

**Social communication behavior with peers in natural interactive situations of children with high functioning autism**

Analia Shefer

School of Education

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## Abstract

**Theoretical background:** Children's social-communication behaviors with their peers are a central aspect of early childhood development. Deficits in social-communication are a significant characteristic of autism spectrum disorder (ASD) and are more noticeable when these children interact with their peers, as opposed to interactions with adults. Children with ASD reveal difficulties in verbal and nonverbal communication, peer interaction, and reciprocal behavior as well as in conversing with others and participating in social play and social-pretend play (Dawson et al., 2004; Locke, Shih, Kretzmann, & Kasari, 2016; Wimpory, Hobson, & Nash, 2007). Autism spectrum disorder is also characterized by repetitive behavioral patterns and restricted interests, that affect the social-communication behavior of children with ASD with their peers (Kim & Lord, 2010). In light of these difficulties, it is important to observe the peer interactions of children with ASD in order to characterize their strengths and weaknesses in a variety of social situations and settings. The information gathered via direct observation is critical for comprehensively assessing these children's social-interactive skills and for developing appropriate interventions (Spears, Tollefson, & Simpson, 2001). Yet, despite this topic's importance, currently available observational measures are insufficient, calling for the design and validation of a broad assessment tool to comprehensively examine the social-communication skills of children with ASD as observed directly during interactions with their peers in diverse situations within their natural settings.

**Research aim:** This study aimed to comprehensively examine the diverse social-communication behaviors displayed by preschoolers with high-functioning ASD (HFASD; IQ > 75) as observed during their natural interactions with peers in the children's inclusive educational setting. To address this aim, the *Autism Preschool Peer Interaction Observation Scale* (APIOS) was developed for the purpose of this study, and the young children with HFASD ages 3-6 years were compared to a cohort of young children with typical development (TD) who were matched for chronological age and mental age. This study design enabled not only examination of group differences in social-communication behaviors in naturalistic social situations but also investigation of the new APIOS tool's validity and reliability. The two preschooler groups' social-communication skills as directly observed via the new APIOS tool were compared to groups' skills as assessed on two standardized questionnaires measuring social-communication behavior: adaptive skills using the Vineland Adaptive Behavior Scales, Second Edition (VABS-II) and social responsiveness using the

Social Responsiveness Scale, Second Edition (SRS-2). In addition, correlation analysis was computed between the APIOS observations and the VABS-II and SRS-2 questionnaires. Furthermore, the new APIOS tool's intercorrelations with participants' IQ scores (full, verbal, and nonverbal) and with participants' ASD severity (using the ADOS-2) were analyzed.

**Methodology:** Participants comprised 85 children ages 3-6 years: 50 children with HFASD, and 35 children with TD as the control group, who were matched with the children with ASD for age, IQ, and maternal education levels. Two background measures were collected: the Mullen Scales of Early Learning, AGS Edition (Mullen, 1995) to assess IQ scores; and the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord et al., 2012) as the gold standard for diagnosing ASD and assessing symptom severity. Children's social-communication abilities were observed directly using the APIOS developed for the purpose of this study. The APIOS includes 9 categories and 17 subcategories for adaptive social functioning (Non-verbal communication, functional and complex social behaviors, pro-social behaviors, social and imaginary play, conversation, range of facial expressions and appropriate emotional expression) and 3 non adaptive behaviors (aggressive, stereotyped-repetitive and, irregular sensory interest). At the end of a 3-hours observation, the observer rated children's behaviors on a rating scale from 1 (typical) to 4 (very atypical behavior). Children were also assessed using two standardized questionnaires: the VABS-II (Sparrow, Cichetti, & Balla, 2005), which assesses the independent adaptive functioning skills necessary for daily life, and the SRS-2 (Constantino & Gruber, 2012), which assesses social capabilities. Children's background measures (ADOS-2, Mullen) were administered individually in a first session at the preschool. The 3-hour qualitative APIOS observation of children's peer interactions was conducted in a second session spanning various inclusive preschool activities (e.g., indoor and outdoor free play, mealtime). During one of these two visits, the researcher met with the child's teacher, who completed both the VABS-II and SRS-2.

**Results:** Overall, findings provided support for study hypotheses. Significant group differences (HFASD/TYP) were found on all APIOS categories and subcategories, with the TD group outperforming the HFASD group, as expected. As hypothesized, some of the observed social-communication behavior categories and subcategories on the APIOS were more difficult for children in both groups to perform well (e.g., prosocial behavior, social-pretend play, conversation) compared to other observed behavior categories (e.g., nonverbal



communication, functional social behavior, appropriate emotional expression). Overall, the APIOS observations yielded a similar profile of social-communication behaviors for preschoolers in the two groups, but a much more severe social-communication deficit was evident from observations of the clinical group (HFASD).

Correlation analyses demonstrated that most of the APIOS social-communication categories correlated nicely with the VABS-II social-communication domains and with social responsiveness as measured on the SRS-2, with children who observed to demonstrate more intact peer relations on the APIOS, had better adaptive and socialization skills on the VABS-II, and less social atypicalities on the SRS-2. In addition, better social functioning as measured by the VABS-II and the SRS-2 questionnaires was found among children who were observed to exhibit fewer stereotypical behaviors using the APIOS. Those children with HFASD who had higher IQ scores displayed better social-communication functioning on the APIOS. Likewise, among the children with HFASD, those with less deficient social affect (ADOS-2) demonstrated higher APIOS scores on observed nonverbal communication, social-pretend play, discourse, and range of facial expression. Furthermore, the children with HFASD who showed more severe stereotypical behaviors (ADOS-2) were observed as exhibiting less involvement in social-imaginative play (APIOS) compared to their age-mates with TD.

The finding that the APIOS tool differentiated between the groups in terms of social-communication behavior testifies to its construct validity. In addition, the correlations found between the APIOS and the two valid standardized measures for assessing social-communication behaviors (VABS-II, SRS-2) testify to the APIOS tool's convergence validity. Finally, the correlations found between the APIOS and measures of IQ (Mullen) and autism severity (ADOS-2) correspond with the empirical literature, thus providing additional support for the new tool's strength.

**Study conclusions and implications:** The current study extends available knowledge on the larger social-communication deficits of preschoolers with HFASD compared to their age-mates with TD, while providing a novel empirical observation instrument to assess social-communicative and maladaptive functioning. The APIOS observation tool is unique in its inclusion of a wide range of social-communicative and maladaptive behaviors – observed in children interacting naturally with peers in inclusive preschools – and in its qualitative evaluation of those behaviors' quality. The strong validity and reliability of the APIOS

indicate its viability for standardizing peer interaction assessment in familiar settings. Assessment through direct observation of preschoolers with HFASD in their natural environments, where these behaviors occur spontaneously, not only can provide knowledge about these young children's patterns of social-communication with peers but also can contribute to the design of effective personalized intervention programs by helping set appropriate and precise peer-interaction goals for each child. The APIOS can also be used to measure outcomes of early childhood intervention targeting peer interaction. Moreover, considering that peer interaction is considered a core deficit in children with ASD, the knowledge gleaned from future widespread utilization of the APIOS may shed light on core issues in this disorder's definition. Thus, it may be a fruitful addition to formal diagnostic measures such as the ADOS-2 and the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, & LeCouteur, 1994). Furnishing critical information on preschoolers' social-communication during spontaneous peer interaction in natural environments can lead to a broader, fuller picture of these young children's functioning.