

BAR ILAN UNIVERSITY

**Peer Collaboration Intervention for Minimally
Verbal Children with Autism Spectrum
Disorder in Relation to their Sensory Profile**

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Submitted in partial fulfillment of the
requirements for the Master's Degree
in the School of Education

Bar-Ilan University

Ramat-Gan, Israel

2017

Abstract

Background

Autism Spectrum Disorder (ASD) is a developmental disorder characterized by difficulties in social and communicative skills, in addition to a narrow range of interests and repetitive behavior (*DSM-V*, American Psychiatric Association, 2013). Minimally Verbal Children with ASD (MVCwA), with no more than 30 functional words, are characterized by severe communicative and social deficits due to their impairment in using spoken language efficiently for communicative purposes (Wan, et al, 2011). In fact, as many as a quarter of MVCwA show a deterioration in communicative and social skills, as well as avoidance from social interaction the older they get (Tager- Flusberg & Kasari, 2013).

Most of the research which examined MVCwA focused on developing language and functional communication (Kasari, et al, 2010; Pickett, Pullara, OGrady & Gordon, 2009 ; Tager-Flusberg & Kasari, 2013) or developing alternative language through Augmentative and Alternative Communication (AAC) (Tager-Flusberg & Kasari, 2013; Gordon, et al, 2011; Howlin, Gordon, Pasco, Wade & Charman, 2007; Kasari, Tager-Flusberg & Cooper, 2010; Kasari, et al, 2014; Wan, et al, 2011; Pickett, et al, 2009). There are very few research studies which focused on developing social interaction of MVCwA using an adult partner (Franco, Davis & Davis, 2013; Goods, Ishijima, Chang, & Kasari, 2013; Shire, et al, 2015), as well as research focusing on developing social skills among high functioning children with ASD with their peers (Bauminger, 2002; Bauminger, 2007ab; Laugeson, Gantman, Kapp, Orenski & Ellingsen, 2015; Radley, Ford, Battaglia & McHugh, 2014; Waugh & Peskin, 2015). Actually, no research was found which focused on developing social skills of MVCwA with their peers.

The ability to cooperate in social interactions is one of the most important skills which when combined with conversation skills, make up social functioning (Barminger, 2007ab). Cooperation with peers is a process in which individuals work together in a synchronized and coordinated fashion in order to complete a common task (Fawcett, & Garton, 2005; Rochelle, & Teasley, 1995). These cooperative skills were found deficient in children with ASD, when

compared to peers with developmental delays (Colombi, et al, 2009; Liebal, Colombi, Rogers, Warneken, & Tomasello, 2008).

Another deficiency characteristic of most children with ASD is a deficiency in sensory processing (SP) (Baker, et al, 2008; Lane, Young, Baker & Angley, 2010; Tomchek & Dunn, 2007). SP is the process in which the sensory systems in the brain receive information from sensory stimuli, decode that information and respond accordingly (Baker, Lane, Angley & Young, 2008; Ben-Sasson, Carter & Briggs-Gowan, 2010; Hilton, et al, 2010). A connection has been found between sensory processing deficiencies and a social skills deficit among individuals with ASD (Hilton, Graver & LaVesser, 2007; Hilton, et al, 2010; Lane, Young, Baker & Angley, 2010; Lundqvist, 2015).

Study goals and objectives

Despite the severe social impairment among MVCwA and despite the knowledge that cooperation is one of the most important skills needed for social functioning, no research has been found which attempts to develop social cooperation among MVCwA interacting with their peers. This is the novelty of this current research. The main goal of this study is to examine the efficiency of an intervention program which promotes social cooperation among MVCwA interacting with their peers in improving their social-communicative skills. An additional goal is to examine the associations between the different types of sensory profiles, nonverbal IQ and language comprehension of MVCwA who received the intervention program and the percentage of improvement in spontaneous social communication following the intervention program.

Study hypotheses

The first hypothesis is that MVCwA who received an intervention program which promotes social cooperation with peers will show progress in spontaneous social communication and in their abilities to adjust to social -communicative situations, compared to a control group of MVCwA who did not receive any such intervention. The second and third hypotheses is that the type of sensory profile and the verbal (language comprehension) and nonverbal IQ of the MVCwA in the treatment group will contribute to children's progress following the

intervention, although it is hard to predict the direction of this contribution. These hypotheses also dealt with the question of whether there is a difference in the relationship between these factors (sensory profile, verbal and nonverbal IQ) and between the percentage of improvement in social communication within two points of time (before and after the intervention) for children from the treatment group versus the control group.

Methodology

The present study is part of a wider research study which examined social-communicative abilities among 54 MVCwA children between the ages of 8-16, 36 of whom participated in this particular study. The children were divided randomly into equally numbered groups, 18 children in the treatment group who received intervention and 18 children in the control group. The children who were chosen for the study had limited verbal skills of up to only 30 functional words, tested moderate cognitive deficiencies or above in nonverbal and language comprehension abilities according to the Raven and Peabody Tests, and they all had been clinically diagnosed with Autism by previous testing, as well as by the SCQ.

The various measurements were evaluated by evaluators with special education backgrounds, who were blind to the study conditions and to whether a child was in the treatment or control group. The background tests given prior to the intervention were: Social Communication Questionnaire (SCQ; Rutter, Bailey & Lord, 2003)- A parent Questionnaire confirming their child's clinical diagnosis and the severity of the disability, Raven's colored progressive matrices (Raven, 1976)- testing for nonverbal IQ and the Peabody Picture Vocabulary Test-III (Dunn & Dunn, 1997)- testing for language comprehension skills. In addition, measurements to assess the evaluation of the intervention were given before and after the intervention. These measures included: The Sensory Profile School Companion Questionnaire (SPSC; Dunn, 2006)- a teacher questionnaire to evaluate differences in sensory profiles, Vineland Adaptive Behavior Scale (Sparrow, Balla, & Cicchetti, 1984)- a teacher questionnaire to evaluate the ability of a child to adjust to communicative and socialization abilities, accompanied by an observation which was encoded using an adapted scale of The Modified-Classroom Observation Schedule to Measure Intentional Communication M-

COSMIC (Clifford, et al, 2010), to test spontaneous social communication. Moreover, in order to evaluate and critique the intervention program and to assure that it was executed consistently by the teachers taking part in the intervention, Fidelity questionnaires were filled out once every two weeks by those teachers.

The intervention program, which was carried out with a dyadic structure, was given by teachers during a period of three and a half months, four sessions a week (each session lasted 45 minutes). The goal of the intervention was to advance the ability to cooperate and to promote pro-social skills of MVCwA dyads. Other goals were: to teach joint decision making amongst peers, to improve joint performance abilities amongst peers, to develop sharing skills amongst peers, to develop giving help and asking for help amongst peers and to develop encouragement and support skills amongst peers.

Results

In accordance with the first hypothesis, children from the treatment group showed progress in their spontaneous social communication skills and in their ability to adjust to social-communicative situations, compared to children from the control group. While children from the treatment group showed a decrease in passive behavior toward an unspecified partner (adult or peer), a higher tendency to have a social interaction with a peer, an increase in the development of interpersonal behaviors and a higher tendency in social skills during play and leisure time, the control group showed a decrease in active social behaviors and social interaction amongst their peers, a lower tendency for social behavior during play and leisure time and yet an increase in some of the spontaneous social and communication skills towards adults (while showing a decrease towards their peers). In a slight contrast, children from the control group were found to have a decrease in passive behavior toward their peers.

With regard to the second hypothesis, the type of sensory profile did indeed contribute to the progress of children in the intervention program (without committing to the type of the sensory profile or the direction of its contribution). Among children from the treatment group, the more severe the disability of poor registration and sensation avoiding, the higher the children measured on some of the spontaneous social and communicative skills (such as social

interaction, verbal and nonverbal behaviors and communication activities) towards various partners at the end of the intervention. There is one exception to this pattern, in that the less severe the disability of sensation avoiding, the higher the children measured on regulatory behaviors toward adults in the treatment group. In addition, in answer to the second half of the second hypothesis, different significant correlations were found between the extent of adjusting behaviors according to profile sensory patterns and the percentage of improvement following the intervention for both research groups (treatment and control).

Regarding the third hypothesis, no relation was found neither between nonverbal IQ nor language comprehension and progress in spontaneous social communicative skills following the intervention amongst the treatment group. In answer to the second half of the hypothesis, a difference was found between the treatment and control groups, whereas in the control group, a relation was indeed found between nonverbal IQ and the percentage of improvement within two points of time (before and after the time period of the intervention) when no such relation was found in the treatment group.

Conclusions

This study was the first to examine the efficiency of an intervention program to promote cooperation among peers in improving social-communicative skills among MVCwA. No such study has ever dealt with improving peer social-communicative skills in MVCwA, despite the fact that this population suffers from severe disabilities in this area (Tager-Flusberg & Kasari, 2013; Wan, et al, 2011).

The present study indicates that an intervention program to advance cooperation amongst MVCwA does indeed lead to an improvement in social-communicative skills and perhaps even decreases their dependence on adults to intervene in peer interactions. In addition, the suggested intervention used in this study could significantly improve social-communicative skills for children who have more damaged sensory patterns than others (such as poor registration and sensation avoiding), and can be used with a heterogenic cognitive population.

It is, however, important to note that the results do not fully corroborate the study hypotheses. It is possible, among other things, due to the small sample of the study which might

not necessarily reflect a wider population, due to the short intervention period, due to the measurements used which may not have suited the heterogenic population of the MVCwA who participated in the study or due to the different teaching styles of teachers who participated in the intervention.

The results of this study, despite these limitations, imply the need to continue to develop research in the area of peer social-communicative skills among MVCwA, as well as to implement similar interventions in educational environments in order to decrease their social isolation and improve their social interaction.