

**BAR-ILAN UNIVERSITY**

**The Role of Executive Functions and Adaptive  
Behavior in Social Interaction of Minimally  
Verbal Children with ASD**

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## Abstract

**Background** - Social communication is used in order to transfer social messages (Eigsti, de Marchena, Schuh & Kelley, 2011), for purposes of behaviour regulation, social interaction and social sharing (Maddox, 2010; Dykstra, Boyd, Watson, Crais & Baranek, 2012). Children with ASD (Autism Spectrum Disorder) show delayed and deficient social communication (American Psychiatric Association, 2013) that impact the child's ability to interact efficiently with his peers (Hay, Payne, & Chadwick, 2004). This study focussed on minimally verbal children with ASD (MVCwA). The verbal abilities of these children range from a complete inability to speak or string words together or those who use sounds or syllables to communicate to children who have a limited spoken vocabulary of up to 30 words in structured sentences (Whittaker, 2011; Kasari, Brady, Lord & Tager-Flusberg, 2013; Tager-Flusberg & Kasari, 2013). MVCwA make up 30% of the total ASD population (DiStefano, Shih, Kaiser, Landa & Kasari, 2016). Despite representing a sizeable minority, up until now, there has been very little research examining the social communication development in school age children who are identified as MVCwA, even though this age group requires even greater social interaction (Fabes, Martin & Hanish, 2009).

**Research goals and objectives.** The purpose of this research was to examine the role of executive functions and adaptive behaviour in the context of social communication interaction of school aged MVCwA. The study aimed to characterize the social communication profile of these children as well as to broaden the limited clinical knowledge of this heterogeneous group, in order to further understand how to provide practical, social and educational interventions.

**Study Hypotheses and Questions.** The first hypothesis was that there would be a positive correlation between executive dysfunction and dysfunctional social communication abilities in MVCwA. The second hypothesis was that there would be a positive correlation between low adaptive behaviour and dysfunctional social communication abilities in MVCwA. The third hypothesis was that there would be a positive correlation between executive dysfunction and low adaptive behaviour. The fourth area of research examined the extent to which the profile and background of this group (including severity of autistic dysfunction, social dysfunction, chronological age and cognitive ability) as well as the measures of executive functions and adaptive behaviour contribute to the explanation of the variance in social communication. In addition, the study examined whether chronological age affects cognitive, functional and social measures.

**Methodology.** The current study was part of a larger project that examined joint attention, cooperation, and conversational abilities of MVCwA between the ages of 8 and 16. Fifty-four children participated in the study. The background information of the participants was collected at the start of the study. The teachers completed the BRIEF questionnaire, which evaluates the executive functions that contribute to regulation of behaviour and meta-cognition. Teachers used the Vineland Questionnaire to evaluate adaptive behaviour with an emphasis on communication and socialization. Social communication was evaluated using the M-cosmic-adp (Modified-Classroom Observation Schedule to Measure Intentional Communication) by analysing video recordings of social play interactions with another child and a staff member who facilitated the interaction between the children. The coding of the video recordings was conducted by two evaluators, both experts in special education. They analysed the communicative role of the children during the interaction (whether they

were active or passive), with whom they communicated (the other child, the staff member or both), as well as the communicative function that was observed (regulating behaviour, social interaction or social sharing). They also categorized the type of communication observed (verbal, action or non-verbal).

**Outcomes-** The first hypothesis was partially confirmed. It was found that when a child had higher abilities in some of the executive functions as well as in the three general factors (regulating behaviour, meta-cognition and the overall score of executive functions) there were greater indications of social sharing during the social interaction. This finding is in line with the initial hypothesis, that there would be a positive correlation between executive dysfunction and dysfunctional social communication abilities. In addition, there was a correlation between executive functions and communicative activities. We found that children with lower meta-cognitive executive function scores performed fewer communicative actions directed toward the other child or toward both the other child and the staff member present. This finding too is in line with the initial hypothesis. However, the results showed that children with lower executive functions (regulating behaviour and meta-cognitive) performed more actions directed at the staff member than children with higher levels of executive functioning. This finding does not support the hypothesis that executive dysfunction would be positively correlated with lower social communicative behaviour. We also found that a child with meta-cognitive executive dysfunction was less verbal when the interaction involved both a second child and a member of the staff. This is in line with our initial hypotheses.

The second hypothesis concerning the elements of social communication (communication partner in relation to the communicative role, style of communication) was confirmed, Better adaptive behaviours, (especially social

communication) led to less passive behaviour observed during interactions with the staff member. In addition, there was a positive correlation between active interactions between the child toward both of the communication partners (the other child and the staff member) and better adaptive social behaviours in general and during play and leisure activities in particular. The more efficient adaptive behaviours between the subjects were related to more social sharing behaviours during the interactions. The utilization of multiple types of communicative behaviours was also found to be connected to more successful socialization, especially during play and leisure activities.

The third hypothesis was also confirmed. There was a correlation between more efficient meta-cognitive executive function abilities and adaptive behaviours in play and leisure activities. In addition, it was found that the meta-cognitive executive function ability to organize the environment had a significant connection to adaptive behaviours (interpersonal relationships, play, leisure activities and problem solving).

The statistical regression analysis contributed to understanding the variance of the role of the style of the children's communication during the interaction (active and passive behaviour) and to understanding the communicative function of their behaviour (regulatory behaviours, social interaction and social sharing). The variance in passive behaviour was mainly associated with the level of disabilities and of adaptive behaviour. The level of active behaviour was associated with the level of verbal IQ and the interaction between the age of the subjects and their performance IQ. There was a statistically significant correlation between higher performance IQ scores and lower active behaviours for the group of the younger children.

The variance in regulatory behaviours was associated with the level of disabilities. The variance in social interaction was mainly associated with the

interaction between the age of the subject and performance IQ scores, but neither of these relationships were statistically significant. The variance of social sharing was associated with the interaction between the age of the subject and the level of executive functioning. However, only in the younger age group was there a statistically significant correlation between better executive functions and more social sharing during interpersonal interactions.

**Conclusions-** The results of this research have significant practical and clinical implications. The findings show that it is possible to outline a social communicative profile in the MVCwA population of school age. The findings contribute to existing knowledge, by showing that low adaptation behaviours, higher levels of disabilities and low executive functioning can predict passive behaviour in social interactions.

This research discovered a number of correlations between executive functioning pertaining to the organization of the environment and different social and communicational behaviours in the MVCwA population. These findings emphasise the importance of an organized environment to enable and support this population in communicating successfully in social situations. The external environment can compensate for the lack of internal organization.

This research found a connection between social sharing and executive functions, in particular those that regulate behaviours (especially emotional control) and with meta -cognitive functions (especially organization and monitoring). These were found to contribute to successful interactions between the subjects and their peers or with both a peer and a staff member. Social sharing was also found to be connected to the socialization domain of the adaptive behaviours. Most significantly, it was found that in the younger population, better executive functioning and adaptive

behaviour skills predict increased social sharing behaviours. Therefore, it is advisable to introduce an intervention program in primary schools that focuses on the development and reinforcement of regulating behaviours emphasizing emotional control, environmental organization and monitoring behaviours. Such a program would develop and improve social sharing behaviours.

The results showed a connection between meta- cognitive executive functions and adaptive behaviours during play and leisure activities. This indicates the importance of building an intervention program to increase playing abilities alongside the reinforcement and development of meta- cognitive abilities.

The final conclusion concerns the research population, MVCwA, and the staff that works with them. The adults seem to act as an external regulating factor and the children depend on them to overcome executive dysfunctions. Thus the adult or caregiver has a significant role in the socialization processes of MVCwA. At the same time, it is necessary to develop intervention programs aimed at developing self-regulating behaviours, in order to minimize the level of dependence on the staff or on the significant adults who take care of these children .