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Abstract

This study investigated possible changes in social play and initiations in eight boys (5 to 7-years-old) with autistic spectrum disorders (ASD) who were moving from an old to a new school playground that was designed specifically to enhance playful peer interaction. Each boy was observed for half an hour over three occasions in the old, then the new setting. The playgrounds differed in design, spatial density and identity of potential play partners. As hypothesised, frequency of group play and overall social initiations increased significantly in the new setting. We discuss how playgrounds with appropriate levels of physical challenge and support for both structured, imaginative play and solitary observation may support peer interactions in children with ASD.

Keywords

Autism - Play - Peer-interaction - Playground design

Footnote Information

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BRIEF REPORT

Brief Report: Designing a Playground for Children with Autistic Spectrum Disorders—Effects on Playful Peer Interactions

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Abstract This study investigated possible changes in social play and initiations in eight boys (5 to 7-years-old) with autistic spectrum disorders (ASD) who were moving from an old to a new school playground that was designed specifically to enhance playful peer interaction. Each boy was observed for half an hour over three occasions in the old, then the new setting. The playgrounds differed in design, spatial density and identity of potential play partners. As hypothesised, frequency of group play and overall social initiations increased significantly in the new setting. We discuss how playgrounds with appropriate levels of physical challenge and support for both structured, imaginative play and solitary observation may support peer interactions in children with ASD.

Keywords Autism · Play · Peer-interaction · Playground design

Introduction

The playground is an important context for social development and can facilitate social play and peer interaction of many types (Rogers, 2000). In turn, opportunities for playful peer interaction can foster the development of social cognitive skills, peer acceptance, and the many social and intellectual benefits associated with acceptance. It is not surprising, then, that playground time is valued in education as a means of fostering social interaction.

Children with autism spectrum disorders (ASD) rarely interact with others in free play situations (Hauck, Fine, Waterhouse, & Feinstein, 1995). For example, Lord and Magill-Evans (1995) found that children with autism showed fewer peer interactions than children with behavioural disorders and typically-developing children, and made fewer social initiations than the other groups. Many studies have therefore investigated the power of different interventions to facilitate or increase peer interaction in free play in children with ASD (McConnell, 2002; Rogers, 2000). These studies have usually assessed the influence of different play partners or structured training on social play, but there appear to be no published studies assessing the potential of playground design to foster playful peer interaction in children with autism.

Physical setting and equipment show clear effects on playful interactions in typically developing children (Barbour, 1999). Susa and Benedict (1994) found that typical children showed more creative play in a contemporary playground design, with linked sets of equipment, than in a traditional playground setting, with discrete, linearly-placed equipment. However, such results cannot be generalised to children with ASD, since they play in distinct ways. Equipment designed to foster creative play in typical children may not be sufficient to support such play in autism. For example, Lewis and Boucher (1995) showed that a toy car was sufficient stimulus for generating original actions by typical children, but did not do so for

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children with autism. Furthermore, there is little investigation of how playground design might foster particular sorts of interaction in ASD.

In the current study, the opportunity to design a new playground for a group of children with ASD enabled us to assess the impact of the physical environment on their playful interaction with peers, using quantitative measures to assess whether differences occurred, and qualitative analysis to investigate possible reasons for any differences between the old and new playgrounds. We hypothesised that the different design of the new playground would facilitate group interaction and social initiations, and reduce solitary play, as compared to the old playground.

Method

Participants

All children attended an ASD unit providing daily education for 12 5- to 11-year-old children within a special school in West Sussex, UK. All had been diagnosed using DSM-IV (APA, 1994) criteria. Some children with ASD are included in UK mainstream schools, but the children here were considered to need specialist schooling because of their level of special need. Four of the 12 children were excluded because they were not present in both settings. The remaining eight boys were aged 5;7 to 7;4, with a mean age of 6;0 years.

Design of the Playgrounds

Old Playground

This had a central climbing/sliding structure and portable play equipment that changed daily. The ASD group shared it with a group of about 16 other children from the school, most of whom had speech and language disorders (SLD). The two groups were taught in separate classrooms and the two classes tended not to mix in the playground.

New Playground

The unit teacher designed this with two aims: to increase individual children's motivation to use the equipment, and to foster interaction between children. Four factors, below, were identified and we note why the feature was important, how it was instantiated and how it contrasted with the old playground.

1. *Appropriate level of physical challenge*. To engage the children in object-oriented physical activity, rather than solitary or self-directed activity, activities had to be suitable to the physical skills of the children in the class. A slide, climbing wall and towers were designed to be just difficult enough for the children to tackle with effort. The old equipment was well within all the children's capabilities.

2. *Support for imaginative play*. Props to support this were kept simple and stable, because the children responded well to routine. Props were linked to themes the children enjoyed, notably trains. A circular 'railway' track with 'road' crossing points was designed to foster pretend play and to give children an opportunity for repetitive play on motivating themes. The old playground did not have such features, and toys provided there were changed daily. The ASD group generally did not play with them, perhaps because they did not have the time to develop play routines.

3. *Structured movement*. The environment can structure play by many means, such as proximity or salience of equipment and social invitations from others. The teacher believed that this group of children required clear structuring for their movements through the play activities. The new playground therefore had a layout that afforded a clear circuit. For example, the track was a self-contained circuit, and the slide curved to send the user to the start of the next activity. In contrast, the old playground had a more linear design.

4. *Observation points*. The children with ASD appeared to find it difficult to approach peers, and seemed to obtain comfort from periods free from the need to interact. A high lookout tower was designed to allow a single child to stand and observe the whole play area without needing to interact, and a board with a hole at head height afforded children the opportunity to watch others playing.

Other differences in the new playground were mainly consequences of circumstances: tarmac safety surface instead of wood chippings, increased spatial density with 6.9 m^2 per child rather than 16.5 m^2 and a slightly higher overall adult–child ratio of 1:4 rather than 1:5, although the ratio of adult to child with ASD was the same as it had been before. Also, the group no longer had to share with the SLD group.

Procedure

With parental permission, the children were videotaped for the first 10 min of three 45-min lunch breaks, in their old playground (November to December) and for the same time in their new playground (January to February). The camera was in a fixed position from

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which most of the playground could be seen. Any point at which a child could not be seen was coded as missing data. Two types of coding were made: play and social initiation, with two raters trained together, one blind to the hypotheses.

Play Categories

The tapes were divided into 15-s intervals to code the number of intervals at the end of which children showed one of four mutually exclusive types of play, adapted from Parten (1932). We added the category of 'adult play' because its occurrence was quite distinctive from other forms of play, with adults providing much more scaffolding of play activity than peers. Random double coding of 25% of the data gave kappa over .94 for each category.

Play categories were (1) solitary play—no companion in group or parallel play, (2) parallel play—close to one or more others engaged in similar behaviours, companions do not interact with the focal child and their presence does not appear to affect the focal child's behaviour, (3) group play—interacts substantially with one or more other children, visually, through conversation or in the organisation of a game and (4) adult play—in parallel or group activity with an adult.

Initiations

An initiation was defined as "the child beginning a new social sequence, distinguished from a continuation of a previous sequence by a change in partner, a change in activity, or a discontinuation of a previous sequence for at least 5 s" (Hauck et al., 1995, p. 585). Each initiation was coded into one of six categories, adapted from Jenkinson and Hall (1999), with random double coding of 25% of the data giving kappa over .82.

Initiation categories were (1) play—initiate play with other child, (2) positive/neutral contact—hug, pat or tap other child, (3) negative contact/aggressive—push, hit or provocative action e.g. take a toy, (4) talk/look—vocal or visual contact, (5) seek attention from non-attending child verbally (e.g. shout) or non-verbally (e.g. gesture) and (6) adult—any initiation involving an adult.

Results

Play Behaviours

Scores for play behaviours are expressed as the mean number of sample points as a proportion of the total number of sample points across all children. The proportions of each category of play in the old and new playgrounds are shown in Fig. 1.

Wilcoxon's matched-pairs test showed there was a significant decrease from old to new setting in solitary play, $z = 2.10$, $P < .05$ and an increase in group play, $z = 2.21$, $P < .05$. The increase in parallel play was not significant, $z = 1.54$, $P = .12$ and there was no change in adult play, $z = .54$. Solitary play was the most common activity in the old playground and group play was, by a small margin, the most common in the new playground.

We also looked at change over sessions within each playground, to see whether the effects could be attributed to a gradual increase over time in more peer-oriented play. Only one of the eight boys showed an increase in group play over the three observation periods in the old playground. Four children showed an increase in group play from the last session in the old playground to the first in the new playground and two of these boys, plus another two, also showed increases in group play across the three sessions in the new playground.

Social Initiation

The initiations of each type were expressed as a proportion of the total number of initiations over children, expressed as a mean per session. The proportional frequency of each initiation type in the old and new playgrounds is shown in Fig. 2. We compared the mean proportion of initiations of each type in old and new settings using Wilcoxon's signed ranks test, one-tailed in line with our predictions of increases in initiations. The increases were significant for neutral/affectionate contact, $z = 2.20$, $P < .01$, negative initiations, $z = 1.75$, $P < .04$, talking/looking, $z = 1.86$, $P < .03$, attention-seeking, $z = 1.75$, $P < .04$, and for interactions involving an adult, $z = 2.52$, $P < .01$. The difference was not significant for play initiations, $z = 1.17$,

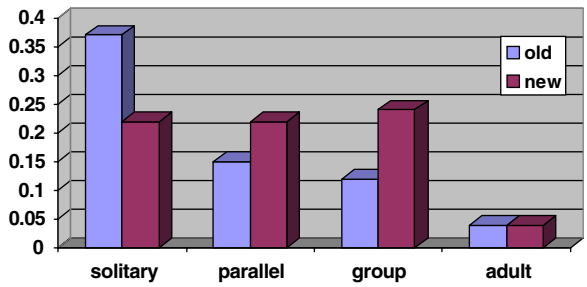

Fig. 1 Mean proportion of sample points showing each category of play in old and new playgrounds

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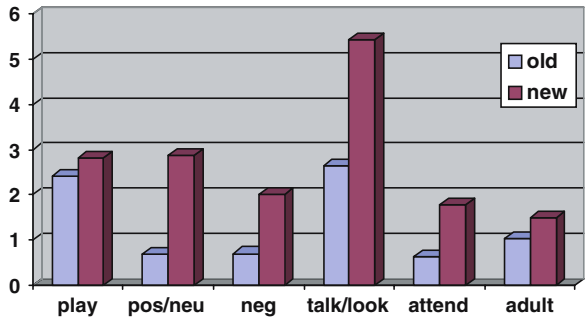

Fig. 2 Mean frequency of each initiation type per session in each playground

n.s. In both locations, talking/looking was the most common form of initiation.

Observations

Since children increased their group play and initiations in the new playground, we present a summary description of how children's behaviour in the new playground seemed to be stimulated by specific design features.

Level of Physical Challenge

Children made comparisons of their success over time and comparisons with other children, apparently taking account of others' behaviours.

Support for Imaginative Play

The track was used for repetitive, apparently imaginative play, e.g. running round with arms out, making car or train noises. Other items featured in imaginative games that developed over time, for example a game that began with repeated cycles of the key worker ('monster') advancing on a child, who ran away, and was extended by evolving variations of children 'singing the monster to sleep', 'regenerating' it, or 'chopping its hands', with one child finally taking the role of monster. The track also engendered initiations, often through conflict, as it became crowded with children behaving as 'trains' in parallel.

Structured Movement

Children completed circuits and smiled at the end, suggesting that the layout helped them to structure their play. Several features also structured their imaginative play, as described above. A safety rule of counting while descending the slide led to some older children regulating their own behaviour by counting for themselves, and also regulating others, by counting for them.

Discussion

Group play and social initiations in the ASD children were higher in the new than in the old playground, and examples of social and imaginative play were observed in the new setting. This lends some support to the idea that the playground design fostered playful peer interaction. Despite the lack of an experimental design, it seems unlikely that the children would have shown the level of change here if they had stayed in the old playground: only one of the eight boys showed any increase in group play over the three observation periods in the old playground. Four children showed an increase on the first session in the new area and four also showed increases in group play across the three sessions there. Qualitative observation suggests that the layout of the new playground was important in providing sufficient structure to guide children's activities together with an appropriate level of challenge and props to foster group and imaginative play.

Since the study was opportunistic and lacked a control condition, changes could have been due to other factors. Perhaps children would increase their social behaviour with increasing age and peer experience at their school. This is unlikely given that increases in social play were shown over a relatively short period and across successive sessions in the new playground, with no such pattern in sessions in the old playground. Another possibility is that mere novelty of the setting stimulated new play patterns and interactions in children and teachers. However, qualitative analysis suggests that the new play patterns were structured by features of the playground design, and teachers reported that the patterns continued over time.

The greater spatial density of the new playground might have brought children into closer contact and hence increased interaction. In studies with typically-developing children (e.g. Frost, Shin, & Jacobs, 1997) there is usually more interactive play as density increases. However, increased density was associated with increased withdrawal in an ASD group (Hutt & Vaizey, 1966), compared with typical and brain-damaged children, so spatial density is unlikely to explain the present data.

A further possible explanation of our findings is that in the new playground, the children with ASD were no longer with children with SLD. Research on the

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influence of different play partners on children with autism shows that integration with typically developing older or younger peers seems to lead to greater social interaction in children with autism (see McConnell, 2002, for a systematic review). It seems unlikely then that the mere presence of children from the infant department suppressed social interaction in the old playground in the current study. However, it is worth noting that features of the old playground were designed with the infant department children in mind. In particular, different play materials were made available each day. This may have been disruptive for the children with ASD: Olley (1987) suggested that unpredictability may produce disruption and an increase in repetitive ritualistic behaviours in children with ASD. In contrast, the track in the new playground became a focus for repetitive behaviour (running or walking round the track), but this was incorporated into group play involving gross motor activity. Baker (2000) found that allowing children with autism to incorporate their own ritualistic behaviour into a play theme increased social interaction in play. She suggests that this is because engagement in rituals sustains the children's motivation and background knowledge, helping them to engage with playmates

There were differences between the children in the extent to which social interaction increased, and two children in particular showed less change than the others. The observations numbered only three for each location and took place over only two months. It would be interesting to see whether some children increase their social interaction at a more gradual pace. Further work is also needed on the longer-term consequences of changes in playground design. A further important question is whether different sorts of initiations bring different developmental consequences for children. Both neutral and negative initiations increased in the new playground. Perhaps conflicts could prompt social development by helping children to recognise and negotiate between different points of view, as suggested by the literature on the role of conflict in prompting cognitive development (e.g. Doise, 1990).

The data here lend some support to the hypothesis that changes in playground design could support playful peer interaction and social initiations in children with ASD. Many studies in this area have focused on teaching strategies (Rogers, 2000), but this study shows the potential value of the design of the physical environment in fostering peer interaction in such groups. Given that children with more severe forms of autism often have separate classrooms and play facilities, it is important to know what features of the play environment might influence the appearance of more social forms of play in such children. The study raises several new questions that should be addressed, given the potential benefits of appropriate playground design.

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References

American Psychological Association (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). (DSM-IV). Washington D.C.: APA.

Baker, M. J. (2000). Incorporating the thematic ritualistic behavior of children with autism into games: Increasing social play interactions with siblings. *Journal of Positive Behavior Interventions, 2*, 66–84.

Barbour, A. C. (1999). The impact of playground design on the play behaviors of children with differing levels of physical competence. *Early Childhood Research Quarterly, 14*, 75–98.

Doise, W. (1990). The development of individual competencies through social interaction. In H. Foot, M.Morgan, & R. Shute (Ed.), *Children Helping Children*. Chichester: John Wiley.

Frost, J. L., Shin, D., & Jacobs, P. (1997). Physical environments and children's play. In B. Spodek (Eds.). *Multiple perspectives on play in early childhood education*. New York: SUNY.

Hauck, M., Fein, D., Waterhouse, L., & Feinstein, C. (1995). Social initiations by autistic children to adults and other children. *Journal of Autism and Developmental Disorders, 25*, 579–595.

Hutt, C., & Vaizey, M. J. (1966). Differential effects of group density on social behavior. *Nature, 209*, 1371–1372.

Jenkinson, J., & Hall, L. (1999). Playground politics: Social interactions of children with disabilities in regular and special school playgrounds. *Research Information for Teachers, 1*, 1–4.

Lewis, V., & Boucher, J. (1995). Generativity in the play of young-people with autism. *Journal of Autism and Developmental Disorders, 25*, 105–121.

Lord, C., & Magill-Evans, J. (1995). Peer interactions of autistic children and adolescents. *Developmental Psychopathology, 7*, 611–626.

McConnell, S. R. (2002). Interventions to facilitate social interaction for young children with autism: Review of available research and recommendations for educational intervention and future research. *Journal of Autism and Developmental Disorders, 32*, 351–372.

Olley, J. G. (1987). Classroom structure and autism. In D. J. Cohen, & A. M. Donellan (Eds.), *Handbook of Autism and Pervasive Developmental Disorders*. New York: John Wiley.

Parten, B. (1932). Social participation among preschool children. *Journal of Abnormal and Social Psychology, 27*, 243–269.

Rogers, S. J. (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders, 30*, 399–409.

Susa, A. M., & Benedict, J. O. (1994). The effects of playground design on pretend play and divergent thinking. *Environment and Behavior, 26*, 560–57.

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