JCSHD
COGNITIVE SCIENCES AND HUMAN DEVELOPMENT

Understanding Inclusive Playgrounds

Mohd Daniel Mohd Idros[1,6], Puteri Fadzline Muhamad Tamyez*[2], Wan Zaiyana Mohd Yusof[3], Hafizoah Kassim[4] & Muhammad Ashraf Fauzi[5]
[1,2,3,5] Faculty of Industrial Management, Universiti Malaysia Pahang Al-Sultan Abdullah
[3] College of Creative Arts, Universiti Teknologi MARA
[4] Centre for Modern Languages, Universiti Malaysia Pahang Al-Sultan Abdullah
[6] Knendhoi Design Studio

ABSTRACT

Inclusive education has shown an increasing interest in teaching students with autism spectrum disorder (ASD) through playgrounds. This approach not only fosters the development of social skills but also enhances cognitive and emotional growth in learners. Although the playground's impact on the skills of ASD students has been acknowledged, some criticism stems from the lack of a precise conceptualisation. Recent studies have highlighted the significance of teaching through playgrounds in improving problem-solving abilities. While there is a growing body of research on hands-on learning through playgrounds, a challenge remains in tailoring the learning experience to accommodate individual differences among ASD learners. Detailed discussions on supporting personalised learning experiences and cognitive enhancement in the playground setting are lacking. This paper is a literature review and qualitative investigation to address these gaps. The main contributions are twofold: first, it offers a review of how the physical space of the playground design impacts the development of children with ASD, and second, it suggests several implications for future research based on extensive literature review and qualitative study.

Keywords: autism spectrum disorder, children, inclusive playground, cognitive development, inclusive play

ARTICLE INFO
Email address: fadzline@ump.edu.my (Puteri Fadzline Muhamad Tamyez)
*Corresponding author
https://doi.org/10.33736/jcshd.5738.2023
e-ISSN: 2550-1623

Manuscript received: 7 June 2023; Accepted: 14 September 2023; Date of publication: 30 September 2023

1 INTRODUCTION

A few generations ago, not many would have thought that playgrounds had much, if anything, to do with learning among children with Autistic Syndrome Disorder (ASD). The playground is vital to ensure the effectiveness of their learning. Times have changed, and the past century has seen the evolution of the playground design from a traditional playground to an inclusive playground. Analysing playgrounds' impact on social development is a crucial topic of discussion in special education.

There are several relationships between the use of playgrounds and their social development. However, the needs of children with ASD are not met by playground design in the United States, similar to the current playground design in Malaysia. Badgett (2020) argued that an effective playground does not stand alone but must be integrated with the overall strategy of available treatments and teaching strategies. In a study by Julia Jantan (2008), she cited that two methods could be implemented for children's academic difficulties: Cognitive Training and Direct Instructions. As mentioned previously, play is one of the main activities that contribute to pleasure for most children and develop socio and cognitive skills. There are also studies regarding the relationship between cognition and mood effects on memorising capability. There are several testable hypotheses regarding these factors. One is mood state-dependent memory, which is excellent when the mood at retrieval syncs at the time of learning and retrieved great when there is correspondence between affective value and the learner's current mood state. According to Bower's (1981) theory regarding mood-state dependence, the level of recall is high when the mood matches during the learning and recall sessions. However, the levels of recall were low whenever the person's mood did not match in these two sessions.

Thus, there is a need to have a comprehensive understanding of how playgrounds may contribute to enhanced skills among children with ASD. There are extensive discussions among researchers on how the effectiveness of playgrounds differs across types of playground equipment. However, distinct features of playgrounds are almost non-existent in the literature. With this gap in mind, this research addresses the lack of consensus over the value playgrounds offer. Discussions about the playground's key elements are gathered from the existing literature and qualitative studies to fill this gap. The paper explores the potential of this valuable tool for their development and the effects of playgrounds on their learning. Playgrounds have evolved based on various philosophies. Three core types of playgrounds are commonly seen around the world. The first playground, Traditional Playground, was constructed in the early 1900s based on how children learn and play. In addition, within this type of Traditional Playground, the play was described by G.T Patrick in 1916 as behaviour stemming from a need that had no cognitive function (Maria Prellwits, 2007).

The second type of playground developed from the traditional is the Contemporary Playground, built in the 1950s, consisting of motor skill and cognitive development. Contemporary playgrounds can increase the children's interest due to the creative design through various methods (Hartle & Johnson, 1993). The third type of playground is the Adventure Playground, built in Denmark in 1943. An adventure playground is not just for motor skill development but to develop social and cognitive skills among the children.

This paper consists of a literature review of the historical and current playground models available and how far the playground concept is incorporated in the development of ASDs in the second section. The third section presents the brief methodology of this study. The fourth section provides recommendations from the review of the existing literature in the field of autism development.

2 REVIEW OF LITERATURE

This section focuses on the historical backdrop of education using playgrounds, followed by a discussion on inclusive playgrounds. This section concludes with a discussion on the support of playgrounds for students with an autism spectrum disorder.

2.1 Historical Backdrop of Playground

Adults design and build playgrounds for children, emphasising play as a crucial activity in their daily lives. According to Perry (2001), play can manifest in various forms, but its essence lies in pleasure, a vital learning aspect. The definition of play can vary depending on different perspectives. Children can invent and explore by engaging their bodies, making their environment more enjoyable and stimulating.

Research indicates that a child's development is influenced not only by their school and home environment but also by their "play life." Understanding and assessing a child's play is crucial in creating their ideal experience. Play has long been recognised as a significant contributor to children's cognitive, social, and emotional development (Bundy, 2008). It is considered the medium of social interaction in early childhood (Coelho et al., 2017), providing a natural and effective avenue for social interaction, learning and communication in educational settings.

Play is a fundamental component of the learning process. It allows children to understand social values as they interact with the other children. Several skills crucial for development are honed through play during childhood. For example, in 1997, Frost emphasised the significance of play in developing children by engaging with tools by supportive adults. Bateson's theory of play and fantasy (1995) further supported the idea that play is essential for learning. Freud (1961) confirmed this concept, stating that play is a cognitive and voluntary activity that contributes to cognitive development, including problem-solving and creative thinking. Play plays a central role in children's cognitive, physical, and motor development. It is considered the most critical factor in fostering their growth and learning.

Consequently, play has been utilised as an intervention to enhance the social communication skills of children with autism. Additionally, the playground has been perceived as a valuable resource for parents and teachers, addressing challenges they may encounter in organising family and student play activities during leisure and teaching periods. Over time, playground concepts have undergone significant changes to accommodate diverse philosophies and clear objectives. Initially, the focus was primarily on providing play equipment for physical activities, with little consideration for cognitive development during children's leisure time.

Various play-based interventions share similarities that can guide practitioners in the field. These interventions consider the child's developmental stage and interests (Chang et al., 2016; Vincent et al., 2018; Watkins et al., 2019), involve guided play or adult participation and assistance (Beadle-Brown et al., 2018; Vincent et al., 2018), and promote the involvement of genuine peers (Beadle-Brown et al., 2018; Chang et al., 2016; Vincent et al., 2018; Watkins et al., 2019). Additionally, they recognise the potential to approach naturalistic value (Chang et al., 2016; Goods et al., 2013; Lawton & Kasari, 2012; Vincent et al., 2018).

It is highly recommended to conduct practitioner-led research to evaluate the effectiveness of play-based interventions in the educational context. Such research and findings would bridge the gap between research and practice (Guldberg, 2017; Hume et al., 2021; Kasari & Smith, 2013; Wood et al., 2015) and provide valuable insights for improving intervention strategies. Considering safety guidelines for playground design and material selection is critical. Hudson et al. (1997) also provided information that can be used to develop playground safety guidelines. There are several categories of playgrounds: creative playgrounds, designer playgrounds, preschool and toddler playgrounds, and educational playgrounds.

2.2 Traditional Playground

Traditional playgrounds have been around since the early 1900s, with their construction on understanding why children play and how they learn. The earliest definition of play, dating back to 1873 by Spencer, described it as an activity that expends excess energy. Patrick, in 1916, further described the play as a behaviour that comes from a need and does not require any cognitive elements (Maria Prellwitz, 2007). Play is seen as a means of communication and emotional expression, involving cognitive and physical movement and providing satisfaction and achievement. Play also plays a significant role in helping children develop their motor skills, mental abilities, emotional intelligence, and social skills.

The evolution of playground designs began in Western countries in the early 1880s, moving from traditional playgrounds to adventure playgrounds introduced in Sweden in the 1950s. The traditional playground typically features swings, see-saws, monkey bars, jungle gyms, and slides, which offer exercise and help develop children's motor capabilities. However, these playgrounds may lack emphasis on cognitive development, interaction skills, and imagination. Research has shown that children more involved in their classrooms' social networks tend to spend more time engaging with peers on the playground. Thus, promoting social interactions in various contexts within schools should be emphasised.

2.3 Contemporary Playground

Contemporary playgrounds are designed to focus on motor skills and cognitive development, particularly on imaginative play. The play elements stimulate children's imagination, allowing them to take on roles like pirate captains, forest dwellers, or rulers of fairy tale kingdoms. In the 1950s and 1960s, these contemporary playgrounds gained popularity, featuring creative and aesthetically pleasing structures with various themes, such as nautical, pirates, and jungle animals,

to engage and excite children seeking stimuli. This design approach offers children more play value and opportunities to explore their environment, increasing their interest through creative and complex materials and methods.

While contemporary playgrounds incorporate traditional play equipment like monkey bars, see-saws, and slides, they use different materials and feature multifunctional play equipment, allowing children to explore various activities within a single structure. The distinctive feature of contemporary playgrounds is the incorporation of specific themes, such as giant whales, leaning houses, pirate ships, dinosaurs, or prince's castles, which ignite children's imagination even at first sight. These playgrounds are often designed to complement the surrounding landscape and architecture, sometimes incorporating artistic features, making them seamlessly blend with the overall environment. In summary, contemporary playgrounds balance motor skills and cognitive development with a strong focus on imaginative play. They incorporate traditional play equipment with different materials and multifunctional elements while offering specific themes and artistic features that spark children's creativity and interest, making them an integral part of the surrounding landscape and architectural design.

2.4 Adventure Playground

Adventure playgrounds, also known as natural playgrounds, are often envisioned as playgrounds made of "junk" materials. They prioritise using materials in the surrounding environment, such as wood, tree trunks, stones, leaves, and water. The concept of the adventure playground originated from Sorensen's idea of a "junk playground" described in his book, "Open Space for Town and Country," and the first adventure playground was built in Emdrup, Copenhagen, in 1943 (Bengtsson, 1972). These playgrounds are commonly found in European countries and Japan.

One of the challenges in spreading the idea of adventure playgrounds is the strict safety regulations, especially in the United States of America. Although adventure playgrounds are designed for children's play, adult supervision is necessary to form suitable activities, namely digging, building castles and many more. These playgrounds encourage parents to bond with their children by spending quality time. They foster genuine interaction, thereby developing social skills among children. Social play is encouraged through playhouses, materials for hut-building, blocks and boards for construction, and designated areas for meeting and conversation (Wilkinson, 1980). The primary focus of adventure playgrounds is not just on motor skill development but on fostering cognitive and social skills among children. Engaging in creative activities during play enhances their decision-making abilities. Bill Michaels developed values that make adventure playgrounds more effective than traditional playgrounds (Brett, 1993). These values include encouraging social growth among children, providing flexibility, promoting fantasy-making rather than fantasy feeding, supporting physical and emotional development through risk-taking, integrating various groups, and as a model play behaviour for both children and parents. These values contribute to the unique and beneficial aspects of adventure playgrounds.

2.5 Playgrounds for Children with Disabilities and Autism Spectrum Disorder (ASD)

Much uncertainty still exists about the relationship between understanding how children with impairment play in playground environments and implementing Universal Design (UD) in public playgrounds. One of the challenges faced in providing a full-inclusive public playground for children with impairment is space, which seems to be gradually hard to find in urban areas. Even the same issue has arrived in most urban cities; the urgent involvement of expertise from various city dwellers' backgrounds is essential to developing inclusive play spaces.

Recent studies have shown that parents with children with ASD are highly concerned about the risk factors that could occur in rural settings that do not compile with their children's behaviour and interests. Several ranges of solutions have been expressed regarding this issue. One solution highlighted is to improve the recreational settings with educational strategies suitable for impaired children. The strategies also emphasised the policy objectives for community spaces, including the safety area for children with ASD who can play in the area without parents enduring fears. In addition, recent evidence suggests that playground needs are essential to develop relationships among the children and provide human interaction within the play space.

Even though more spaces are required to design inclusive playgrounds, playground manufacturers have seen the requirements as their potential to maximise profit rather than benefit the communities. A much-debated question is whether the experts have empirically tested the playground equipment provided to the manufacturers' communities regarding children's cognitive or physical development. It has been conclusively shown that universally designed playgrounds arrive to be suitable orientations to enhance the effectiveness of the playground. The shift of the new playground design is derived from a universal design framework.

Thus far, global outdoor game equipment and playground facilities have shown increased features to support children's development through gaming and play activities. The main challenge of designing an inclusive playground is the complexity of variables between the products needed and targeted consumer ability. As a result, more effort and further study had to be conducted to be almost entirely suitable for children with impairments while playing.

Zhukova (2020), in his study, suggested that both architects and designers could work together in one inclusive program development. This was based on the recent articles that highlighted the playground manufacturer's purpose in terms of inclusive design products, including for children with autism disorder. Several findings in this study and analysis addressed three main points: firstly, the children's involvement in every game, increased interaction between peers, and third, collaborative activities stimulation focused on the children's social development.

Investigating play behaviour is a continuing concern within the spectrum of special needs children, which requires different approaches than their typical peers. Previous studies conducted by Miller et al. (2017) regarding the effectiveness of playground equipment reported that the verbal and proprioception capability among the children was increased while using the play equipment. The study validity is based on the coding scheme established from the case study. The behavioural

coding scheme was widely used throughout the study to measure the relationship between the play equipment and the children's development degrees, including social, cognitive, verbal and motor skills. Furthermore, this method validated the features of a playground suitable for children's development, both in the cognitive and physical spectrum.

A study by Wenger et al. (2021) derived that an inclusive playground has a complex environment that requires special requirements that suits the need of various children's ability in order to develop inclusion in the inclusive playground, despite the fact that the interrelation between several aspects such as physical and social environment should be obtained, the involvement of children experience by sharing their perspective is essential in planning the playground. However, a recent study by Wenger et al. in 2023 also showed that the direction of creating inclusion in playgrounds remains challenging due to a lack of understanding and knowledge. Involvement from the community network to bring children's experiences to be addressed along with the playground manufacturer is essential to create an inclusive playground in the focused community. Supported design approaches such as universal design played a significant role in balancing and creating more consideration factors from the children's glance, making the playground more welcoming.

In case studies by Sterman et al. (2018), several factors found that a lack of understanding in designing an inclusive playground for disabilities came from the method of approach by the local government. Local governments focus on only one focal point in physical access with minimal requirements and a lack of engagement with the local community to provide a suitable playground. Furthermore, the study by Yildirim et al. in 2022 highlighted that collaboration between expert designers and planners was required to create successful inclusive playground design based on various factors and criteria. A recent study by Van Engelen et al. (2021) found that the emotional barrier that parents and children experience arises as a core factor in children with PD not involved in play activities. However, the professionals and parents viewed many ways of improvement that could be implemented, especially from the appointed related organisation.

The investigation by Paykoc et al. (2021) has summarised that children's needs are hard to achieve ultimately, even though the play space had been considered with the universal design approaches. However, the study by Wilson (2020) stated that with play activities, the learning process shows decent positive effects for children with ASD.

Play through inclusivity is a central aspect of designing playground facilities, ensuring they cater to children with various physical disabilities, such as hearing, speech, and mental disabilities. ASD is a neurodevelopmental disorder characterised by atypical interactions and restricted and repetitive behaviours (American Psychiatric Association, 2013). It can be diagnosed as early as 18 months, with most diagnoses occurring between ages three and four. ASD directly affects skills through communication and behaviour, thus leading to noticeable repetitive behaviours (National Institute of Mental Health, 2008). Children with ASD often face challenges in making friends at school and have limited interactions with others in free-play situations (Santillan et al., 2019; Hauck et al., 1995).

In the context of Malaysian public parks, there is a lack of awareness and consideration for the needs of children with disabilities, including those with ASD, in providing playgrounds (Bakar, 2002; Ayatac, 2017). Existing playgrounds do not adequately accommodate their special needs, indicating the necessity for inclusive playgrounds (Soltania et al., 2011). However, designing inclusive playgrounds for children with ASD requires addressing specific issues, such as expressive communication skills, sensory integration challenges, visual organisation needs, motor-planning skills, and the need for reinforcement and co-active assistance (Groft & Block, 2003; Houston-Wilson & Lieberman, 2003; O'Connor et al., 2000; Reid & O'Connor, 2003; Reid et al., 2003; Schultheis et al., 2000; Collier & Reid, 2003). The outdoor environment significantly influences the interactions and play types among children with and without ASD (Hestenes & Carroll, 2000). While much research focuses on improving the physical space and equipment of playgrounds for children with ASD, more literature on supporting inclusive playgrounds for ASD is needed.

Table 1 presents the statistics of primary students with various difficulties in Malaysia. Mental and physical disabilities among the children that the Ministry of Education of Malaysia recorded between 2006 and 2010, the number of children with learning difficulties is increasing year by year, making the scenario worse; the learning difficulties students are the highest group that has been recorded for the over past five years, starting from 2006 until 2010. Almost 10,000 students with learning disabilities had increased between 2006 and 2010.

Table 1. Primary students with various difficulties in Malaysia
(Ministry of Education Malaysia, 2010).

	2006	**2007**	**2008**	**2009**	**2010**
Learning Difficulties	20,929	24,034	25,696	33,359	39,331
Hearing Difficulties	3,478	3,775	3,495	3,982	3,086
Visual Difficulties	669	782	744	1,112	744

In conclusion, play-based learning has benefited children with ASD, and inclusive playground design is essential to accommodate various physical disabilities. Addressing specific challenges faced by children with ASD is crucial in designing inclusive playgrounds that promote social development and facilitate interactions among children with and without ASD. More research is needed to fully explore the potential of inclusive playgrounds for supporting the needs of children with ASD.

3 METHODOLOGY

This study began with a thorough review of the current literature. Coupled with purposive judgmental sampling, a qualitative research approach was used to pick teachers for the interview. Initially, 9-10 interview sessions were planned. However, data saturation occurred considerably faster than expected, creating no new codes in the final few interviews. A semi-structured interview approach facilitates the study's desired conceptualisation since it is well-suited for eliciting observations. The face-to-face interviews lasted roughly 30 minutes, according to the appointments. The entire process was done in a matter of weeks. During the interviews, audio recordings were made and subsequently transcribed verbatim. These transcripts were then input into coding and analysis software. The researchers maintained consistency and familiarity with the data, all interview-related tasks, audio recordings, and coding.

4 FINDINGS

Three semi-structured interviews have been completed in this study. In order to fulfil the academic standards and regulations, the researcher diligently sought and obtained ethical approval from two distinguished entities: Universiti Teknologi Mara (UiTM) and the Ministry of Education Malaysia (Kementerian Pendidikan Malaysia, with reference KPMSP.600-3/2/3 Jld 8. had been submitted to the school one month before the study was conducted. Both institutions' letters listed the guidelines for the researcher to follow during the study. One of the ethical points that has been highlighted is to keep any formal information about the informants, including their names and faces. The study procedure was conducted at the outdoor playground built near their classroom.

When all the data have been initially coded and collated, and a list of the different codes has been identified across the data set at this phase, the researchers re-focuses the analysis at the broader level of themes rather than codes, involves sorting the different codes into potential themes and collating all the relevant coded data extracts within the identified themes. In this phase, the researcher used the ATLAS.ti software. The researchers started thinking about the relationship between codes and themes.

When the researchers have derived a set of candidate themes, it involves refining them. However, it involves two levels of reviewing and refining the themes before the researcher finalises the themes. Level one involves reviewing the level of the coded data extracts. This means the researchers must read all the collated extracts for each theme and consider whether they appear to form a coherent pattern. If the researchers find that the candidate themes appear to form a coherent pattern, then the researcher moves on to the second level of this phase. Suppose the researchers found that candidate themes do not fit; the researchers consider whether the theme itself is problematic or whether some of the data extracts within it do not fit there, in which case. In that case, it would rework the theme, create a new theme, find a home for those extracts that do not currently work in an already-existing theme, or discard them from the analysis.

All informants who were among teachers hold at least a degree certification and are between the ages of 35 and 40. Teachers were asked how they see improvising the existing playground could help special students develop their cognitive (learning) and social skills as teachers who have been closely engaged with the special education practice. The overall results are displayed in Table 2. The most important theme is discussed in the text and supported with relevant codes.

Table 2. Theme and codes for an inclusive playground.

Codes	Theme
Modified due to their needs based on their physical difficulties	Safe and customized
Flexible approach	
Decrease the danger	

The results indicate that the playground equipment needs to be modified to accommodate the needs of the ASDs. Additionally, incorporating innovative and safer features should improve the current playground. As stated by one of the teachers,

"Playground equipment should be modified due to their needs based on their physical difficulties. The existing playground is also should improvise in terms of innovation and add more safety features to make it easy and safe to make it a medium to develop their cognitive value and social skills."

This will create a better environment for developing cognitive and social skills, especially for students with slower learning capabilities. The proposed modifications aim to reduce the risk of injuries for all playground students. To cater to the diverse requirements of exceptional students, the playground equipment should be designed flexibly.

More specifically, the informant mentioned;

"The playground equipment should be designed flexibly to suit the special students' various needs."

Safety concerns are one of the reasons why the teacher could not allow her students to play on the playground during the teaching session. She worries about the student's limited ability to use the playground equipment safely and appropriately.

The informant's view stated that

"Develop the innovation in playground equipment to decrease the danger for the student while playing in the playground".

5 DISCUSSION AND PROPOSED CONCEPTUAL MODEL

An extensive and detailed literature has emerged identifying a valuable contribution to the understanding of how children with ASD can perform through the use of a playground. In recent years, there have been many playgrounds that have been designed for them. Most ASD-friendly playgrounds commonly focus on the physical autism spectrum disorder, namely regarding peer engagement (Kretzmann et al., 2015; Yuill et al., 2007) and physical activity (Ledford et al., 2016). A study was carried out by Yuill, Strieth, Roake, Aspden, and Todd (2007) to compare the old and new playgrounds and how ASD children could interact through social play. The playgrounds differed in design, spatial density, and potential play partners' identities. As predicted, the frequency of group plays and overall social initiations increased substantially in the new setting.

Playgrounds that offer appropriate levels of physical challenge, support for structured and imaginative play, and opportunities for solitary observation can facilitate interactions among children with Autism Spectrum Disorder (ASD) and their peers. Allowing children with autism to incorporate their ritualistic behaviours into play themes can enhance social interaction during play (Baker, 2000). Participating in rituals helps sustain their motivation and background knowledge, enabling them to engage with their playmates.

Children with ASD often exhibit more basic interactive behaviours, such as staying near others, imitating their peers' social actions, engaging in functional behaviours like giving and requesting information, and sometimes observing or playing alone. They may find initiating peer interactions more challenging than responding to them, and their responses might differ from typical social interactions (Bauminger-Zviely et al., 2014; Scheeren et al., 2020).

Regarding group activities, children with ASD tend to perform better in short, individual physical activities rather than in group settings. They may benefit from clear visual boundaries and continuous prompts to complete tasks, and they often display fewer undesirable behaviours when following an expected schedule or routine (Menear et al., 2006). These considerations can be important when designing inclusive playgrounds and play environments for children with ASD, considering their unique social and sensory needs.

The school playground presents an opportunity for social inclusion, but children with Autism Spectrum Disorder (ASD) often struggle with appropriate social interactions in this unstructured setting. Various studies have investigated interventions to improve peer interaction in free play for children with ASD. For example, the FRIEND Playground Program, a play-based intervention, has increased social engagement and initiations among children with ASD and social challenges. Moving classroom interventions to the playground can enhance social development and generalise education and training to a new setting. However, cognitive and personalised learning for children with ASD are not widely considered in most facilities. Playgrounds are underutilised for fostering the social development of children with disabilities, and teacher-mediated interventions may be necessary to promote inclusive interactions with typically developing peers.

In Malaysia, facilitating a suitable physical environment for children with ASD can be challenging due to weather conditions. Nonetheless, there is a lack of attention to the correlation between academic development and playground design. Evaluating the potential of playground design to foster cognitive skills in children with ASD remains limited. A cognitive development model for playground equipment design can be valuable for children with ASD. Hypothetically, a new playground design could encourage group interaction and cognitive development compared to the old design. The design process should involve reviewing relevant literature, identifying the specific needs of children with autism, aligning with the school's physical education goals, collaborating with a playground designer, and seeking feedback from school personnel. While budget constraints may limit extensive redesigning, teacher-mediated interventions can still play a significant role in the playground's development. (Nabors et al., 2001).

Overall, there is a need for more comprehensive discussions on supporting personalised learning experiences in the playground and investigating the playground's potential impact on cognitive development in children with ASD. Implementing thoughtful and inclusive playground designs and teacher-mediated interventions can promote positive outcomes for these children.

The findings derived from the interviews mention the need to create a safer and more customised approach while using an inclusive playground. The teachers mentioned that the approach must decrease the danger while being flexible based on their needs and limitations. Based on the findings and discussions presented, the researchers recommend a comprehensive model for teaching and learning for children with Autism Spectrum Disorder (ASD). This model aims to address the unique needs and challenges faced by children with ASD in educational settings, particularly in the context of playgrounds. The proposed model incorporates play-based interventions, teacher-mediated support, and inclusive playground design to promote social interaction, cognitive development, and personalised learning experiences for children with ASD.

Play-Based Interventions: Implement structured play-based interventions, such as The FRIEND Playground Program, designed to improve social interactions during recess for children with ASD and other challenges. These interventions should focus on incorporating the children's ritualistic behaviours into play themes, sustaining their motivation, and enhancing their background knowledge to facilitate peer interactions.

Teacher-Mediated Support: Teachers and their assistants should actively facilitate inclusive interactions for children with special needs on the playground. Interventions can be designed to support cooperative play between children with ASD and typically developing peers. Holding teacher workshops or in-services to provide guidance and brainstorm ideas on incorporating lesson plans onto the playground can help overcome potential resistance.

Inclusive Playground Design: Design playgrounds with adequate levels of physical challenge and assistance for both structured and imaginative play, as well as spaces for solitary observation. Consider adapting play equipment to make it safer and more accessible for children with ASD, providing visual supports, and offering structured play activities that suit their abilities and interests.

Cognitive Development Focus: The model should emphasise cognitive development as a crucial aspect of playground design and interventions for children with ASD. Addressing their cognitive needs through play and personalised learning experiences can improve academic and social outcomes.

Research and Evaluation: Continuously assess the model's effectiveness through research and evaluation. Investigate the impact of different interventions and playground designs on social play and cognitive development in children with ASD. This ongoing evaluation will help refine the model and inform future improvements.

By adopting this recommended model, educational institutions and stakeholders can create a supportive and enriching environment for children with ASD. The model aims to enhance their social interactions, promote cognitive development, and provide personalised learning experiences that cater to their unique strengths and challenges. With collaborative efforts and a focus on inclusion, the proposed model can contribute to the holistic development and well-being of children with ASD in educational settings, as shown in Figure 1.

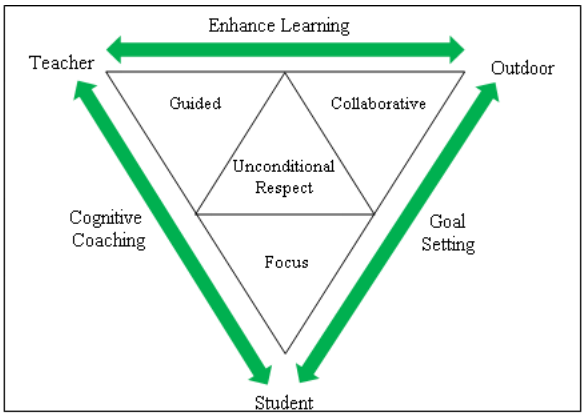

Figure 1. A cognitive development model for playground equipment design for children with ASD.

This recommended model emphasises the significant roles played by teachers and the outdoor environment, particularly the playground, in enhancing the learning process. Teachers will guide slow learner students, helping them focus and set lesson goals using playground equipment. Additionally, teachers will supervise and encourage collaboration among slow learners and their peers to achieve these targeted lesson goals.

The teacher's guidance will be implemented through cognitive coaching methods. At the same time, the playground equipment will serve as a valuable tool to expand the student's learning experiences and foster the development of their cognitive, physical, and social skills. As a result, this approach will indirectly contribute to the professional growth of teachers by promoting reflective practice and guiding slow learners towards self-directed learning.

6 IMPLICATIONS

This literature review provides a comprehensive examination of the utilisation of playgrounds among children with ASD. It highlights several promising research studies on play-based interventions to support the social interaction of children with ASD in educational contexts. This area is still in its early stages of exploration. The findings offer valuable insights for future research in this field.

There are several implications for future research. Firstly, while all the studies were conducted in educational settings, future practice-based research could benefit from investigating play-based interventions as an integral part of classroom practices rather than focusing solely on isolated educational settings (Bellini et al., 2007; Hansen et al., 2017; Jung & Sainato, 2013; Kent et al., 2020). Secondly, despite the growing importance of playgrounds in enhancing children's social engagement and physical skills, it is surprising that research is scarce regarding the use of playgrounds to enhance children's cognitive skills and support personalised learning experiences. Further exploration in this area could be highly beneficial.

7 CONCLUSION

There has been a growing trend of research about the quality of the physical environment for children with ASD. Recent investigations have increased learners' opportunities to engage in hands-on learning through playgrounds; however, it continues to be challenging to tailor learners' learning to facilitate individual differences in learners' ASD. We proposed a cognitive development model for playground equipment design for these children. Hence, it is a method and means to improve cognitive skills while retaining the principles of academic value. The main takeaway is that the playground can be utilised effectively by examining and designing the appropriate sequence and combination of learning processes and activities guided by the proposed conceptual framework. The theoretical framework offers valuable insights into establishing a practical approach to special education using the playground as a supportive learning environment. By aligning instructional methods with the framework, educators can create meaningful and compelling learning experiences for children with special needs, fostering their cognitive, physical, and social development inclusively and engagingly.

Transferring classroom interventions to the playground can significantly enhance the use of playgrounds to promote the social development of children with special needs and facilitate the generalisation of education and training to new environments. By relocating classroom centres, toys, and materials to the playground, the number of interventions aimed at improving the social skills of children with special needs on the playground can be increased (Nabors et al., 2001).

Our research has revealed abundant literature on social interaction and the role of play as a tool for social development in children, including the significance of playgrounds in their overall development. However, these studies do not consistently align with one another, particularly when considering cognitive development, especially in children with Autism Spectrum Disorder (ASD). As a result, cognitive development and personalised learning for children with ASD are not given

sufficient consideration in most facilities, whether in primary/secondary schools or recreational parks. There is a need for a more comprehensive integration of cognitive development approaches and personalised learning strategies for children with ASD in these environments to ensure their holistic growth and well-being.

ACKNOWLEDGMENTS

The authors thank the Ministry of Higher Education for providing financial support under Fundamental Research Grant Scheme (FRGS) No. FRGS/1/2021/SSI0/UMP/02/1 (University reference RDU210132).

REFERENCES

American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders.

Bakar, N. A., Ali, Z., Saputra, J., Jusoh, Z., Alsmadi, M. S., & Solahudin, M. H. (2022). Improvement of Teaching Effectiveness for Autism Children. *International Journal of Advances in Social Sciences and Humanities, 1*(4), 179-186. https://doi.org/10.56225/ijassh.v1i4.94

Beadle-Brown, J., Wilkinson, D., Richardson, L., Shaughnessy, N., Trimingham, M., Leigh, J., Whelton, B., & Himmerich, J. (2018). Imagining Autism: Feasibility of a drama-based intervention on the social, communicative and imaginative behaviour of children with autism. *Autism, 22*(8), 915–927. https://doi.org/10.1177/1362361317710797

Bellini, S., Peters, J. K., Benner, L., & Hopf, A. (2007). A Meta-Analysis of School-Based Social Skills Interventions for Children With Autism Spectrum Disorders. *Remedial and Special Education, 28*(3), 153-162. https://doi.org/10.1177/07419325070280030401

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36*(2), 129–148. https://doi.org/10.1037/0003-066X.36.2.129

Brett, A., Moore, R. C., & Provenzo Jr, E. F. (1993). *The complete playground book*. Syracuse University Press.

Buijsman, R., Begeer, S., & Scheeren, A. M. (2023). 'Autistic person' or 'person with autism'? Person-first language preference in Dutch adults with autism and parents. *Autism, 27*(3), 788-795. https://doi.org/10.1177/13623613221117914

Bundy, A. C., Luckett, T., Naughton, G. A., Tranter, P. J., Wyver, S. R., Ragen, J., Singleton, E., & Spies, G. (2008). Playful interaction: occupational therapy for all children on the school playground. *The American Journal of Occupational Therapy, 62*(5), 522–527. https://doi.org/10.5014/ajot.62.5.522

Coelho, L., Torres, N., Fernandes, C., & Santos, A. J. (2017, 2017/11/02). Quality of play, social acceptance and reciprocal friendship in preschool children. *European Early Childhood Education Research Journal, 25*(6), 812-823. https://doi.org/10.1080/1350293X.2017.1380879

Didehbani, N., Allen, T., Kandalaft, M., Krawczyk, D., & Chapman, S. (2016, 2016/09/01/). Virtual Reality Social Cognition Training for children with high functioning autism. *Computers in Human Behavior, 62*, 703-711. https://doi.org/https://doi.org/10.1016/j.chb.2016.04.033

Fracchiolla, M., Terzi, M., D'Amico, F. S., Tedone, L., & Cazzato, E. (2017). Conservation and pastoral value of former arable lands in the agro-pastoral system of the Alta Murgia National Park (Southern Italy). *Italian Journal of Agronomy, 12*(2). https://doi.org/0.4081/ija.2017.847

Frost, J. L. (1978, 1978/02/01). The American Playground Movement. *Childhood Education, 54*(4), 176-182. https://doi.org/10.1080/00094056.1978.10729698

Frost, J. L., Brown, P.-S., Sutterby, J. A., & Thornton, C. D. (2004). The developmental benefits of playgrounds. *Childhood Education, 81*(1), 42.

Hartle, L., & Johnson, J. E. (1993). Historical and contemporary influences of outdoor play environments. In *Children on Playgrounds: Research perspectives and applications.* (pp. 14–42). State University of New York Press. https://doi.org/98114-001

Hestenes, L. L., & Carroll, D. E. (2000, 2000/01/01/). The play interactions of young children with and without disabilities: Individual and environmental influences. *Early Childhood Research Quarterly, 15*(2), 229-246. https://doi.org/https://doi.org/10.1016/S0885-2006(00)00052-1

Hudson, S. D., Thompson, D., & Mack, M. G. (1997, 1997/10/01). Are we Safe Yet? A Twenty-five-Year Look at Playground Safety. *Journal of Physical Education, Recreation & Dance, 68*(8), 32–34. https://doi.org/10.1080/07303084.1997.10605002

Hume, K., Steinbrenner, J. R., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yücesoy-Özkan, S., & Savage, M. N. (2021, 2021/11/01). Evidence-Based Practices for Children, Youth, and Young Adults with Autism: Third Generation Review. *Journal of Autism and Developmental Disorders, 51*(11), 4013-4032. https://doi.org/10.1007/s10803-020-04844-2

Kent, C., Cordier, R., Joosten, A., Wilkes-Gillan, S., Bundy, A., & Speyer, R. (2020, 2020/03/01). A Systematic Review and Meta-analysis of Interventions to Improve Play Skills in Children with Autism Spectrum Disorder. *Review Journal of Autism and Developmental Disorders, 7*(1), 91-118. https://doi.org/10.1007/s40489-019-00181-y

Kern, P., & Aldridge, D. (2006). Using Embedded Music Therapy Interventions to Support Outdoor Play of Young Children with Autism in an Inclusive Community-Based Child Care Program. *Journal of Music Therapy, 43*(4), 270–294. https://doi.org/10.1093/jmt/43.4.270

Krakowiak, P., Goines, P. E., Tancredi, D. J., Ashwood, P., Hansen, R. L., Hertz-Picciotto, I., & Van de Water, J. (2017, 2017/03/01/). Neonatal Cytokine Profiles Associated With Autism Spectrum Disorder. *Biological Psychiatry, 81*(5), 442–451. https://doi.org/https://doi.org/10.1016/j.biopsych.2015.08.007

Kretzmann, M., Shih, W., & Kasari, C. (2015, 2015/01/01/). Improving Peer Engagement of Children With Autism on the School Playground: A Randomized Controlled Trial. *Behavior Therapy, 46*(1), 20-28. https://doi.org/https://doi.org/10.1016/j.beth.2014.03.006

Lawton, K., & Kasari, C. (2012). Teacher-implemented joint attention intervention: pilot randomized controlled study for preschoolers with autism. *Journal of consulting and clinical psychology, 80*(4), 687. https://doi.org/10.1037/a0028506

Ledford, J. R., Hall, E., Conder, E., & Lane, J. D. (2016). Research for Young Children With Autism Spectrum Disorders:Evidence of Social and Ecological Validity. *Topics in Early Childhood Special Education, 35*(4), 223–233. https://doi.org/10.1177/0271121415585956

Lieberman, L. J., & Houston-Wilson, C. (2009). *Strategies for inclusion: A handbook for physical educators*. Human Kinetics.

Lynch, H., Moore, A., Edwards, C., & Horgan, L. (2019, 2020/02/01). Advancing play participation for all: The challenge of addressing play diversity and inclusion in community parks and playgrounds. *British Journal of Occupational Therapy, 83*(2), 107–117. https://doi.org/10.1177/0308022619881936

Malinverni, L., Mora-Guiard, J., Padillo, V., Valero, L., Hervás, A., & Pares, N. (2017, 2017/06/01/). An inclusive design approach for developing video games for children with Autism Spectrum Disorder. *Computers in Human Behavior, 71*, 535-549. https://doi.org/https://doi.org/10.1016/j.chb.2016.01.018

Menear, K. S., & Neumeier, W. H. (2015, 2015/03/24). Promoting Physical Activity for Students with Autism Spectrum Disorder: Barriers, Benefits, and Strategies for Success. *Journal of Physical Education, Recreation & Dance, 86*(3), 43-48. https://doi.org/10.1080/07303084.2014.998395

Miller, L. J., Schoen, S. A., Camarata, S. M., McConkey, J., Kanics, I. M., Valdez, A., & Hampton, S. (2017, 2017/07/03). Play in natural environments: A pilot study quantifying the behavior of children on playground equipment. *Journal of Occupational Therapy, Schools, & Early Intervention, 10*(3), 213–231. https://doi.org/10.1080/19411243.2017.1325818

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Physical Therapy, 89*(9), 873-880. https://doi.org/10.1371/journal.pmed.1000097

Nabors, L., Willoughby, J., Leff, S., & McMenamin, S. (2001, 2001/06/01). Promoting Inclusion for Young Children With Special Needs on Playgrounds. *Journal of Developmental and Physical Disabilities, 13*(2), 170–190. https://doi.org/10.1023/A:1016665409366

Nicolopoulou, A. (1993). Play, cognitive development, and the social world: Piaget, Vygotsky, and beyond. *Human Development, 36*(1), 1–23. https://doi.org/10.1159/000277285

O'Connor, D., & Reid, A. (2016). *Ancient Egypt in Africa*. Routledge. https://doi.org/10.4324/9781315435015

Paykoç, E., Ballice, G., & Güler, G. (2021). Evaluation of Coast Universal After of Izmir Design: Playgrounds Deniz Izmir, in Terms Karsıyaka Project. *Game+ Design Education: Proceedings of PUDCAD 2020, 13*, 35. https://doi.org/10.1007/978-3-030-65060-5_3

Perry, M. A., Devan, H., Fitzgerald, H., Han, K., Liu, L.-T., & Rouse, J. (2018, 2018/04/01/). Accessibility and usability of parks and playgrounds. *Disability and Health Journal, 11*(2), 221–229. https://doi.org/10.1016/j.dhjo.2017.08.011

Porayska-Pomsta, K., Alcorn, A. M., Avramides, K., Beale, S., Bernardini, S., Foster, M. E., Frauenberger, C., Good, J., Guldberg, K., & Keay-Bright, W. (2018). Blending human and artificial intelligence to support autistic children's social communication skills. *ACM Transactions on Computer-Human Interaction (TOCHI), 25*(6), 1-35. https://doi.org/10.1145/3271484

Santillan, L., Frederick, L., Gilmore, S., & Locke, J. (2019). Brief Report: Examining the Association Between Classroom Social Network Inclusion and Playground Peer Engagement Among Children With Autism Spectrum Disorders. *Focus on Autism and Other Developmental Disabilities, 34*(2), 91–96. https://doi.org/10.1177/1088357619838275

Soltani, S. H. K., Abbas, M. Y., & Awang, M. B. (2012, 2012/01/01/). Disabled Children in Public Playgrounds: A Pilot Study. *Procedia - Social and Behavioral Sciences, 36*, 670-676. https://doi.org/https://doi.org/10.1016/j.sbspro.2012.03.073

Sterman, J., Villeneuve, M., Spencer, G., Wyver, S., Beetham, K. S., Naughton, G., Tranter, P., Ragen, J., & Bundy, A. (2020). Creating play opportunities on the school playground: Educator experiences of the Sydney playground project. *Australian Occupational Therapy Journal, 67*(1), 62–73. https://doi.org/10.1111/1440-1630.12624

Taylor, L. G., Vanderloo, L. M., Arbour-Nicitopoulos, K. P., Leo, J., Gilliland, J., & Tucker, P. (2022). Playground inclusivity for children with a disability: protocol for a scoping review. *JMIR Research Protocols, 11*(7), e37312. https://doi.org/10.2196/37312

van Engelen, L., Ebbers, M., Boonzaaijer, M., Bolster, E. A. M., van der Put, E. A. H., & Bloemen, M. A. T. (2021, 2021/08/28). Barriers, facilitators and solutions for active, inclusive play for children with a physical disability in the Netherlands: a qualitative study. *BMC Pediatrics, 21*(1), 369. https://doi.org/10.1186/s12887-021-02827-5

Vincent, P., & Schunn, C. D. (2018, 2018/11/30). The nature of science identity and its role as the driver of student choices. *International Journal of STEM Education, 5*(1), 48. https://doi.org/10.1186/s40594-018-0140-5

Wenger, I., Prellwitz, M., Lundström, U., Lynch, H., & Schulze, C. (2023, 2023/05/04). Designing inclusive playgrounds in Switzerland: Why is it so complex? *Children's Geographies, 21*(3), 487-501. https://doi.org/10.1080/14733285.2022.2077093

Wenger, I., Schulze, C., Lundström, U., & Prellwitz, M. (2021, 2021/02/17). Children's perceptions of playing on inclusive playgrounds: A qualitative study. *Scandinavian Journal of Occupational Therapy, 28*(2), 136-146. https://doi.org/10.1080/11038128.2020.1810768

Wolfberg, P. J. (2015). *Play and imagination in children with autism*. Teachers College Press.

Wright, B. M., & Benigno, J. P. (2019). Autism spectrum disorder and sibling relationships: Exploring implications for intervention using a family systems framework. *American Journal of Speech-Language Pathology, 28*(2), 759–767. https://doi.org/10.1044/2018AJSLP-18-0088

Yildirim, Y., Keshavarzi, G., & Aman, A. R. (2022, 2022/12/01). Does play-based experience provide for inclusiveness? A case study of multi-dimensional indicators. *Child Indicators Research, 15*(6), 2197-2214. https://doi.org/10.1007/s12187-022-09951-3

Yuill, N., Strieth, S., Roake, C., Aspden, R., & Todd, B. (2007, 2007/07/01). Brief Report: Designing a Playground for Children with Autistic Spectrum Disorders—Effects on Playful Peer Interactions. *Journal of Autism and Developmental Disorders, 37*(6), 1192-1196. https://doi.org/10.1007/s10803-006-0241-8

Zhukova, T. E., Krasilnikova, O. P., Podchernina, M. I., Zhukov, P. V., & Neyman, D. V. (2021, 2021//). Playground Arrangement for Children with Special Health Needs. *Advanced Technologies for Sustainable Development of Urban Green Infrastructure*, 209-217. https://doi.org/10.1007/978-3-030-75285-9_20