

A longitudinal analysis of an ABA program's effects on adaptive behavior, autism spectrum symptoms, and language in school-age children



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CENTRAL PA REGIONAL AUTISM PARTNERSHIP
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ABSTRACT

This study investigated the effects of an ABA treatment over time on several variables, including adaptive behavior, symptoms of Autism Spectrum Disorders (ASDs), and communication competencies. In regards to adaptive behavior, caregivers reported that expressive language, written language, and community skills decreased with time; teachers reported that children's play and leisure skills, coping skills, and socialization skills increased over time. Mental health professionals reported that ASD symptoms decreased with time. Auditory and expressive comprehension scores increased with time as reported by the child's speech-language pathologist. Overall, results suggest that while the targeted skills are mostly changing in the expected direction as reported by school personnel, these changes may not be generalizing to the home environment.

INTRODUCTION

Background & Significance. Applied behavior analysis (ABA) is the process of systematically applying interventions based upon the principles of learning theory to improve socially significant behaviors to a meaningful degree and to demonstrate that the interventions employed are responsible for the improvement in behavior (Baer, Wolf & Risley, 1968). ABA is an inductive method of teaching with its application closely monitored through data collection and analysis. Specifically, ABA is the thoughtful arrangement of stimuli that occur just before and just after behavior in order to bring about desired effects. Because young children with ASD do not acquire effective behavioral repertoires under naturally occurring conditions and contingencies, precise teaching procedures such as prompting (with prompt fading), shaping, chaining, and functional behavior assessment are used to develop socially significant behaviors such as social and communication skills, play and leisure skills, self-care, academics, as well as reducing interfering or undesirable behaviors. The need for effective ABA programming is well documented in the literature (Eikeseth, 2009; Reichow & Wolery, 2009).

Present Study. This study investigated the effects of an ABA treatment over time on several variables, including adaptive behavior, symptoms of Autism Spectrum Disorders (ASDs), and communication competencies. Each variable was measured annually as part of the student's annual progress monitoring. Informants included the child's primary caregiver who reported on behaviors as observed in the home environment and the child's behaviors as observed in the school environment by a child's teacher or a mental health professional.

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HYPOTHESES

1. As a result of ABA treatment:
 - a. Adaptive behavior skills will increase.
 - b. Symptoms associated with ASDs will decrease.
 - c. Communication competencies, specifically auditory and expressive communication, will increase.

METHOD

Participants.

Data was collected from 43 students (38 males; 5 females) at The Vista School. The Vista School is a day school which provides education and therapeutic programs for children diagnosed with an Autism Spectrum Disorder. See Table 1 for other descriptive statistics.

Table 1. Descriptive Statistics

	M (SD) or %
Child age (Time 1)	7.75 (3.20)
Child gender: male/female	88/12
Child ethnicity: non-minority/minority	91/9
Child IQ	62.69 (28.09)
Caregiver's age	40.28 (7.95)
Caregiver's marital status ¹	86/14
Caregiver's years of education	14.84 (4.12)
Caregiver's current status of employment ²	95/5
Family income	\$35,150 (\$8,898)

¹ Dual/single; ² Employed/Unemployed

Procedure.

Caregivers and teachers of students complete several questionnaires administered yearly which measure adaptive skills and child behavior. Caregivers and teachers of students completed the adaptive skill measure, mental health professionals working at the school completed the questionnaire assessing autism symptoms, and speech-language pathologists (SLPs) rated communication competencies.

Measures.

• **Vineland Adaptive Behavior Scales, Second Edition (Vineland – II; Sparrow, Cicchetti, & Balla, 2005, 2008).** The Vineland – II measures personal and social skills needed for everyday living. Three domains assessed by this measure were included in the present analyses: Communication, Daily Living Skills, and Socialization.

• **Gilliam Autism Rating Scale (GARS – 2; South et al., 2002).** The GARS – 2 measures the severity of the targeted individual's autism spectrum symptoms. Items are grouped into three subscales, Stereotyped Behaviors, Communication, and Social Interaction, as well as an Overall Autism Index.

• **Preschool Language Scale (PLS – 4; Zimmerman, Steiner, & Evatt Pond, 2002).** The PLS – 4 measures progress in language development. Areas assessed include Auditory Comprehension and Expressive Communication. The PLS – 4 is only normed to age 6:11 but was utilized to measure language progress in predominantly nonverbal children and adolescents.

RESULTS

Hypothesis 1: Mean differences in adaptive behavior skills, ASD symptoms, and communication competencies. One-factor repeated measures ANOVAs were conducted to compare the effect of an ABA intervention on adaptive behavior, autism symptoms, and language over three years.

Hypothesis 1a. In regards to adaptive behavior, the majority of the domains and subdomains did not show significant change over time. There was a significant effect on expressive language [F (2, 44) = 12.13, $p < .001$], written language [F (2, 44) = 10.82, $p < .001$], and community skills as reported by the child's caregiver over time [F (2, 44) = 5.87, $p < .01$]. The child's caregiver reported that these skills were significantly decreasing over time. On the other hand, there was a significant effect on play and leisure skills [F (2, 80) = 10.04, $p < .001$], coping skills [F (2, 80) = 5.42, $p < .01$], and socialization skills [F (2, 80) = 8.56, $p < .001$] as reported by the child's teacher over time. The child's teacher reported that these skills were significantly increasing.

Hypothesis 1b. There was a significant effect on the overall Autism Index [F (2, 56) = 8.44, $p < .01$] as well as on Stereotyped Behaviors [F (2, 56) = 11.00, $p < .001$] as reported by a mental health professional working in the school over time. The child's mental health professional reported that these symptoms were significantly decreasing.

Hypothesis 1c. Finally, in regards to language skills, there was a significant effect on auditory comprehension [F (2, 52) = 17.29, $p < .001$] and on expressive comprehension [F (2, 52) = 16.41, $p < .001$] as reported by the child's SLP over time. The children's SLPs reported that these skills were significantly increasing.

Table 2. Hypothesis 1

	df	F	Time 1	Means Time 2	Time 3	Direction of change
Vineland – 2 (Caregiver)						
Expressive language	(2, 44)	12.13***	5.61	5.22	4.39	Decreasing
Written language	(2, 44)	10.82***	8.17	7.87	7.22	Decreasing
Community skills	(2, 44)	5.87**	6.26	6.43	5.52	Decreasing
Vineland – 2 (Teacher)						
Play and leisure skills	(2, 80)	10.04***	6.76	7.39	7.51	Increasing
Coping skills	(2, 80)	5.42**	7.21	7.98	7.88	Increasing
Socialization skills	(2, 80)	8.56***	54.17	56.79	57.62	Increasing
GARS – 2 (MHP)						
Autism Index	(2, 56)	8.44**	91.45	88.17	82.10	Decreasing
Stereotyped Behaviors	(2, 56)	11.00***	8.38	7.34	6.00	Decreasing
PLS – 4 (SLP)						
Auditory Comprehension	(2, 52)	17.29***	51.33	60.59	61.93	Increasing
Expressive Communication	(2, 52)	16.41***	44.63	47.89	51.89	Increasing

* $p < .05$, ** $p < .01$, *** $p < .001$

Note: MHP – Mental Health Professional, SLP – Speech-Language Pathologist

DISCUSSION

Conclusions. The purpose of this study was to investigate the effects of an ABA treatment on caregiver report of adaptive behavior, as well as school personnel report of adaptive behavior, ASD symptoms, and communication competencies. In regards to adaptive behavior, neither caregivers nor teachers reported significant change in either direction over time for the majority of skills. Caregivers reported that their children's expressive and written language, as well as their children's community skills, decreased with time. On the other hand, teachers reported that children's play and leisure skills, coping skills, and socialization skills increased with time. Mental health professionals rated their student's ASD symptoms overall, as well as stereotyped behaviors, as decreasing with time. Finally, according to children's SLPs ratings, both auditory and expressive comprehension scores increased with time. Overall, results suggest that while the targeted skills are mostly changing in the expected direction as reported by school personnel, these changes may not be generalizing to the home environment.

Limitations. There are a number of limitations to this study. First, all data were measured by self-report. Future studies should incorporate observational data. The sample was somewhat restricted in cognitive ability, ethnicity, and gender. Future research should establish whether these findings can be generalized to more diverse ASD populations. Finally, the study has no control group; therefore, it is not known whether change occurred as an effect of time only.

Implications. Despite these limitations, the present study expands existing knowledge of the potential efficacy of ABA treatments for children/adolescents with moderate to severe ASD symptoms. More importantly, results inform clinical work as to in which skill sets ABA treatment effects change and which skills sets it may not be as effective in treating.

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