension also reveal themselves (Sect. 4; examples 2 & 3): No-go areas that cause fear of injury or shame contrast with favorite places or spaces of opportunity that offer safety, accessibility, and usability thanks to design features such as level floors with low rolling resistance and sufficient space to maneuver (large) (powered) wheelchairs. It seems more or less in line with expectations that playing on green spaces or in bushes does not feature significantly in the interviews, whereas previous schoolyard research at mainstream schools has attached importance to this (Bikomeye et al., 2021; Derecik, 2011). Other inaccessible areas, such as slides, swings, etc., are either accepted with resignation by the respondents "a bit stupid" or normalized with resilience "can use everything" (Sect. 4; example 4), which suggests creative and use-focused appropriation of space as a coping strategy (which should be explicitly investigated in future research).

Taken together, the findings suggest that recess in the schoolyard is best understood as a relational participation space. Participation was not determined by the students' wheelchairs or by the physical environment alone. Rather, it emerged through the interaction of students' bodies, wheelchairs, peers, materials, spatial arrangements,

weather conditions, and available support. Accessibility therefore shaped more than students' ability to move from one place to another. It influenced which activities they could join, which peers they could reach, how independently they could act, and whether particular areas were experienced as inviting spaces or as places to avoid. The students' accounts also show that accessibility was valued primarily in relation to shared activities and social belonging, rather than as an isolated technical property of the schoolyard.

A further contribution concerns the social meaning of accessibility. The participants' suggestions for asphalt, rubber mats, wider passages, and accessible equipment were closely connected to their relationships with peers. Students wanted to reach places where friends spent time and to participate in activities that were shared with others (Sect. 4, example 6). Accessibility was therefore experienced not only as a matter of personal mobility or safety but also as a condition of belonging. This finding suggests that schoolyard accessibility should be evaluated not only by asking whether a student can enter or use a particular feature, but also whether the student can reach peers, remain with the group, and participate in activities on comparable terms.

Overall, the study expands the (German) state of research on participation in informal learning at playgrounds and schoolyards (Aktion Mensch, 2023; Osnabrück Research Group, 2016) by examining space appropriation practices in the context of special needs schools for physical and motor development and determining design knowledge from the perspective of children and adolescents who use wheelchairs. In conclusion, this study shows that accessibility is a central condition for participation in recess in the schoolyard, although it cannot by itself guarantee participation in play, physical activity, or informal learning. For the students in this study, accessibility was experienced relationally: it mattered because it enabled movement, autonomy, access to peers, and participation in shared activities. The findings therefore support the inclusion of children and adolescents who use wheelchairs as experts in the planning and evaluation of schoolyards. Their perspectives can identify not only barriers but also concrete spatial and material conditions that make recess more accessible, usable, and socially inclusive.

Following the recommendations outlined in the playground research (Sect. 2.3), we believe that the exploratory qualitative approach chosen can be described as fruitful. The situational embedding (Kühl, 2016; Kusenbach, 2003) encouraged spontaneous and sometimes episodic narratives from the children and adolescents and enabled them, for example, show situations when they lacked the words to explain or found it difficult to do so. In this way, too, exclusionary spatial conditions could be revealed. Contemporaneously, the students' perspectives offer creative solutions – rubber mats, extended paths, etc. – that are technically feasible and can promote participation.

Limitations and Future Research

At the same time, limitations must also be mentioned. These result, among other things, from the small sample size ($n = 9$), which does not represent the full spectrum of physical and motor impairments, as well as the focus on special schools, which prohibits generalizations about a "wheelchair perspective in general." Furthermore,

the exploratory nature and sampling of the study preclude comparisons with inclusive settings (especially elementary schools) for the time being, where social dynamics may differ. In addition, the interview-based approach requires verbal language skills and cognitive processing, which does not include all students. Future studies should constructively address these limitations and focus on increased participation. Photo-Voice (Wang & Burris, 1997; Wihofszky et al., 2020), for example, enables visual data collection – children photograph relevant aspects of the schoolyard, which are then reflected upon and interpreted in dialogue – to reduce language barriers. Similarly, multi-method designs with quantitative barrier measurements (e.g., rolling resistance tests) and comparisons with regular schools could also provide exciting insights.

Implications for Practice

The empirical results suggest specific conclusions that may be regarded as practical implications:

- Provide continuous, level, solid, and weather-resistant routes with low rolling resistance to avoid inaccessible areas (e.g., sand, mud) and enable students to reach shared activities and peer gathering places year-round.
- Ensure sufficient space for maneuvering and avoid narrow passages, abrupt transitions, and overcrowded equipment layouts that restrict independent mobility or separate wheelchair users from their peers.
- Provide accessible play and movement equipment while preserving opportunities for challenge, choice, creativity, and age-appropriate risk-taking.
- Involve students who use wheelchairs in accessibility audits, planning, and evaluation because their situated knowledge reveals barriers that may remain invisible in formal inspections.
- Treat adult assistance as supportive but not as a substitute for accessible design; staffing plans should ensure help is available without making participation dependent on continuous one-to-one support.

In conclusion, this research contribution also reveals that material and spatial accessibility is not a sufficient condition for participation in exercise, play, and sports or for informal (and inclusive) learning in the schoolyard, but it is a spatial quality that must be taken into account. To this end, it is important to consult the users themselves, children and adolescents, as experts in ensuring this quality.

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Data Availability The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

Declarations

Competing interests The authors declare no competing interests.

Ethical Approval This study was performed in line with the principles of the Declaration of Helsinki (1964) and its later amendments or comparable ethical standards. The research project, entitled "Ab in die Pause", was reviewed by the Ethics Committee of the Faculty of Education at Universität Hamburg, Germany. The committee assessed the project as ethically unobjectionable (reference number: FB_21-012). Informed consent procedures were conducted in accordance with the approved study protocol.

Informed Consent Participation was voluntary, and informed consent was obtained from both parents/guardians and students.

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