# Change in autism classification with early intervention: Predictors and outcomes

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ABSTRACT

The current study characterized stability and changes of autism diagnostic classification with intervention in very young children and examined pre-treatment predictors and post-intervention outcome. Sixty-eight children diagnosed with autism, aged 18–35 months ($M = 25.4$, SD = 4.0) participated in the study. Children underwent comprehensive evaluations at pre-intervention time (T1) and after 1 year of intervention (T2). The evaluation included autism classification based on Autism Diagnosis Observation Schedule (ADOS) original algorithm, cognitive abilities (Mullen) and adaptive skills evaluation (Vineland). At T2, two groups were identified: the Unchanged group ($n = 53$) remained in the same autism classification and the Improved group ($n = 15$) changed classification to Autism Spectrum Disorder (ASD) ($n = 13$) or Off Spectrum ($n = 2$). The verbal domain scores at T1 was the only significant variable that distinguished the two groups. Specifically, the Improved group had better receptive language scores than the Unchanged group. The Improved group gained significantly more than the Unchanged group in all the outcome measures (cognitive, adaptive and reduction of stereotyped behaviors). Two distinct subtypes of autism were identified, one with stable autism symptomatology, poor verbal abilities and limited cognitive and adaptive gains, and a second type with better baseline verbal abilities and overall better response to intervention.

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Autism Spectrum Disorders (ASDs) form a heterogeneous set of clinical syndromes. Great variability has been described in the severity of social-communication symptoms, cognitive and verbal skills at diagnosis and in response to intervention, as some will show limited progress while others make rapid and remarkable gains. Recent awareness of ASD among parents and professionals and the utility of existing state-of-the-art diagnostic methods have led to an increased diagnosis of autism in early age and to the implementation of early intensive intervention.

Recently, studies have focused on measuring the outcome of intervention in young children diagnosed with ASD on cognitive, language and adaptive skills. However, evidence regarding changes in autism severity and ASD classification using standardized tests has been limited due to the scarcity of follow-up outcome studies. Several studies looked at autism diagnostic classification stability over time in children diagnosed with ASD in the second year of life. Turner and Stone (2007) used the Autism Diagnostic Observation Schedule (ADOS) (Lord, Rutter, DiLavore, & Risi, 1999) test to assess diagnosis stability between the ages of 2 and 4 years, reporting that 32% of children diagnosed with ASD at 2 years did not meet the criteria for ASD at age 4. Chawarska and colleagues reported that symptoms of autism and PDD-NOS at age 2 were pronounced and the stability of the clinical diagnosis was high, but highlighted advantages and limitations in using standardized tests, such as the Autism Diagnostic Interview Revised (ADI-R) (Lord, Rutter, & LeCouteur, 1994) and the ADOS (Chawarska, Klin, Paul, & Volkmar, 2007).

Current studies have looked for possible predictors of outcome for children diagnosed with ASD at an early age. The child's cognitive level at diagnosis has been found in many studies to have a significant impact on outcome. In a longitudinal study, a group of 17 preschoolers with autism or PDD-NOS was classified into a high functioning group (DQ > 63) and a low functioning group (DQ < 49). The high functioning group progressed over time with significant improvement in DQ and linguistic skill, while the low functioning group made little progress and some showed regression in DQ scores and speech (Gabriels, Hill, Pierce, & Rogers, 2001). Several other studies have shown that the cognitive ability of children with ASD correlated with outcome of therapy (Stevens et al., 2000; Szatmari, Bryson, Boyle, Streiner, & Duku (2003); Volkmar, 2002; Volkmar, Cohen, Bergman, Hooks, & Stevenson, 1989; Waterhouse et al., 1996). Some studies have noted that the severity of the child's baseline social deficits was related to a change in autism diagnosis category and to language outcome (Ben-Itzchak & Zachor, 2007; Turner & Stone, 2007).

Studies looking at language skills as predictors of outcome have identified early verbal and nonverbal communication as important predictors of outcome of adaptive behavior and communication skills, regardless of intervention type or intensity (Lord & Schopler, 1989; Stevens et al., 2000; Tager-Flusberg & Joseph, 2003). The presence of language abilities, even abnormal ones such as echolalia, might predict positive outcomes for a younger group of children with autism, but not for an older group (Fenske, Zalenski, Krantz, & McClannahan, 1985). Szatmari et al. (2003) reported that initial cognitive and language abilities predict progress in communication and social skills but not in repetitive and stereotyped behaviors. Initial IQ and receptive language raw scores best predicted the progress of children with ASD after 2 years of intervention.

The current study, examined a wide range of child and parental factors that might contribute to the variability of autism diagnostic classification with intervention. This study selected a carefully defined sample of very young children with autism and used quantitative measures to determine autism diagnostic classification. The current study is the first to investigate patterns of response to intervention in cognitive and adaptive domains and in reduction of stereotyped behaviors in regard to the change or the stability of autism classification.

## 1. Methods

### 1.1. Participants

The study was conducted in accordance with Helsinki Committee requirements. Informed consent was obtained from all parents.

Seventy-four children were referred for evaluation before enrollment in a center-based intervention program at the Autism Center at Assaf Harofeh Medical Center. The diagnostic process