

# Metadata of the article that will be visualized in OnlineFirst

ArticleTitle	Brief Report: Designing a Playground for Children with Autistic Spectrum Disorders--Effects on Playful Peer Interactions	
Journal Name	Journal of Autism and Developmental Disorders	
Corresponding Author	Family Name	<b>Yuill</b>
	Particle	
	Given Name	<b>Nicola</b>
	Suffix	
	Organization	University of Sussex
	Division	Department of Psychology, Centre for Research in Cognitive Science
	Address	BN1 9QH, Brighton , UK
	Email	nicolay@sussex.ac.uk
Author	Family Name	<b>Strieth</b>
	Particle	
	Given Name	<b>Sara</b>
	Suffix	
	Organization	University of Sussex
	Division	Department of Psychology, Centre for Research in Cognitive Science
	Address	BN1 9QH, Brighton , UK
	Email	
Author	Family Name	<b>Roake</b>
	Particle	
	Given Name	<b>Caroline</b>
	Suffix	
	Organization	University of Sussex
	Division	Department of Psychology, Centre for Research in Cognitive Science
	Address	BN1 9QH, Brighton , UK
	Email	
Author	Family Name	<b>Aspden</b>
	Particle	
	Given Name	<b>Ruth</b>
	Suffix	
	Organization	St Anthony's School
	Division	
	Address	Chichester, UK
	Email	
Author	Family Name	<b>Todd</b>
	Particle	
	Given Name	<b>Brenda</b>
	Suffix	
	Organization	University of Sussex
	Division	Department of Psychology, Centre for Research in Cognitive Science
	Address	BN1 9QH, Brighton , UK

---

Email

---

Received

Schedule

Revised

Accepted

---

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

---

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

Nicola Yuill · Sara Strieth · Caroline Roake ·  
Ruth Aspden · Brenda Todd

© Springer Science+Business Media, LLC. 2006

**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

N. Yuill (✉) · S. Strieth · C. Roake · B. Todd  
Department of Psychology, Centre for Research in  
Cognitive Science, University of Sussex,  
Brighton BN1 9QH, UK  
e-mail: nicolay@sussex.ac.uk

R. Aspden  
St Anthony's School, Chichester, UK

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

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

## 73 Method

### 74 Participants

75 All children attended an ASD unit providing daily  
76 education for 12 5- to 11-year-old children within a  
77 special school in West Sussex, UK. All had been  
78 diagnosed using DSM-IV (APA, 1994) criteria. Some  
79 children with ASD are included in UK mainstream  
80 schools, but the children here were considered to need  
81 specialist schooling because of their level of special  
82 need. Four of the 12 children were excluded because  
83 they were not present in both settings. The remaining  
84 eight boys were aged 5;7 to 7;4, with a mean age of  
85 6;0 years.

### 86 Design of the Playgrounds

#### 87 *Old Playground*

88 This had a central climbing/sliding structure and por-  
89 table play equipment that changed daily. The ASD  
90 group shared it with a group of about 16 other children  
91 from the school, most of whom had speech and lan-  
92 guage disorders (SLD). The two groups were taught in  
93 separate classrooms and the two classes tended not to  
94 mix in the playground.

#### 95 *New Playground*

96 The unit teacher designed this with two aims: to  
97 increase individual children's motivation to use the  
98 equipment, and to foster interaction between chil-  
99 dren. Four factors, below, were identified and we  
100 note why the feature was important, how it was  
101 instantiated and how it contrasted with the old  
102 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 'rail-  
way' 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 pro-  
vided there were changed daily. The ASD group gen-  
erally 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 oth-  
ers. 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<sup>2</sup> per child rather than 16.5 m<sup>2</sup> 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 video-  
taped 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

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

159 Play Categories

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

169 Play categories were (1) solitary play—no compan-  
 170 ion in group or parallel play, (2) parallel play—close to  
 171 one or more others engaged in similar behaviours,  
 172 companions do not interact with the focal child and  
 173 their presence does not appear to affect the focal  
 174 child’s behaviour, (3) group play—interacts substan-  
 175 tially with one or more other children, visually, through  
 176 conversation or in the organisation of a game and (4)  
 177 adult play—in parallel or group activity with an adult.

178 Initiations

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

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

195 Results

196 Play Behaviours

197 Scores for play behaviours are expressed as the mean  
 198 number of sample points as a proportion of the total

number of sample points across all children. The pro- 199  
 portions of each category of play in the old and new 200  
 playgrounds are shown in Fig. 1. 201

202 Wilcoxon’s matched-pairs test showed there was a  
 significant decrease from old to new setting in solitary 203  
 play,  $z = 2.10, P < .05$  and an increase in group play, 204  
 $z = 2.21, P < .05$ . The increase in parallel play was not 205  
 significant,  $z = 1.54, P = .12$  and there was no change 206  
 in adult play,  $z = .54$ . Solitary play was the most 207  
 common activity in the old playground and group play 208  
 was, by a small margin, the most common in the new 209  
 playground. 210

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

222 Social Initiation

223 The initiations of each type were expressed as a pro-  
 224 portion of the total number of initiations over children,  
 225 expressed as a mean per session. The proportional  
 226 frequency of each initiation type in the old and new  
 227 playgrounds is shown in Fig. 2. We compared the mean  
 228 proportion of initiations of each type in old and new  
 229 settings using Wilcoxon’s signed ranks test, one-tailed  
 230 in line with our predictions of increases in initiations.  
 231 The increases were significant for neutral/affectionate  
 232 contact,  $z = 2.20, P < .01$ , negative initiations,  
 233  $z = 1.75, P < .04$ , talking/looking,  $z = 1.86, P < .03$ ,  
 234 attention-seeking,  $z = 1.75, P < .04$ , and for interac-  
 235 tions involving an adult,  $z = 2.52, P < .01$ . The dif-  
 236 ference was not significant for play initiations,  $z = 1.17,$

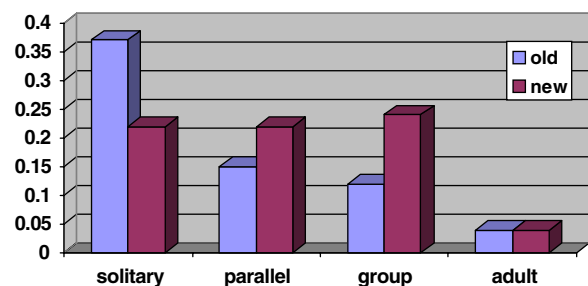
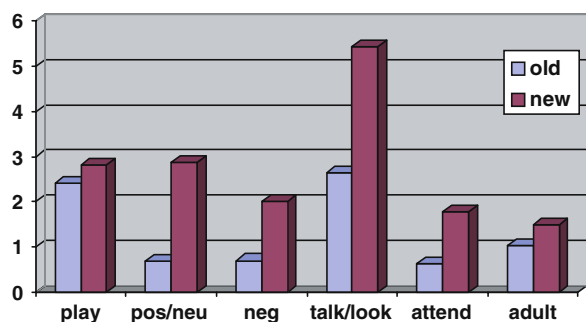


Fig. 1 Mean proportion of sample points showing each category of play in old and new playgrounds



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

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

#### 239 Observations

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

#### 245 *Level of Physical Challenge*

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

#### 249 *Support for Imaginative Play*

250 The track was used for repetitive, apparently imagi-  
251 native play, e.g. running round with arms out, making  
252 car or train noises. Other items featured in imaginative  
253 games that developed over time, for example a game  
254 that began with repeated cycles of the key worker  
255 ('monster') advancing on a child, who ran away, and  
256 was extended by evolving variations of children 'sing-  
257 ing the monster to sleep', 'regenerating' it, or 'chop-  
258 ping its hands', with one child finally taking the role of  
259 monster. The track also engendered initiations, often  
260 through conflict, as it became crowded with children  
261 behaving as 'trains' in parallel.

#### 262 *Structured Movement*

263 Children completed circuits and smiled at the end,  
264 suggesting that the layout helped them to structure  
265 their play. Several features also structured their imagi-  
266 native play, as described above. A safety rule of  
267 counting while descending the slide led to some older

children regulating their own behaviour by counting 268  
for themselves, and also regulating others, by counting 269  
for them. 270

#### Discussion 271

Group play and social initiations in the ASD children 272  
were higher in the new than in the old playground, and 273  
examples of social and imaginative play were observed 274  
in the new setting. This lends some support to the idea 275  
that the playground design fostered playful peer 276  
interaction. Despite the lack of an experimental design, 277  
it seems unlikely that the children would have shown 278  
the level of change here if they had stayed in the old 279  
playground: only one of the eight boys showed any 280  
increase in group play over the three observation 281  
periods in the old playground. Four children showed an 282  
increase on the first session in the new area and four 283  
also showed increases in group play across the three 284  
sessions there. Qualitative observation suggests that 285  
the layout of the new playground was important in 286  
providing sufficient structure to guide children's activ- 287  
ities together with an appropriate level of challenge 288  
and props to foster group and imaginative play. 289

Since the study was opportunistic and lacked a 290  
control condition, changes could have been due to 291  
other factors. Perhaps children would increase their 292  
social behaviour with increasing age and peer experi- 293  
ence at their school. This is unlikely given that 294  
increases in social play were shown over a relatively 295  
short period and across successive sessions in the new 296  
playground, with no such pattern in sessions in the old 297  
playground. Another possibility is that mere novelty of 298  
the setting stimulated new play patterns and interac- 299  
tions in children and teachers. However, qualitative 300  
analysis suggests that the new play patterns were 301  
structured by features of the playground design, and 302  
teachers reported that the patterns continued over 303  
time. 304

The greater spatial density of the new playground 305  
might have brought children into closer contact and 306  
hence increased interaction. In studies with typically- 307  
developing children (e.g. Frost, Shin, & Jacobs, 1997) 308  
there is usually more interactive play as density 309  
increases. However, increased density was associated 310  
with increased withdrawal in an ASD group (Hutt & 311  
Vaizey, 1966), compared with typical and brain-dam- 312  
aged children, so spatial density is unlikely to explain 313  
the present data. 314

A further possible explanation of our findings is that 315  
in the new playground, the children with ASD were no 316  
longer with children with SLD. Research on the 317

318 influence of different play partners on children with  
 319 autism shows that integration with typically developing  
 320 older or younger peers seems to lead to greater social  
 321 interaction in children with autism (see McConnell,  
 322 2002, for a systematic review). It seems unlikely then  
 323 that the mere presence of children from the infant  
 324 department suppressed social interaction in the old  
 325 playground in the current study. However, it is worth  
 326 noting that features of the old playground were  
 327 designed with the infant department children in mind.  
 328 In particular, different play materials were made  
 329 available each day. This may have been disruptive for  
 330 the children with ASD: Olley (1987) suggested that  
 331 unpredictability may produce disruption and an  
 332 increase in repetitive ritualistic behaviours in children  
 333 with ASD. In contrast, the track in the new playground  
 334 became a focus for repetitive behaviour (running or  
 335 walking round the track), but this was incorporated  
 336 into group play involving gross motor activity. Baker  
 337 (2000) found that allowing children with autism to  
 338 incorporate their own ritualistic behaviour into a play  
 339 theme increased social interaction in play. She suggests  
 340 that this is because engagement in rituals sustains the  
 341 children's motivation and background knowledge,  
 342 helping them to engage with playmates

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

360 The data here lend some support to the hypothesis  
 361 that changes in playground design could support  
 362 playful peer interaction and social initiations in chil-  
 363 dren with ASD. Many studies in this area have focused  
 364 on teaching strategies (Rogers, 2000), but this study  
 365 shows the potential value of the design of the physical  
 366 environment in fostering peer interaction in such  
 367 groups. Given that children with more severe forms of  
 368 autism often have separate classrooms and play facili-  
 369 ties, it is important to know what features of the play  
 370 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.

**Acknowledgments** We would like to thank the pupils, staff and  
 parents for their cooperation in the study, and colleagues for  
 helpful comments on the manuscript.

## 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 (Eds.), *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.