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SAGE Publications
and The National
Autistic Society
Vol 10(4) 330–343; 064433
1362-3613(200607)10:4

A case study of the use of a structured teaching approach in adults with autism in a residential home in Greece

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ABSTRACT In November 2001, the Greek Society for the Protection of Autistic People (GSPAP) established the first residence for people with autism in Greece, following the guidelines of structured teaching and the TEACCH method with all 12 of the residents. Using interview questionnaires and systematic naturalistic observations, this case study explored the effectiveness of the training programme in the residence for the 12 adolescents and adults with autism, who had never received any other intervention or training. The instruments used for the evaluation were the Childhood Autism Rating Scale, the Vineland Adaptive Behavior Scales and structured observations. The categories evaluated were personal independence, social abilities and functional communication. After a period of 6 months the results showed significant progress in these three areas of functioning for all of the residents. The implications of the results in particular for further research and service development in Greece are discussed.

KEYWORDS *adults; autism; Greece; residential home; structured teaching; TEACCH*

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Autism is a developmental disorder that emerges in early childhood (Frith, 2003), and reported international prevalence ranges from 1 to 60 in 10,000 people, depending on the definition used (Wing and Potter, 2002). It exists along a continuum of severity, which has become known as the autistic spectrum and is characterized by deficits in social interaction, communication and imagination (Wing, 1996).

In the hope of improving outcomes for people with autism, emphasis has been on early intervention, including intensive intervention behavioural programmes and educational interventions such as the Lovaas

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DOI: 10.1177/1362361306064433

approach (Lovaas, 1987), the Treatment and Education of Autistic and related Communication Handicapped Children (TEACCH) and structured teaching (Schopler et al., 1995). However, there is a lack of independent evaluative research on these approaches. For example, Jordan and Jones (1999) report that there is a paucity of evaluative research of education-based interventions and that the research that does exist has methodological problems. In terms of interventions with adults with autism, many of these focused initially around the use of drugs to control behaviour problems, and the use of Applied Behaviour Analysis (ABA) approaches to teach skills and appropriate behaviour, as was done with many individuals with intellectual disabilities (Davison and Neale, 2001; Lovaas, 1987). Recent work in services for adults with autism has focused on a mixture of these approaches, similar to the bio-psychosocial model for mental illness (Engel, 1980). TEACCH and a structured teaching approach (or at least elements of it) are widely used in many different settings with people with autism and with other intellectual and developmental disabilities.

TEACCH

Today TEACCH, and in particular structured teaching, are in operation in many countries around the world (Mesibov, 1997; Schopler et al., 1995). It is not restricted to one technique or one method, but is a philosophy of services for people with autism that makes use of various techniques in various combinations depending upon the individual person's needs and emerging capabilities. The philosophy of TEACCH includes an understanding of autism, a focus on the individual needs of each person with autism, adoption of the appropriate adaptations, and a broad-based intervention strategy that builds on the existing skills and interests of the person (Mesibov, 1997).

Educational strategies are established for each person on the basis of an assessment of individual ability. The assessment is done using the Psychoeducational Profile–Revised (PEP–R) for children (Schopler et al., 1990) and the Adolescent and Adult Psychoeducational Profile (AAPEP) (Mesibov et al., 1988), which identify strengths, weaknesses and emerging skills. In addition, the Childhood Autism Rating Scale (CARS) is often used to identify the degree of autism (Mesibov et al., 1989).

The use of structured teaching is an important component of TEACCH. According to Schopler et al. (1995), structured teaching is an important priority because it fits the 'culture of autism' more effectively than any other technique. Organizing the physical environment, developing schedules and work systems, using visual cues and making expectations clear and explicit, help people with autism to develop skills and understanding (e.g.

understanding of the world that surrounds them, communication skills, social awareness, and decision making) and drives them to maximize their autonomy (Faherty and Hearsey, 1996; Schopler et al., 1995).

Effectiveness of TEACCH

Although Jordan and Jones (1999) found research in the evaluation of educational interventions in autism had methodological problems, such as not having matched control groups, there is some evidence that the TEACCH approach is effective in reducing challenging behaviour and in improving communication, sensori-motor skills and independence. For instance, although lacking a control group, Panerai et al. (1998) evaluated the TEACCH approach in an Italian-based study, assessing progress at 12 and 18 months of structured intervention in 18 children and adolescents with autism. They found a statistically significant difference overall in communication, daily living skills and socialization domains ($p < 0.05$) between baseline and 12 month evaluations and between baseline and 18 month evaluations. Differences between the 12 month and 18 month evaluations were significant for daily living skills, play and leisure ($p < 0.02$). A Swedish-based study by Person (2000) found that, over a period of 2½ years, seven men with autism, who followed the TEACCH approach, showed significant increases in personal independence. Three of the participants had about 50 percent relative progression, three showed about 20 percent relative progression, and one showed 5.9 percent relative progression over the baseline scores. Again no control group was included in this study, so it is difficult to comment on the strength of the findings.

There have been two studies that have included control or comparison groups. Ozonoff and Cathcart (1998) compared 11 children with autism following additional TEACCH training at home with a control group following only a discrete trial classroom-based programme. The outcome showed that the combined TEACCH and ABA programme helped children with autism to improve on imitation skills, fine motor skills, gross motor skills and non-verbal conceptual skills at a rate three to four times greater than the control group (ABA only) in all outcome measures. A similar education-based comparison study by Panerai et al. (2002) compared a TEACCH approach programme with the classic Italian approach for the integration of children with learning disabilities in regular schools with support teachers. The outcome of this study was that the children and adolescents following the TEACCH approach showed statistically greater improvements ($p < 0.05$) in imitation, gross motor skills, daily living skills, hand–eye coordination, perception and cognitive performance. The total score was also significantly different ($p < 0.02$).

Finally, one study has evaluated the long-term effect and parental satisfaction with the TEACCH approach. According to Mesibov (1997), in 1981 Schopler et al. found that of 348 families examined, 96 percent reported that their children with autism were still living in the community and found TEACCH positive, productive and enriching.

As illustrated above there are few studies that provide scientific evidence for the effectiveness of TEACCH or elements of the approach, such as structured teaching. This is especially true of adults with autistic spectrum disorders. Most of the studies have focused on children or on people who have been following the programme for a long time. The aim of the current case study was to investigate the effectiveness of the programme in a residence which is based on the TEACCH method and involves structured teaching for adults and adolescents with autism in Greece, none of whom had previously received any kind of intervention. The study focused on three specific areas of functioning: personal independence, social abilities and functional communication.

Method

Design

The design is a repeated measures design looking at a period of 6 months of following structured teaching and the use of other elements of the TEACCH method.

The residence

The Greek Society for the Protection of Autistic People (GSPAP) established the residence in November 2001. It was the first residential home for people with autism in Greece which used TEACCH guidelines and structured teaching. The residence provides accommodation for 12 persons with autism. The staff team was recruited in September 2001, and was trained (by people with long experience of structured teaching and TEACCH) for two months prior to the starting of the residence and in an in-service training programme once the service opened.

Some basic elements of TEACCH and structured teaching were used with each individual: the exact nature of the programme was determined by the history and the level of functioning of the service users. The programme was kept simple because the residents had transferred from mental health institutional settings and they did not have any previous experience of training and a structured environment. Basic aspects of structured teaching and the principles of TEACCH that are used in the residence are:

1 Strong cooperation between the staff team and the parents: parents are educated in the use of structured teaching and TEACCH principles at home.
2 All the areas are physically arranged so that people with autism have continual visual cues in order to understand what is expected from them. Different areas are designated for each activity.
3 Daily visual schedules based on each person's ability are used: a schedule of work and play is displayed in such a way that each person with autism learns to look at this and follow its instructions in order to do the next activity independently.
4 Strong work rules such as 'first work and then play' are used. Each activity is designed to positively reinforce the residents.
5 A transition area is a special area where schedules are displayed and where each person can replace a symbol from a completed activity with one for the next activity. In this way he/she is helped to orient a change from one activity to another. Schedules are arranged from top to bottom or left to right.
6 Structured activities: all the activities are structured, whether they are work-based activities, personal care, outdoor activities or meal times. Also by setting up the work in a given order from left to right, each person knows that he must take materials from the box on the left, do his task and, when he has done the work, put everything in the box on the right.
7 Visual prompts are employed in order to maximize success in the daily activities. Photos are displayed in various parts of the residence (e.g. on the wardrobe there are photos of the clothes that are inside).
8 A process that enhances skills, accepts deficits and accommodates routines that are sometimes distracting, uses them in a positive way and transforms them into something productive (Schopler et al., 1995)

Participants

There were 12 participants in the study – eight men and four women – all of whom were diagnosed with autism according to the criteria of both the Childhood Autism Rating Scale (CARS: Mesibov et al., 1989) and the DSM-IV (American Psychiatric Association, 1994). The age range was from 16 to 30 years (mean age 21.3). All the participants also had learning disabilities, ranging from mild to severe. None of them had previously experienced the TEACCH approach. They had lived in the parental home or in psychiatric hospitals before moving to this residence.

Materials

Questionnaire A questionnaire was used to interview the trainers in the residence about the residents. This questionnaire was based on the Vineland Adaptive Behavior Scales (Sparrow et al., 1984) with Likert-type questions and modified in order to access personal independence, social abilities and functional communication only (the questionnaire is available from the first author on request).

Observation checklist In addition to the questionnaire, participants were observed during their daily activities. The observation checklist had columns denoting the two different categories of behaviours that were observed ('activity' and 'social behaviour') and their subcategories and rows denoted successive sample intervals of 1 minute (Martin and Bateson, 1993).

Procedure

Questionnaire The questionnaire was completed with one trainer and one assistant trainer. As such 24 questionnaires were collected, two on each participant. The two sets of data were used to check inter-informant reliability.

Observation The observation was structured by observing each participant in three sessions during the day where each session lasted 10 minutes. Specific scoring criteria (category codes) were developed for looking at certain actions and speech patterns that occurred in the two behavioural categories. Category definitions were as used in Beasley et al. (1993). A one–zero sampling was used with a time interval of 1 minute (Martin and Bateson, 1993). The above procedure was repeated after 6 months.

Inter-informant reliability

This was assessed for the questionnaires by assessing agreement between the two informants on each question at both time points, using the kappa statistic. The kappa statistic was calculated for each trainer and assistant trainer pair for both June and December time points, for each behaviour coded.

Data analysis

The comparisons between initial (time I) and follow-up (time II) assessments were conducted using Wilcoxon's signed rank tests for non-parametric, related data.

Ethical issues

In order to begin and conduct the current study, an ethics application was made to the Greek Society for the Protection of Autistic People (GSPAP). The application explained that the researcher was going to follow the code of conduct authorized by the British Psychological Society and the University of Kent Ethics Committee. The basic rights to confidentiality were followed and all the personal information of the participants was kept confidential. The staff and the parents of the participants were briefed about the study. In addition, an information leaflet was prepared for the residence's staff team and the families of residents. Both the GSPAP and the University of Kent Ethics Committee gave permission to conduct the study.

Results

Inter-informant reliability

Table 1 presents the mean and standard deviation for the scores on each domain of the questionnaire for both trainers and the assistant trainers for time I and time II.

The average kappa value for each category of behaviour and each time point and the minimum and maximum values are presented in Table 2. As can be seen, average kappa values are acceptable (over 0.6) for all categories and time points apart from social abilities at time I where the average fell just below 0.6.

Table 1 **Mean scores for the responses of trainers and assistant trainers at time I and time II (*N* = 12)**

	Time I (June)		*Time II (Dec.)*	
	M	*SD*	*M*	*SD*
Personal independence:				
Trainer	80.6	26.2	91.5	21.7
Assistant trainer	81.6	25.9	92.8	20.5
Social abilities:				
Trainer	60.8	22.5	71.8	19.7
Assistant trainer	62.5	20.0	72.9	20.0
Functional communication:				
Trainer	61.5	27.4	70.6	26.4
Assistant trainer	63.7	27.4	71.0	27.7

Table 2 **Mean kappa statistic values across the behaviours within each category at time I and time II**

	Time I (June)	*Time II (Dec.)*
Personal independence:		
N	29	29
Mean	0.631	0.745
Min.–max.	0.104–1.00	0.308–1.00
% behaviours $\kappa > 0.50$	69	87
% behaviours $\kappa > 0.60$	48	72
Social abilities:		
N	27	26
Mean	0.566	0.716
Min.–max.	0.273–0.874	0.036–1.00
% behaviours $\kappa > 0.50$	67	85
% behaviours $\kappa > 0.60$	37	77
Functional communication:		
N	29	28
Mean	0.667	0.750
Min.–max.	0.111–1.00	0.100–1.00
% behaviours $\kappa > 0.50$	86	82
% behaviours $\kappa > 0.60$	65	82

N = number of items across which kappa was calculated.

Results on changes over time of personal independence, social abilities and functional communication

Comparing responses of the trainers at time I and time II, analyses of data indicated a significant difference between time I and time II for personal independence ($z = 3.062$, $N = 12$, $p = 0.002$ two-tailed), for social abilities ($z = 3.063$, $N = 12$, $p = 0.002$ two-tailed) and for functional communication ($z = 3.062$, $N = 12$, $p = 0.002$ two-tailed). These differences are illustrated in Table 1.

A separate analysis was done for each item of the questionnaire at time I and time II. No significant difference was found for items within the subscale of personal independence and functional communication ($p < 0.01$), although there were several items (Table 3) where results approached significance ($p < 0.05$) in the direction of an increase in skills from time I to time II. It is these results that may have contributed to the significant difference for the overall domain.

For social abilities, only one item was found to be significant at $p < 0.01$. This item asked if the participant looks at the face when talking with someone ($z = 2.646$, $N = 12$, $p = 0.008$). There were a number of items on the social abilities domain where results approached significance

Table 3 **Items of the questionnaire which showed significance in the three domains explored at $p < 0.05$**

Personal independence		*Functional communication*		*Social abilities*	
Item	*p*	*Item*	*p*	*Item*	*p*
Drinks from cup or glass unassisted	0.046	Smiles in response to a familiar person	0.014	Plays simple interaction games	0.020
Demonstrates understanding that hot things are dangerous	0.035	Demonstrates understanding of the meaning of 'No'	0.021	Imitates adult movements such as clapping hands	0.025
Urinates in toilet	0.046	Demonstrates understanding of the meaning of 'Yes' or 'Okay'	0.035	Participates in at least one game or activity with others	0.029
Brushes teeth without assistance	0.038	Uses names of siblings, friends or peers or states their names when asked	0.041	Follows simple games without being reminded	0.018
Put on shoes correctly without assistance	0.024	Uses words like 'between' or 'behind' as a preposition in a phrase	0.046	Follows general rules of residence	0.016
				Responds appropriately when introduced to strangers	0.026

($p < 0.05$: see Table 3) in the direction of an increase in social abilities from time I to time II.

Changes over time in levels of activity and social behaviour as measured by observational data

Table 4 shows the mean number of minutes spent in each behaviour for time I and time II. As can be seen in Table 4, people spent more time engaged in activity and in social behaviour at time II compared to time I ($z = 3.074$, $N = 12$, $p = 0.002$ two-tailed; $z = 2.956$, $N = 12$, $p = 0.003$ respectively).

Table 5 presents the mean number of minutes spent in each category code of behaviour. It is notable that there is a difference in the direction of an increase in the time spent in each type of behaviour from time I to time II, except for the negative category codes 'no activity' and 'no social act',

Table 4 **Mean number of minutes participants spent in each of the two behaviours (activity and social behaviour) at time I and time II (*N* = 12)**

	Time I (June)	*Time II (Dec.)*
Activity:		
Mean	16.3	25.0
SD	3.9	4.1
Social behaviour:		
Mean	7.4	10.0
SD	4.5	4.45

Table 5 **Mean number of minutes participants spent in each category code of the two behaviours (activity and social behaviour) at time I (June) and time II (December) (*N* = 12)**

	Mean		*SD*	
	Time I	*Time II*	*Time I*	*Time II*
Activity				
No activity	5.90	3.41	2.35	2.64
Leisure/recreational	3.08	4.66	2.50	2.34
Personal self-care	3.66	5.58	2.30	2.46
Practical tasks	2.41	3.75	1.56	1.76
Other tasks	1.25	2.58	1.28	1.72
Work	3.58	4.91	1.44	1.50
Out walking	2.33	3.50	1.37	1.31
Social behaviour				
No social act	4.66	3.08	2.80	2.06
Social act	3.00	5.30	2.30	2.67
Unclear social act	2.83	3.75	2.08	2.00
To observer	1.58	0.90	2.02	1.16

where there is a decrease ($z = 2.460$, $N = 12$, $p = 0.014$ and $z = 3.088$, $N = 12$, $p = 0.02$ respectively).

Discussion

The current study is a small-scale case study that provides preliminary results for future research and the development of services for people with autism in Greece. Despite the short time span of 6 months, there was significant improvement in participants' personal independence, social abilities and functional communication. For a number of the individual

items in each domain, some trends in the same direction were also found. Similar results were found for the observational data, with significant increases in both activity and social behaviour overall. None of the individual subcategories showed significant increases but the trend was always in that direction, and it is clear that the people involved are doing more activity of different types (rather than a significant increase in leisure or recreational activity). The only subcategories where the differences were significant were for the 'no activity' and 'no social act' categories, where there were significant decreases across time.

There are a number of issues that affect the adequacy of the data:

1 The current case study was part of a university student project in the United Kingdom, so the baseline measurement was done 9 months after the beginning of the intervention programme at the residence in Greece. This is acknowledged as a weakness, but it should also be noted that since changes between June and December were found to be significant, this does not limit the findings substantially. However, baseline data from the beginning of the programme would have been more helpful in deciding whether the programme at the residence is helpful for the residents.
2 Although it would have been preferable to have included a control group, this residence is the only one of its type in Greece, and therefore finding a matched control group following a different training would have been almost impossible. This makes it difficult to conclude that the changes seen here are definitely the result of the residents' programme rather than of some other factor such as maturation or the effects of *any* programme. A further study that includes a matched control group would give stronger conclusions. However, there is some existing evidence that the skills and behaviours of adults with learning disabilities and/or autism do not change much over time. Beadle-Brown et al. (2002) found there were some changes for a few skills in the categories of communication, self-care and cognitive skills over time, but that improvement over time without specific intervention was more notable in children than in adults. The findings from the observation of the current case study showed that the participants were doing significantly more at follow-up than they had at time I. Future research should focus on whether the improvement of the residents (who had never received any kind of intervention before) was because of the specific programme of structured teaching or whether a different programme would produce the same outcomes.
3 Although it was possible to conduct inter-informant reliability on the questionnaires, it was not possible to do the same for the observational

measures. The timescale of this study was such that it was not possible to train someone in Greece to do the observations, and the author did not have ethical approval or equipment available to use videos for inter-observer reliability. With regard to the inter-information reliability on the questionnaire, reliability was good for the most part, although kappa values were lower for the time I pairs. This may have been the result of several factors such as the short time since the establishment of the residence, so that staff were still a little unsure about what people could and could not do. The trend appeared to be for assistant trainers to say that people could do things while trainers said they could not. However, the average values are still acceptable, with only the time I values for social ability falling below 0.6. The finding that social ability is the most difficult for raters to agree on is consistent with other work on social impairment (Beadle-Brown et al., 2002) and may simply reflect a true difference in how the person interacts with different members of staff.

4 The questionnaire itself may not have been sensitive to subtle changes in behaviour, given that it was based on the Vineland Adaptive Behavior Scales, for which quite substantial changes are needed for scores to increase significantly. Having said that, the scale was sensitive enough to pick up a number of increases in skills and abilities and in particular to pick up changes in overall categories. With a longer timescale for the evaluation, it is possible that more items would be significant at $p < 0.01$.

5 Fidelity to the TEACCH approach and to structured teaching is always an issue in evaluation. The staff were trained on-site at the residence rather than at the official centre in the USA. They were trained not by an official TEACCH trainer but by professionals who had extensive experience of the TEACCH method. As such there remains some question as to how faithfully the approach has been replicated in the residence on a staff-by-staff basis, although the elements of the programme used at this residence closely replicated the published TEACCH approach. In addition, the TEACCH approach is used worldwide both in part and in its entirety, with reported benefits for the individuals using it. Flexibility appears to be one advantage of this approach. This study has shown quite dramatic changes in a short time for these people with a range of levels of disability, and as such fidelity may not be such an issue. This study, despite its limitations, has shown that the young adults with autism and learning disabilities living in this residence in Greece, which is using structured teaching and the TEACCH approach programme, are improving in skills and independence. As such it is a model to which service providers should pay attention when considering future provision.

Conclusion

The current small-scale case study is the first ever done in Greece. It tried to explore the effectiveness of a residential programme based on structured teaching and the TEACCH approach, with adolescents and adults with autism who had never before received any kind of training. The results of the study, although having limitations, showed that the participants benefited from the residence's programme, and suggest the need for further study.

Acknowledgements

We are very grateful to the Greek Society for the Protection of Autistic People, the President of the Society Professor Christos Alexiou, and the Psychologist of the Society Mr Pantelis Proios. Also we would like gratefully to acknowledge the staff team, the residents who participated, and the parents of the residents for their help and cooperation in this study.

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