

EVALUATION OF THE USE OF AN INFLATABLE WITH SEVERELY MENTALLY HANDICAPPED ADULTS: AN OBSERVATIONAL STUDY

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INTRODUCTION

Toys and play equipment have an important contribution to make in the cognitive and social development of normal infants (Eckerman & Whatley, 1977; Mueller, 1978; Piaget, 1952; Ross & Goldman, 1977; White, 1975; Furby & Wilke, 1982). Features of toys such as novelty, stimulus complexity, texture and response-contingent stimulation have been examined in this context (Corter & Jaimison, 1977; Finkedstein & Ramey, 1977; McCall, 1974; Yarrow et al., 1972). Toys may promote exploratory play, learning and also modulate the nature of the infants attachment to them (Passman, 1977; Passman & Weisberg, 1975; Weisberg & Russell, 1971).

Although children with mental handicap may experience difficulty in playing and may need assistance from an early age, toys may be a valuable aid in promoting play as well as their social and cognitive development particularly when used in conjunction with carefully designed programmes of activity (Morgenstern et al., 1966; Toy Libraries Association 1979-80; Riddick, 1982). Toy libraries are now a feature of many mental handicap services and a wide range of toys and other play materials is available. Furthermore a variety of specially designed toys and play environments have been developed for people with mental handicap (Goodall et al., 1982; Thomas et al., 1980; Richardson et al., 1981; Sandhu & Hendrick-Jansen, 1976).

It is also clear, however, that the claims made by educationalists and manufacturers for many pieces of play apparatus are only rarely substantiated by data. Toys purchased for people with mental handicap may be unused or misused either because they are found to be inappropriate or because inadequate guidance is given. This is the issue we have addressed in this study.

Quilitch and Risley (1973) have suggested that play materials can be evaluated along an isolate-social play dimension. Some toys are designed for the individual child to use, have a clear goal and sequential activities constrained by the material itself. Other play apparatus allows simultaneous use and encourages social interaction and cooperation amongst its users. In a previous study we have examined the utility of a group of toys designed for "isolate play" (Crisp et al., 1984). In this study we evaluate a piece of apparatus, a large inflatable, designed for simultaneous use.

Inflatables take a variety of forms. They are constructed from PVC or similar material and inflated with air either continuously from a pump or sealed after initial inflation. Sandhu and Hendrick-Jansen (1976) have described a number of these including a 0.3m polythene 23m long, a flat air mattress 1.9m square, a soft air mattress constructed of four standard 1.9 × 0.3m tubes, framing a large

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central inflatable cushion. Four (1982) has also described a number of similar tubes and airbeds.

To date only one evaluative study of inflatables had appeared (Sandhu & Hendrick-Jansen, 1976). This study was conducted in a special school in a mental handicap hospital. Thirty two mentally handicapped children participated. They were observed in groups of eight with either air mattresses or PVC foam rubber mats present in the room. The four observers used 15 second instantaneous time sampling (Tyler, 1979). The study found that time spent in gross physical activity (limb and/or body movement) and social activity (including verbal and non-verbal communication) increased when the inflatable was present. There was no increase in peer-peer interaction. No intra-group differences emerged based on diagnosis (e.g. Down's Syndrome etc.). The study concluded that inflatables increased physical and social activity when compared with foam mattresses.

The present study extends this previous study by empirically evaluating the behaviour of a group of adults with severe and profound mental handicap while using an inflatable and while in their regular classroom.

METHOD

Participants and setting

The subjects were twelve adults with severe and profound mental handicap and four care-staff. There were eight women and four men, of whom ten provided enough data to complete the experiment. This group of people were normally together during the day. The mean age of these ten participants was 27 years (standard deviation = 4.8 years, range = 22 to 38 years). The mean years of residence in this setting was 8.7 years (standard deviation 8.7 years, range 0 to 20 years). All people were ambulant (i.e. could independently climb stairs) although one woman used a caliper due to a hemiplegia. One person had Down's Syndrome. The mean Vineland Social Age (Doll, 1947) was 2.2 years (standard deviation = 1.21, range = 1.12 to 4.50 years). The care-staff were four nursing staff who habitually worked in this setting with this group of people.

The experiment took place in two settings referred to as the classroom and the gymnasium both located in a residential hospital setting for people with mental handicap. The setting has been described in detail in previous studies (Sturmey & Crisp, 1986). The classroom was one of the upstairs rooms in the hospital training unit and measured 7.2m \times 11.8m. The room was furnished with tables and chairs arranged in a horseshoe fashion. A staff seating area was located at one end of the room adjacent to a toileting area with a shower and wash facilities. A variety of toys was available throughout the day such as jigsaw puzzles, crayons and paper, posting boxes, threading beads and Morgenstern Apparatus (Morgenstern et al., 1966).

The gymnasium was a separate single floor modern, purpose-built building within the hospital grounds. It measured 25m \times 10m. The gymnasium was very sparsely furnished except that 'the Fort' was located in it. The gymnasium was markedly different from the classroom in that it was well-lit and when occupied quite noisy, due to a low ceiling and the noise of the motor.

Apparatus

The apparatus was a large, PVC inflatable known as "The Fort". It covered a floor area of 9m \times 9m and had inflated PVC side-walls 2m high around three

sides. The Fort was continuously inflated by a motor when it was being used. The Fort provided a very responsive surface so that people could bounce themselves on its lower surface without hurting themselves. When other people moved around the Fort, those sitting on the main surface were bounced as they moved past.

Experimental Design and Data Collection

Originally a multi-element design (Sulzer-Azaroff & Mayer, 1977) had been planned. Because of a variety of practical constraints, this design was modified. A repeated measures design was used in which data were collected on behaviour for three days in the classroom during an activity period and three days in the gymnasium.

Data were collected by non-participant observation (Sackett, 1977). Observations were made of behaviour every 15 seconds using instantaneous time-sampling which gives an unbiased estimate of the proportion of student time spent in the behaviour (Tyler, 1979). The m.h. adults were observed in a fixed order for 30 minutes which gave 10 observations per day per person. In the gymnasium observations were begun only after all participants had arrived from the day unit and all of them had removed their coats.

During a 12 week period pilot observations were made in both settings for about half a day a week. Pilot observations were used to become familiar with the participants, permit them to habituate to being observed, develop behaviour categories and pilot different observation schedules. During this period the Fort was used weekly by the m.h. adults as a normal part of their timetable.

On arrival in the gymnasium the participants removed their coats and were prompted by care-staff to join them on the Fort. If they were reluctant to do so no pressure was applied, though further prompts were made during the course of the session. People not participating in the activity remained in the gymnasium throughout the activity. Observations in the classroom were made at approximately the same time of day. A selection of toys was available. Staffing levels were the same in both settings.

Dependent Variables

Smiling. Raising the corner of the mouth to expose teeth with lips parted. No vocalising. Laughing scored under vocal behaviour.

Vocal Behaviour. Any speech; explosive or inarticulate sounds; gurgles; laughing.

Stereotyped Behaviour. Any repetitive maladaptive behaviour, e.g. body rocking, head weaving, finger manipulation, etc.

Staff-Student Interaction. Staff talking, gesturing or physically guiding participants; prompting the use of toys.

Reaching. A person extends arm(s) towards other persons or objects.

Inter-observer agreement

Data were collected by a second observer one day in the dayroom and one day in the gymnasium. Inter-observer agreement was calculated by overall percentage agreements defined as the number of agreements \times 100 divided by the number of observations made, as the conventional measure of inter-observer agreement. Inter-observer agreement was also calculated by Cohen's Kappa (Cohen, 1960), the proportion of agreements corrected for chance agreement, which is a more

appropriate measure of inter-observer agreement for the extreme rate of scoring behaviour. Values of Kappa should exceed 0.60 (Hollenbeck, 1978).

When collapsed across behaviours and settings, overall percentage agreements were adequate in all cases, though kappas were only marginally adequate for the classroom sessions. Kappa was zero in three cases (smiling in the classroom, reaching in both settings) due to one or both observers not seeing the occurrence of a behaviour. Both behaviours were scored at very low frequencies.

Table I

A summary of inter-observer agreements broken down by behaviours and by settings. Figures represent the overall percentage agreement (number of agreements \times 100/number of observations) and kappa, the proportion of agreements corrected for chance agreement.

Setting	Classroom		Gymnasium	
	Overall percentage agreement	Kappa	Overall percentage agreement	Kappa
Smiling	94.4%	0.000	86.1%	0.644
Vocalising	93.3%	0.542	88.9%	0.625
Stereotyped behaviour	83.3%	0.559	84.7%	0.668
Reaching	100.0%	0.000	98.6%	0.000
Staff-student interaction	92.2%	0.491	88.9%	0.632

RESULTS

Results were analysed using Wilcoxon tests since the data were non-parametric (Siegel, 1956). Values of n differ due to elimination of tied ranks but all calculations are based upon data from 10 people.

Participants spent an average of 17.3 per cent of the time smiling in the classroom and 35 per cent of the time smiling in the gymnasium. This was a statistically significant difference ($T=5$, $n=9$, $P<0.05$). They spent an average of 10.3 per cent of the time vocalising in the classroom and 19.3 per cent of the time vocalising in the gymnasium. This was a significant difference ($T=4.5$, $n=8$, $p<0.05$). They also spent an average of 27.7 per cent of the time exhibiting stereotyped behaviours in the gymnasium and 31.0 per cent of the time exhibiting stereotyped behaviour in the classroom. This was not a statistically significant difference ($T=5$, $n=6$, $p<0.05$). Participants spent an average of 2.3 per cent of the time reaching in the classroom and 2.0 per cent of the time reaching in the gymnasium. This was not a statistically significant difference (Wilcoxon test not calculable, due to excess ties). They spent an average of 15.3 per cent of the time interacting with staff in the classroom and 23.3 per cent in the gymnasium. This was a significant difference ($T=4.5$, $n=10$, $p<0.01$).

DISCUSSION

There was a significant increase in smiling and vocalisation in the gymnasium compared with the classroom situation. The vocalisations were primarily asocial

e.g. laughing and screaming. Emotions and their behavioural expression amongst people who are severely mentally handicapped have received little attention from researchers. Research with non-handicapped subjects indicates that there is both physiological and behavioural evidence supporting the notion that facial expression plays a central role in experience and behaviour. Anatomical and physiological evidence about facial muscles suggest that they are highly differentiated (Izard, 1971) and well supplied with neural connections to the hypothalamus (Gellhorn, 1964). Further evidence indicates that situations that arouse a specific feeling produce common facial-muscle changes (Leventhal & Sharp, 1965) and evidence also suggests that judgements of facial expression can be predicted from muscle pattern in target faces (Ekman & Friesen, 1975). Emotional expressions develop in deaf and blind children suggesting that expressive patterns are innate and initially independent of social reinforcement (Eibl-Eibesfeldt, 1972; Goodenough, 1932).

In the absence of appropriate research it is not possible to say with certainty whether these conclusions are also true of people who are severely handicapped, many of whom have abnormalities of anatomical and physiological structure which influence facial expression. In the absence of evidence to the contrary, some researchers have assumed that vocalisation and smiling can be used as behavioural indices of happiness in this group (Haskett & Hollar, 1978). On these grounds it is clear that although the majority of the group responded passively to the inflatable, they enjoyed the experience more than the more formal and demanding activity period in the classroom. It should be noted that two people actively avoided the inflatable. One, a person with Down's Syndrome and the most able member of the group, sat and watched the activity, but at a distance. The other one, who exhibited multiple stereotypies, may have found the experience excessively arousing in that his stereotypies increased in frequency. He refused to participate further after the first session.

This study replicates Sandhu and Hendrick-Jansen (1976) in that the use of an inflatable by a group of m.h. people has no effect upon their interaction. In fact interactions were not observed to occur either in the classroom or the gymnasium during the pilot observation phase and so were not included among the dependent variables studied. Similarly reaching out toward another person or object occurred too infrequently in both settings to gather sufficient data. Other studies have indicated that social activity between adults who are profoundly handicapped is extremely rare and conceptualised it largely in terms of territorial defence (Paluck & Esser, 1971). The present study supports that view both in terms of rarity of social interactions and in that the majority of people remained passive on the surface often near the edge or in a corner. There appeared to be some consistency across sessions in the particular location chosen. Future studies should examine this aspect of social behaviour further.

When the m.h. adults and staff were using the inflatable together, staff and adults were more readily accessible to each other. Staff-trainee interaction in the gymnasium appeared to be largely staff-initiated. It consisted primarily of games amongst staff and between staff and more able participants, such as pushing each other over, bouncing around someone, sitting on the surface or chasing one another. The active participants in these events were almost always members of staff. The majority of the adults remained passive on the surface being bounced or pushed over by staff. Although the inflatable allows simultaneous use its primary impact was upon the behaviour of staff. It did not facilitate social and cooperative behaviour between the m.h. participants.

On average there was no decrease in the proportion of time participants spent in stereotyped behaviour. Recent research indicates that stereotyped behaviours should not be considered a unitary response class (Romanczyck et al., 1982). In the present intervention several competing mechanisms may have operated. The gymnasium may have provided greater level of auditory, visual, tactile and vestibular stimulation than the regular classroom. Excessive environmental stimulation (Berkson & Mason, 1963; Forehand & Baumeister, 1970) and environmental complexity (Frankel et al., 1978) may both facilitate stereotypy. On the other hand the increase in staff-trainee interaction may have provided behaviours that were physically and/or functionally incompatible with some stereotyped topographies.

Vineland Social Age was found to be related to the behaviour of this group as we have reported in other studies (Crisp & Sturmey, 1984; Crisp et al., 1984). Vineland Social Age was positively correlated with the proportion of time spent vocalising ($r_s=0.57$, $p<0.05$) and negatively correlated with the proportion of time spent in stereotyped behaviour ($r_s=-0.72$, $p<0.05$). Informal observation suggests that global ability may be an important factor in the manner inflatables were used. The more able people were more likely to actively participate than the less able ones. Smiling was not significantly correlated with ability ($r_s=0.28$, $p<0.05$).

Most of the applied behavioural research with people with mental handicap has been directed toward the systematic teaching of new skills and the maintenance and increasing use of skills already established (Yule & Carr, 1980; Whitman et al., 1983). However, systematic instruction may not be appropriate for all (Ellis et al., 1982) and is unlikely to comprise a substantial proportion of the day except for the small minority who may be undergoing intensive training programmes (e.g. Foxx & Azrin, 1973). Consequently much of the day must be planned to incorporate a variety of activities which elicit and maintain the current behaviour repertoire. As part of a diverse timetable, inflatables can be used to provide one such form of pleasurable activity for adults who are severely handicapped. Inflatables may also provide a work activity for the less handicapped students (Four, 1982) or a physiotherapy aid (Sandhu & Hendricks-Jansen, 1976).

SUMMARY

An inflatable (the Fort) which was used by a group of severely and profoundly ambulant mentally handicapped adults was evaluated. Non-participant observations were made both in the regular dayroom and whilst the inflatable was used. The mentally handicapped adults spent a greater proportion of the time smiling and vocalising while on "the Fort". No changes were observed in the proportion of time spent in stereotyped behaviour or reaching.

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