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Exploration of teaching strategies that stimulate the growth of academic skills of children with ASD in special education school

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The cognitive growth of children with developmental disorders, like autism, can be seriously impaired due to the disorder. If so, in the Netherlands, these children can attend special schools where they are treated to ameliorate disorder symptoms and to stimulate cognitive growth. The aim of this paper was to identify teaching strategies that stimulate the growth of academic skills in children diagnosed with autism, attending a special needs education school in the Netherlands. Findings showed that the strongest underlying teaching strategy that predicted the academic growth of the children on the autism spectrum in the short and long term was the provision of structure in place, time and activities. It was further found that long-term academic gains were partly predicted by the emotional support from their teachers. The implications of the findings are discussed.

Keywords: autism spectrum disorders (ASD); cognition; academic growth; special needs education; teaching strategies; treatment factors

Introduction

For the past five decades research has shown that education is one of the most powerful sources to enhance the developmental opportunities for children with autistic spectrum disorders (ASD) (National Research Council 2001). Specifically, a vast majority of children with ASD who are provided with appropriate education show improvements not only in academic learning and functional language but also in socialisation, adaptive skills and communication, while many of them can take better advantage of their abilities and skills, in this respect that they can use them in a more productive and generalised way (Rutter and Bartak 1973; National Research Council 2001; Venter, Lord, and Schopler 1992).

However, educating children in the spectrum might be challenging, as their difficulties in social communication, interaction and cognitive skills might impede their academic achievement or their possible inclusion in typical educational settings (Noland, Cason, and Lincoln 2007). Moreover, children with ASD show a puzzling pattern of strengths and weaknesses, meaning that although they might have difficulties in some aspects of linguistic and cognitive functioning they might have intact or even superior abilities on other related areas (Mesibov, Adams, and Klinger 1997). This uneven profile makes it difficult for both professionals and

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parents to fully understand and cope with the disorder, for that reason understanding the cognitive development of children with autism is essential for the development of effective teaching strategies and educational programmes.

Although the specific mechanisms that lead children with ASD to improvement are not fully known, it is suggested that when appropriate treatment strategies are combined with each child's personal characteristics, this could contribute to cognitive and behavioural amelioration, as well as in symptom reduction in later life (Helt et al. 2008). To date, there are many therapeutic approaches to autism, however, a unique resolving treatment programme has not yet been identified, as the heterogeneity of autistic symptoms requires that interventions be individualised (Howlin and Kwon 2008) and tailored to the needs and the developmental stage of each individual (Campbell et al. 1996; Sherer and Schreibman 2005).

Nonetheless, the majority of these approaches usually share common treatment components that have been proved to be effective in supporting the development of children with ASD. These components include provision of developmentally appropriate objectives, low student-teacher ratio, provision of appropriate instruction across all settings (e.g. repeated planned activities), provision of structure, use of children's strengths in order to support gains to weaker areas as well as systematic monitoring of the programme and of the child's progress (Lord and Bailey 2006; Noland, Cason, and Lincoln 2007).

Regarding the characteristics of children that enhance or promote positive treatment outcomes, studies have tried to identify core predictors of behavioural and cognitive improvement. In the literature, pre-treatment intelligence and early communication, language abilities (Luyster et al. 2007; Mawhood, Howlin, and Rutter 2000; Rogers 1998; Venter, Lord, and Schopler 1992), autism symptom severity (Ozonoff and Cathcart 1998) and the existence or not of co-morbid or neurological conditions (Nordin and Gillberg 1998) are reported as the most consistent prognostic indicators for later improvement. Moreover, another promising predictor is early response to intervention (Sherer and Schreibman 2005; Weiss 1999). The above predictors indicate that the prognosis of children with ASD largely depends on the extent and severity of their cognitive deficit. Indeed Rutter (1979) pointed already out years ago that although 'treatment can do much to reduce the social and behavioral problems shown by autistic children, it does little to alter cognitive development' (Rutter 1979, 261). However, Harris and Handleman (2000) reported that pre-school children with lower IQ showed gains in their cognitive abilities, after their participation in an intensive behavioural programme for children with ASD. Nevertheless, these children were finally placed in a special primary school setting as their progress was not enough to allow them to attend regular classrooms (Harris and Handleman 2000).

Recently, a longitudinal study in special needs education schools in the Netherlands was conducted in which the long-term development of children with ASD was explored (Manti, Scholte, and Van Berkelaer-Onnes 2011). Findings showed that although children with ASD had significant gains in their academic skills after two years of school attendance (reading ability, reading comprehension, spelling and arithmetic skills), there still remained a significant lag when these children were compared with the general population norms. The above findings leave a question mark about the prognosis and the development of children who attend special education settings, as well as the teaching strategies that could help them improve. In fact, there is significantly less research in relation to the best educational practices

or treatment strategies that predict the academic achievement and symptom reduction of individuals with ASD, and more specifically of students with more limited abilities (Charman et al. 2004; Noland, Cason, and Lincoln 2007), who usually attend special education settings.

Given the lack of data concerning the long-term evaluation of programme effectiveness and the social-emotional and cognitive growth of children with ASD (Charman et al. 2004), the investigation of specific treatment components or teaching strategies that lead to effective and efficient generalised effects in the cognitive development of students attending special educational settings is urgently needed (Charman et al. 2004; Noland, Cason, and Lincoln 2007). The aim of the present study is to extend the findings of the previous study (Manti, Scholte, and Van Berkelaer-Onnes 2011), by identifying treatment components that stimulate successful growth of academic skills among children with ASD in this real life special needs educational situation.

Method

Participants

The present study is part of a longitudinal study conducted in a school of the Netherlands that was affiliated with the Pedagogical Institute (PI) of the City of Leiden (Manti, Scholte, and Van Berkelaer-Onnes 2011). The sample consisted of 89 children attending a special education school setting for pupils having behavioural and developmental disorders (Cluster 4). Nearly half of the children ($N=45$) were diagnosed with ASD and the rest had other behavioural or developmental disorders, based on the APA's Diagnostic and Statistical manual of mental disorders-IV (American Psychiatric Association 2001, 4th TR).

Initially, 174 children with special educational needs in 20 classes were assessed at time point 1. However, nearly half of the cases of this initial sample were 'lost' during the reassessment procedures. This was due to the fact that the Dutch school system permits the transition from one educational setting to another; thus about 35% of the attrition cases were children that after the completion of the first or the second year of special education were placed from the PI into a regular school with special help or at another special school. Regrettably, these children could not be followed up at their new school settings due to financial constraints. In addition, about 15% of the parents did not wish to participate in the third time point of the study. In order to ensure that the attrition group did not differ significantly from the non-attrition group, the demographic information for both groups was compared (Table 1). The comparison showed that the two groups were well comparable, except for the fact that the girls-boys ratio was slightly different in the attrition group (more girls than boys). The mean age of all children at time point 1 was 5.8 years ($SD=1.4$ years). At time point 2, the children were 6.6 years ($SD=1.6$ years) and at time point 3 they were 7.6 years ($SD=1.6$ years).

Measures

Academic skills and achievement

The test that has been used in order to assess the cognitive growth of the children was the CITO primary school attainment test (Central Institute of the Test

Table 1. Demographic characteristics of the non-attrition and attrition group.

	Non-attrition group (<i>N</i> = 89)	Attrition group (<i>N</i> = 85)	Statistics
<i>Mean age T1 (SD)</i>	5.8 (1.3)	6.1 (1.8)	$t(172) = -.17$, $p = .86$
<i>Mean cognitive ability T1 (SD)</i>	11.3 (11.6)	13.4 (15.9)	$t(162) = -.99$, $p = .32$
<i>Diagnosis (%)</i>			
Autism/ASD	49.5	45	$\chi^2(1) = .39$, $p = .53$
No-autism	50.5	55	
<i>Gender (%)</i>			
Boys	88	75	$\chi^2(1) = 4.4$, $p < .05$
Girls	12	25	
<i>Family composition (%)</i>			
2-parent family	87.5	79	$\chi^2(2) = 3.07$, $p = .21$
1-parent family	8	16.5	
Other	4.5	4.5	
<i>Ethnicity (%)</i>			
Dutch	93	93	$\chi^2(1) = .01$, $p = .91$
Other	7	7	

Development), an assessment tool that is being recommended by the Dutch Ministry of Education (Driessen, Slegers, and Smit 2008). This test is administered to the pupils of primary and secondary education once or twice per year in order to assess school-based knowledge. General population norms exist that determine age-related academic level. For the purpose of the present study, four basic dimensions of academic skills from this test were used, namely: (a) reading ability, (b) reading comprehension, (c) spelling and (d) arithmetic skills. In order to ensure that those four dimensions indeed reflected the school-related academic skills of children in a valid and reliable way, a principal component factor analysis was conducted in an earlier study showing that the scores were valid and reliable during all time points (see Manti, Scholte, and Van Berkelaer-Onnes 2011). The absolute level of cognitive growth reached by pupils was measured as the number of months of educational growth that they have acquired.

Teaching strategies

In order to explore the instructional teaching strategies that the teachers were using during the three academic years, a questionnaire was constructed comprising of 12 items of evidence-based techniques. To measure the extent to which these techniques were stressed by the professionals, a four-point Likert scale was used (barely, considerably, much, very much). A principal component factor analysis was conducted to determine the underlying teaching dimensions that are measured by this questionnaire (see Results section).

Design and data analyses

Ideally, the efficacy of a treatment programme should be assessed by an experimental/control group design in which children are assigned randomly to a treatment and a control group. However, as in most studies using natural settings, this could not be realised in the present study, as it would be unethical to withhold from treatment children that are in great need. Therefore, a follow-up design with a comparison group was used for this study, in which the developmental measurements taken were compared with those of a group of children of the same gender and age, attending the same school setting, but without the characteristic under study, i.e. autism, ruling out influences such as differences between boys and girls, older and younger children, and the children growing older during treatment (Shadish, Cook, and Campbell 2002).

The treatment factors that contributed to academic growth of children were identified by conducting correlation analyses and regression analyses. First, correlation analyses between treatment factors and academic growth of both groups for the short term (from t_1 to t_2) and the long term (from t_1 to t_3) were computed.

After that, multiple hierarchical regression analyses were conducted separately for the two samples (children with and without ASD) so as to find out whether academic growth of the children can be predicted by specific treatment factors in each group. According to the graph of Miles and Shelvin (2001), if one wants to find a large effect, a sample size of around 50 cases will suffice for six predictors. In the hierarchical method, each set of summary statistics is repeated for each stage of hierarchy. To this end, academic growth at short term (after 12 months of school attendance) and then at long term (after 24 months of school attendance) was the dependent variable while treatment factors and children's characteristics at attendance were the independent factors. The predicting variables were entered as follows: 'structure' at step 1 with forced entry, since this practice is being supported to be one of the most effective instructional approaches for autism. 'Emotional support', 'instructional support' and 'communication' were added at step 2, 3 and 4, respectively, with the stepwise method. Finally, age, gender, IQ and cognitive level at attendance were added at step 5 with the stepwise method, for correction purposes. The stepwise method was chosen given that there is no previous research regarding the effects of these particular factors on academic growth. In this method, each time that a predictor is added to the equation, a removal test is made of the least useful predictors (Field 2005).

In order to ensure that the results are consistent even when the sequence of the predicting variables is changed, a second hierarchical regression analysis was conducted with the cognitive level and IQ of the children in the first step by the forced entry method followed by the remaining predicting variables using the stepwise forward method. The criteria of Cohen were used to assess the size of the effects, with a correlation of .1 denoting a small effect, .3 a medium effect and .5 a large effect (Field 2005).

Procedure

The parents of the children as well as all professionals participating in the study were informed about the purpose of the study by a letter and were asked for written consent. Eighty-five per cent of the parents of the children attending the special

cluster four school of the PI of Leiden (the PI has a regional function) and all the teachers and professionals working for this school gave their consent.

The children with ASD were selected by the presence of a diagnosis of autism as the formal reason for the admission to the institute. This diagnosis was made by a qualified child psychiatrist or psychologist according to the procedure of the APA's Diagnostic and Statistical manual of mental disorders-IV (American Psychiatric Association 2001, 4th TR). According to the admission records, 45 children had a formal diagnosis of ASD and the rest had other diagnoses of developmental disorders, also based on the DSM-IV procedures.

The number of compulsory teaching hours that the children received in the special education school was about 30 h per week. The educational approach of the school was based on the eclectic-treatment model which is a combination of evidence-based special education methods according to each child's educational needs, with the following goals:

- (a) Promotion of academic development and learning including academic skills.
- (b) Reduction of maladaptive behaviours.
- (c) Promotion of social development including self-help, problem solving, etc.
- (d) Promotion of language/communication development.

The teacher–student ratio was 1:4, as in the classroom there were maximum 8–10 students with the presence of two instructors.

The rating scale for the identification of treatment techniques used by the teachers was rated once by the professionals caring for the children in the group at the end of the first month of their stay in the school.

The assessment of the cognitive and social-emotional development of the children took place in the school by the teachers in the third month after the admission. Twelve months and twenty-four months later, different teachers evaluated the children again with the same assessment tools. The study protocol met the ethical norms of the Dutch Organization of Scientific Research.

Results

Validity of the rating scale measuring teaching strategies

In order to confirm the validity of the questionnaire, a principal component analysis was conducted with an orthogonal rotation in order to improve the interpretability of the factors. The analyses revealed that the items of the initial questionnaire were loaded in four subscales/factors, namely: (a) instructional methods, (b) emotional support, (c) communication techniques and (d) structure and control, which explained the 72% of the total variance. The items/questions that loaded to each treatment factor are presented in Table 2.

More specifically each factor consisted of three separate components: Instruction was measured as the extent to which the professionals:

- Used individualised instruction programmes according to each child's needs.
- Used concrete instruction materials like pictograms, objects, etc.
- Repeated daily the instructions.

Table 2. Factor loadings of the items of teachers' questionnaire.

Rotated component matrix				
Teaching strategies	Factor loadings*			
	Instruction	Emotional support	Communication	Structure
Repetition of instructions	.913			
Use of individualised programme	.875			
Use of concrete instructional materials (e.g. pictograms)	.863			
Creation of personal bond		.856		
Expression of emotional support		.806		
Focus on positive qualities of the child		.804		
Promotion of social skills			.761	
Promotion of social cognition			.727	
Promotion of communicative skills			.593	
Structuring the daily living environment				.484
Contingency management				.901
Rewarding of positive behaviours				.767

*Coefficients < .4 have been suppressed. Extraction method: principal component analysis, rotation method: Varimax with Kaiser normalisation.

Emotional support was measured as the extent to which the professionals:

- Expressed affectionate emotional support towards the child.
- Expressed appreciation towards the child and focused on their positive qualities.
- Created a personal bond with the child.

Communication was measured as the extent to which the professionals:

- Helped children to use appropriately communication skills (e.g. language comprehension, participation in a conversation, etc.).
- Helped children to understand and use some basic social skills (e.g. non-verbal communication).
- Helped children to gain social cognition.

Finally, structure and control was measured as the extent to which the professionals:

- Structured the daily living environment in order to provide security and predictability.
- Regulated and controlled children's behaviour by means of contingency management.
- Rewarded the child verbally when he/she has followed the programme.

To determine the reliability of each scale, the internal consistencies (Cronbach's alpha) were calculated. Results showed that the alphas of each factor were the following: 'instructional methods' $\alpha = .91$, 'emotional support' $\alpha = .83$, 'communication techniques' $\alpha = .65$ and 'structure and control' $\alpha = .65$. The above results indicate

that the alphas of the first two factors reflect a good reliability, while the alphas of the latter two reflect an acceptable reliability. For some scales that deal with psychological constructs a cut-off point around .7 can be also expected because of the diversity of the constructs being measured (Kline 1999). Moreover, for research purposes, alphas of .65 are usually acceptable. Given the exploratory nature of this study, it was therefore assumed that all four scales are sufficiently reliable.

Predictors of academic growth

Correlational analyses showed that all the four instructional factors were significantly and with medium effect sizes positively correlated with the academic growth in the group of children with autism, but not in the group of children with other developmental disorders, except for the factor 'communication' at short term (Table 3). Interestingly, the factor emotional support correlated with academic growth in the long term (after two years of school attendance), in contrast with the other three factors that correlated in both short and long terms. No statistically significant correlations between age, gender or IQ of the children with academic growth were found.

Table 3. Correlations between academic growth and treatment factors/child characteristics.

Treatment factors	Cognitive growth	
	Short term (Time 1–2)	Long term (Time 1–3)
<i>Structure and control</i>		
Autism ($N=45$)	.46**	.31*
No autism ($N=44$)	.14	–.08
<i>Emotional support</i>		
Autism ($N=45$)	.21	.36*
No autism ($N=44$)	.15	.09
<i>Instructional support</i>		
Autism ($N=45$)	.39*	.33*
No autism ($N=44$)	.14	.23
<i>Communication</i>		
Autism ($N=45$)	.40**	.36*
No autism ($N=44$)	.56*	.25
<i>Child characteristics</i>		
<i>Age of the child at T1</i>		
Autism ($N=45$)	.16	.24
No autism ($N=44$)	.03	.09
<i>Gender</i>		
Autism ($N=45$)	–.03	–.12
No autism ($N=44$)	.16	.11
<i>General IQ</i>		
Autism ($N=45$)	.16	.04
No autism ($N=44$)	.25	.19

* $p < 0.05$, ** $p < 0.01$.

A hierarchical multiple regression analysis using the forward method to include significant predictors was conducted within the ASD group to investigate the specific effects of the treatment factors. Findings showed that, among the group of children on the autism spectrum, in the first step of this analysis ‘Structure’ (Table 4a) explained 21% of the sample’s total variance regarding the academic growth of children with ASD during the first year of school attendance ($R^2 = .21$, $F(1,43) = 11.5$, $p < .001$). The remaining treatment factors ‘Emotional support’, ‘Instructional support’ and ‘Communication’ that were added in steps 2, 3 and 4 did not significantly contribute to the model, thus only the initial model predicted the outcome variable after one year of school attendance already well. This suggests that ‘Structure and control’ was the strongest factor adding to academic growth.

At the long term, it has been revealed that except for the structure, academic growth was enhanced as well as by the emotional support that the teachers offered to the children with ASD. Specifically, ‘structure’ in the long term explained 9% of the total variance of academic growth (model 1) ($R^2 = .09$, $F(1,43) = 4.1$, $p < .05$) while when ‘emotional support’ variable was added (model 2), this gave an extra 9% to the total variance explained ($R^2 = .18$, $F(1,42) = 3.10$, $p < .05$) (Table 4b).

The hierarchical multiple regression analysis using the forced entry method for IQ and Cognitive level at T1 showed comparable results. At the short term, the only factor that predicted the academic growth of the children with ASD was the ‘Structure and control’ explaining the 23% of the total variance ($R^2 = .23$, $F(1,42) = 10.6$, $p < .01$). The children’s cognitive level and IQ did not significantly contribute to the model. At the long term, structure at step 2 explained 11% of the total variance ($R^2 = .11$, $F(1,41) = 4.5$, $p < .05$), while when the emotional support was added at step 3, 19% of the total variance of academic growth was explained ($R^2 = .19$, $F(1,40) = 3.9$, $p < .05$).

The findings for the group of children with other developmental disorders showed that academic growth was predicted by the application of communication

Table 4a. Multiple regression (stepwise method): children with ASD at short term.

	<i>B</i>	SE B	β
<i>Step 1</i>			
Constant	-5.00	3.37	
Structure	5.80	1.71	.46**

Note: $R^2 = .21$ for step 1. ** $p < .01$.

Table 4b. Multiple regression (stepwise method): children with ASD at long term.

	<i>B</i>	SE B	β
<i>Step 1</i>			
Constant	4.85	3.79	
Structure	4.10	1.92	.31*
<i>Step 2</i>			
Constant	-.39	4.40	
Structure	3.21	1.89	.24
Emotional support	3.10	1.44	.30*

Note: $R^2 = .09$ for step 1; $R^2 = .18$ for step 2. * $p < .05$.

techniques at the short term only. Specifically, this model (Table 5) explained 13% of the sample's total variance regarding academic growth ($R^2=0.13$, $F(2,43)=3.07$, $p<0.05$). Here also the hierarchical multiple regression analysis using the forced entry method for IQ and Cognitive level at T1 showed a comparable result. At the short term, the only factor that predicted the academic growth of the children with other developmental disorders was 'Communication' at step 5 explaining 20% of the total variance ($R^2=0.20$, $F(1,37)=3.84$, $p<0.05$). Cognitive level and IQ did not significantly contribute to the model.

At the long term, no significant correlations between instructional factors and academic growth were found within the group of children without autism.

Discussion

Recently, a longitudinal study regarding the cognitive development of children with ASD in a special needs education schools in the Netherlands showed that these children as well as children with other developmental disorders display a growth of academic skills after two years of school attendance. These skills covered four dimensions of school-based cognitive knowledge, namely: reading ability, reading comprehension, spelling and arithmetic skills. However, it was also found that the gains in academic skills were somehow behind the general population norms (Manti, Scholte, and Van Berkelaer-Onnes 2011), suggesting that more research is needed to explore teaching strategies that promote the growth of the children's academic skills. The present study aimed to contribute to this by trying to identify instructional factors that might play a role in promoting or impeding the academic growth of children with ASD and other behavioural difficulties attending Dutch schools for special needs education.

The findings showed that the cognitive growth of ASD children both on the short and long term was significant and with medium effect sizes associated with the provision of structure, the provision of evidenced-based instructional methods and the teaching of communication techniques during the first year of treatment. The factor, emotional support correlated only with the long-term academic growth. The growth of academic skills of the group of children with other developmental disorders correlated only with the factor 'communication'. These findings suggest that the above-mentioned strategies adopted by the professionals of the special school seem to be more helpful for the developmental course of children with ASD than for children with other developmental disorders.

Table 5. Multiple regression (stepwise method): children with other developmental disorders at short term.

	<i>B</i>	SE B	β
<i>Step 1</i>			
Constant	3.78	2.52	
Structure	1.14	1.25	.14
<i>Step 2</i>			
Constant	-2.70	3.72	
Structure	.29	1.24	.04
Communication	4.02	1.76	.35*

Note: $R^2=.13$ for step 2.

* $p<.05$.

Multivariate regression analysis showed that the provision of structure was the strongest underlying factor that predicted the academic growth of the children with ASD at both time points. This implies that offering children with ASD a well-structured educational environment is a core factor to enhance academic growth. Our finding corroborates the many clinical observations in this area that also reached this conclusion. Numerous single case and small group studies have suggested that a highly structured environment decreases anxiety and confusion and therefore helps children with autism to enhance their performance and increase their academic gains, while at the same time reduce stereotyped or disruptive behaviours (Olley 2005; Quill 1995; Schopler 1997). Throughout a structured curriculum, professionals offer to their students predictability, support, organisation and smooth transitions (Lord and Bailey 2006; Noland, Cason, and Lincoln 2007), by actually addressing the core needs of children with ASD.

Interestingly, in the long-term academic growth was also partly predicted by the emotional support that the teachers offered to the children with ASD. This factor consisted of three different components namely, the expression of affectionate emotional support towards the child, the focus on the child's positive qualities and the creation of a personal bond. This is an important finding; as to date, little evidence exists about the importance that the relationship between ASD children and their teachers plays to their academic achievement. Nevertheless, this issue has been systematically studied in the mainstream education with findings showing that the existence of positive teacher–student relationships helps students to better adjust in the school, enhances their social skills, promotes academic performance and fosters students' resiliency in academic performance (Battistich, Schaps, and Wilson 2004; Birch and Ladd 1997; Hamre and Pianta 2001; Klem and Connell 2004). An explanation for the link between teacher–student relationship and academic performance comes from the attachment theory (Bowlby 1969) which explains how children may use their positive relationships with adults to organise their experiences. Specifically, it is suggested that students with close and qualitative relationships with their teachers will create secure-based relationships and trust which will help them to 'securely' explore the classroom environment, feel safe when making mistakes and feel more comfortable accepting the academic challenges necessary for learning.

A reason why research regarding the role of ASD children's bonding with their teachers is underexplored, might have been its roots in the old ideological belief that children with ASD 'lack of attachment behavior' and thus fail to form emotional bonds with others (Rutter 1978). Nevertheless, evidence now consistently shows that even though their social behaviours may often be very different from those of normally developing children, children with ASD do show attachment behaviours and in most cases are able to even form secure bonds with their caregivers (Capps, Sigman, and Mundy 1994; Dissanayake and Crossley 1996; Rutgers et al. 2004). Specifically, there is evidence showing that those children form bonds by reacting to their caregiver's departure, directing more social behaviour to the caregiver than to a stranger, and by increasing their proximity-seeking behaviour after separation from the caregivers (Rogers, Ozonoff, and Maslin-Cole 1991; Rutgers et al. 2004; Shapiro et al. 1987). Additionally, although ASD children may show some deficits in identifying emotions or in showing socially appropriate behaviour, they can develop cooperative social behaviour (Downs and Smith 2004; McGee, Feldman, and Morrier 1997). In fact Downs and Smith (2004) found in their study,

in which they compared the cooperative social behaviour of children with autism, typically developing children and children with social problems other than autism, that the autism group outperformed the ADHD/ODD group and did not differ significantly from typically developing children (Downs and Smith 2004).

Taking all the above into consideration, it is very likely that the emotional support that the teachers provided the ASD children through this study, might have helped them to create feelings of trust and security which at the long term increased their motivation and interest to school with a consequent positive educational achievement. As far as the group of children with other developmental disorders than ASD is concerned, it was shown that the core instructional factor affecting the academic growth of these children was the 'teaching of communication techniques' at the short term. This finding implies that there should be different parameters that stimulate the academic growth of those children due to the heterogeneity and the diverse nature of their difficulties.

Limitations – Implications

Considering that the results of the present follow-up study were not based on a treatment/control design, the findings should be interpreted with caution. Nevertheless, such a design is difficult to be implemented in a natural setting as most practitioners find it unethical to withhold treatment from children who need it. Another limitation was the use of a specific tool that is only used in the Netherlands to assess changes in school-based academic skills (CITO-test). This may have limited the comparability of our results with other studies. Thus, it is suggested that replications in other special school settings of the Netherlands be made in order to compare the results of the present study with other students. A limitation was also that the reliability of the questionnaire used in this study to determine the teaching strategies was only partly assessed, i.e. by using the internal consistency method. Further assessment of the reliability of this instrument is needed, like the inter-rater reliability. Finally, the lack of qualitative measures, throughout direct observations, that could give us more information about the quality of the treatment during the school hours, is a limitation of the present study.

Despite the above limitations, an important element of the study was the investigation of the factors that affect treatment in relation to individual and group progress in special schools. In addition, another strength of the study was the inclusion of a factor that was, thus, far under examined, namely, the role of the emotional bond between ASD students and teachers. Future interventions and studies should include this parameter in their investigations as it seems that a factor that some might have underestimated due to the social difficulties that children with ASD display, eventually has the potential to contribute positively to the academic growth of these children, but of course more research and replications are still needed.

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