

## **Chapter 4**

### **Developmental Changes in Social Functioning**

Bauminger-Zviely, N. (2013). *Social and academic abilities in high-functioning autism spectrum disorders (chapter 4, pp. 88-109)*. New York: Guilford press.

As children with TYP grow, from the youngest ages through childhood, adolescence, and then young adulthood, their social and emotional functioning rapidly changes and transforms, both in frequency and quality. Yet, children with HFASD reveal considerable difficulties in each and every skill required for competent social functioning. In former chapters pertaining to social development, this book has focused primarily on school-age children, from elementary school through secondary school. To complement these chapters, the current chapter undertakes a developmental perspective in which a lifespan description to the social deficit is provided, starting from infancy up to young adulthood.

#### **Overview of the Social Challenges Experienced during TYP**

As reviewed by Rubin, Bukowski, and Laursen (2009) in their handbook on peer interaction, as children grow and develop, they must cope with substantial, ever-increasing demands in order to function effectively as social human beings, whether in one-on-one interactions, small or large groups, or ongoing friendships. Rapid transformations occur in the frequency and quality of social experiences. Time spent with peers increases significantly from the early ages (preschool) to older ages (middle childhood, adolescence, and then young adulthood). Moreover, social behaviors become less straightforward, thereby demanding much more effort to decipher and perform. The spontaneous, authentic behaviors and emotions exhibited between peers at younger ages are gradually replaced by mediated or inhibited behaviors and hidden emotions, requiring children to acquire deeper social and emotional understanding and knowledge in order to comprehend interpersonal situations and participate in them effectually. To a great extent, as described in the introductory chapter, these progressively demanding social interactions and relationships necessitate socio-cognitive and socio-communicative

competencies such as children's ability for joint attention and for understanding their own and others' mental states (ToM).

Furthermore, as children grow, games and social activities are gradually replaced with verbal conversation, thereby emphasizing the importance of emerging conversational and self-disclosure skills. Such social communication efforts also require greater language proficiency on the part of the children. On the other hand, during preadolescence and middle childhood, many social encounters, especially for boys, comprise outdoor ball games such as basketball and football, which involve social coordination in large groups as well as good physical skills. Over the years, children's friendships with peers become more complex and intimate, and ongoing long-term reciprocal interactions result in affective closeness and intimate bonding (see Chapter 2). Moreover, toward puberty and young adulthood, romantic relationships evolve, with their unique social demands.

Adding to this complexity, the school transitions from preschool to elementary school, from elementary to middle school, from middle to high school, and from high school to "real life" as a young adult all entail mounting challenges regarding the social environment. From a more predictable, structured social environment with few teachers and peers and with one main figure who is responsible for the child's needs, children's experience shifts to much more chaotic, unstructured environments with many teachers and peers and frequent changes in daily routine. These shifts lead to rising demands in terms of children's executive functioning, such as flexible cognitive shifting and organizational and planning skills (see introductory chapter). Adolescents' transition from the high school setting into young adulthood poses another major challenge because, despite its complex interpersonal conditions, high school nonetheless offers a social framework. Young adults who do not proceed directly from their educational setting into another structured social group or network face possible exclusion from any social setting whatsoever, which likely escalates their risk of loneliness and depression.

### **Social Functioning across Development in HFASD**

Individuals with HFASD, as described in the earlier chapters in this book, demonstrate deficits in all of the domains necessary for successful social functioning and for coping with the multiple social transitions from each developmental period to the

next. These deficits pertain to socio-cognitive skills (see Chapter 1), peer interactions and friendships, language-conversational skills (see Chapter 2), and more. Due to the fact that in the former chapters of this book I described the major social difficulties experienced in HFASD during the school ages (mostly middle childhood and adolescence), the current chapter describes the early markers of social deficits and the early development of social play and friendship from infancy and toddlerhood and continuing into the preschool years, and also briefly presents social functioning issues during the transition to elementary school. The chapter also examines social trajectories and predictors and then concludes with social outcomes during young adulthood and adulthood.

### **The Beginning of the Social-Emotional Deficit:**

#### **Early Markers in Infancy through Preschool**

Rapidly growing research efforts are working to identify the early markers for social deficits in ASD, in order to explore the origin of social impairments. These studies derive from parents' retrospective recollections, from home videos, as well as from prospective longitudinal studies looking at young siblings of children with ASD (age 4-6 months) who later develop ASD (at 24 or 36 months). However, to date, no clear developmental trajectory associated with ASD has been identified (see reviews in Tager-Flusberg, 2010 and in Yirmiya & Charman, 2010).

Interestingly, during the first few months of life, the clinical profile of infants with ASD does not portray a clear picture of deficits in social engagement. In one recent prospective study, infants with ASD could not be differentiated from low-risk infants who had a normal outcome, based on their social disinterest or disengagement; indeed, to the contrary, at age 6 months, infants with ASD showed more frequent socio-communicative behaviors compared with low-risk, normal-outcome infants (Ozonoff et al., 2010). In another study, only a somewhat passive temperamental profile, showing relatively few initiations and less responsiveness to efforts to engage their attention, was found to characterize 6-month-old siblings of children with ASD who later received a diagnosis of ASD at 24 months (Zwaigenbaum et al., 2005).

At the age of 12 months, more deficits in socio-communicative behaviors were identified among siblings diagnosed later with ASD (at 24 months). These markers included poor and atypical eye contact as well as limited social responsiveness skills,

including reduced social smiling, orienting to name, social interest, expression of positive affect, reactivity, and responding to bids for joint attention (Ozonoff et al., 2010; Zwaigenbaum et al., 2005). Decreased orienting to name among 12-month-old siblings of children with ASD demonstrated high specificity (but low sensitivity; .50 for ASD) for a 24-month diagnosis of ASD (also in Nadig et al., 2007). Delay in gestures for communication such as pointing, giving, and head nodding were also reported by parents of 12-month-old siblings who later received an ASD diagnosis at 24 months (Mitchell et al., 2006).

In Zwaigenbaum et al. (2005), 12 month olds' play behaviors and use of play materials were found to be limited (lack of imitation; poor coordination of eye gaze and action) and were of a stereotyped self-stimulatory nature (e.g., swinging a string of beads and waving it in front of the eyes). Moreover, these toddlers showed atypical development of visual attention, including poor visual tracking and prolonged latency to disengage visual attention, as well as a tendency to fixate on non-social aspects of the visual environment combined with reduced responses to social approaches from others. Similar findings emerged in Ozonoff et al.'s (2008) study, which pinpointed atypical object exploration (with novel play materials) at 12 months as a predictor of subsequent ASD diagnosis (at 24 and 26 months). Their autism/ASD group was characterized by increased frequency of object spinning, rolling, and rotating, and by unusually prolonged visual inspection, often associated with atypical features such as examining the object from odd angles. Furthermore, repetitive behaviors at 12 months were significantly associated with cognitive and symptomatic status at the 36-month outcome; yet, some infants who showed these behaviors did not receive an ASD diagnosis later on. Thus, Ozonoff et al. concluded that repetitive or stereotyped behaviors may be early risk markers in the development of some but not all children with ASD.

Temperamental profile at 12 months differed from that at 6 months; the older toddlers showed increasing irritability and intense responses to sensory input (often associated with distress; Zwaigenbaum et al., 2005). Lastly, these siblings also showed delayed early language, both in expressive and receptive capabilities (Zwaigenbaum et al., 2005). Interestingly, Young, Merin, Rogers, and Ozonoff (2009) showed that diminished gaze towards the mother's eyes relative to her mouth at 6 months predicted

higher expressive language scores at 24 months. The authors concluded that gaze toward the mouth may play an important role in language development.

The aforementioned markers found in prospective studies corroborate other research on the first year of life using parents' retrospective reports, home videos, and symptoms based on the ADOS-G (Lord et al., 2000). These retrospective studies showed abnormalities in social orienting, poor quality of social overture, impaired early joint attention behaviors (lack of pointing/showing, gestures), poor social interest, and emotional expression delays, as well as abnormalities in play behaviors (see review in Yirmiya & Charman, 2010).

**Early social deficit markers for children at different levels of cognitive functioning.** Despite the fact that cumulative data has demonstrated early markers for social deficits as early as 12 months, the inclusiveness of these markers for the more cognitively able children on the spectrum is not clear. For example in Zwaigenbaum et al. (2005), siblings who received a diagnosis of ASD at 24 months exhibited lower language scores (expressive and receptive) on the Mullen Scales of Early Learning (Mullen, 1995) compared to non-diagnosed siblings and to low-risk controls. These low language scores may hint that at least some of those ASD-diagnosed siblings were not HFASD because the latter would have probably only received a diagnosis after these prospective studies' 24- or 36-month follow-up. Considering that some of the more able children on the spectrum (those with Asperger Syndrome or PDD-NOS) are not diagnosed by those ages, the early markers that were identified in such research may possibly be unrepresentative of siblings with HFASD.

Indeed, in Chawarska, Klin, Paul, and Volkmar's (2007) study examining ASD symptoms in the second year of life (between 14 and 25 months), differences emerged between children classified with autism and children classified with PDD-NOS at that time. Although these two groups of 14- to 25-month-olds showed similar verbal and nonverbal capabilities (Mullen, 1995), the PDD-NOS group later showed higher verbal and nonverbal capabilities at age 36 months. In addition, although their ADOS-G (Lord et al., 2000) evaluation at age 14 to 25 months indicated highly pathological behaviors in both groups (e.g., limited response to name, poor eye contact, limited response to joint attention, lack of pointing, delays in functional and symbolic play), marked differences

also emerged between the autism and PDD-NOS groups at both time points (14-25 months and 3 years).

Specifically, Chawarska et al. (2007) found that while both groups were socially impaired, the children diagnosed with PDD-NOS in their second year were more likely to engage in dyadic exchanges and show emerging intentional communication skills. The PDD-NOS group directed vocalizations and facial expressions toward others, smiled socially, and shared enjoyment more frequently (based on the ADOS evaluation). Despite poor eye contact, children with PDD-NOS integrated gaze into social overtures more frequently. In a like manner, even without language at 14-25 months, they were more likely to engage in spontaneous initiation of joint attention and showing behaviors. Also, motor mannerisms and unusual sensory interests were less frequent in the PDD-NOS group than in the autism group.

As mentioned, at the age of 3 years children who were diagnosed earlier with PDD-NOS showed higher verbal and nonverbal skills compared to children diagnosed earlier with autism (Chawarska et al., 2007). Interestingly, acquisition of verbal and nonverbal skills in the entire sample was associated with a decline in the level of stereotypical behaviors and the severity of social and communicative symptoms and with an increase in the level of play skills over time, highlighting the importance of IQ capabilities for socio-communicative functioning in ASD. Key symptoms, though, remained stable in both the autism and PDD-NOS groups at age 3, such as limited coordination of socio-communicative behaviors, impaired eye contact, low initiation of joint attention, inability to direct facial expression to others, and limited responsiveness to name.

**Summary of early social deficit markers.** Overall, the cumulative research literature indicates that early socio-communicative impairment is indeed noticeable in children with ASD as young as 12 months of age: however, its distinctive profile regarding the more able children on the spectrum, such as the Asperger Syndrome and PDD-NOS groups, has yet to be adequately explored. Altogether, it seems that up to the first 6 months, no clear signs of the socio-communicative deficit in ASD appear; however, at 12 months a set of socio-communicative repetitive behaviors and attention deformations appears, which can predict later diagnosis of ASD. Thus, the beginning of the atypical social-communicative deficit defining ASD seems to emerge sometime

during the second half of the first year of life, and it varies considerably among infants, with no clear understanding of individual differences that may explain this heterogeneity in social-development trajectories, such as the role played by high cognitive abilities in scaffolding for some of the early social deficits (e.g., Tager-Flusberg, 2010). The social deficit of children with HFASD continues into their preschool years, manifesting itself mainly in difficulties in early peer relations, as discussed in the next section.

### **Early Peer Relations—Social Play and Friendship:**

#### **Toddler and Preschool Years**

Peer relations in TYP are considered cardinal for the development of ample cognitive, linguistic, and social skills (e.g., Coplan & Arbeau, 2009). During toddlerhood and preschool, adequate social play is key for efficient peer interaction and friendship with peers. Inasmuch as social play does not develop typically in HFASD, these young children gain only limited early interpersonal peer experiences, which in turn sets the stage for reduced peer engagement in the school years, as described in Chapter 2 on peer relations (Manning & Wainwright, 2010). This section, then, presents the characteristics of social play in toddlers and preschoolers with HFASD as well as the ability to form peer relations.

**Social play in HFASD.** Social play is hard to define, but certain components seem to be important in the definition of play: It involves active, pleasurable, and enjoyable engagement by at least two players; it is spontaneous and voluntary, it is free from means-end directiveness (the play activity is an end in itself); and it should be flexible and dynamic (e.g., Garvey, 1977; Jordan, 2003). Social play, which requires joint action and attention, provides children with opportunities for peer interaction as well as a context for constructing representations of intentional states and knowledge such as ToM (e.g., Toth, Munson, Meltzoff, & Dawson, 2006). Thus, it significantly contributes to toddlers' and preschoolers' cognitive development, socio-cognitive development (e.g., learning to co-share symbolic meaning, attention, and intentions with a partner through pretend play; executive functions like shifting attention, planning, and generativity); and socio-emotional development (e.g., moving from isolated play to joint play), which involves fundamental social and prosocial skills like collaboration, negotiation, empathy, interrelatedness, and intimacy (e.g., Jordan, 2003; Schuler, 2003; Toth et al., 2006).

Social play also provides an essential social context in which early friendships can emerge (Guralnick, Neville, Hammond, & Connor, 2007; Jordan, 2003) as well as intersubjective capabilities such as joint attention and social referencing.

Social play differs in quality and quantity in HFASD as compared to age-mates with TYP, acting as both the cause and the consequence of their social isolation (Schuler & Wolfberg, 2000). The underlying mechanisms that enable creative joint play with peers are hampered in toddlers and preschoolers with HFASD (Jordan, 2003). These impaired mechanisms include representational skills (e.g., joint attention, ToM), creativity and imagination (e.g., executive functions like attention shifting, generativity in pretend play, and flexibility rather than repetitive and obsessive interests and actions), social understanding of "play culture" (e.g., game rules and norms), and spontaneous peer interaction (Schuler & Wolfberg, 2000).

The specific characteristics of social play in HFASD are not well-defined due to a paucity of studies focusing on spontaneous social play in the more cognitively able young children with ASD; most of what we know is based on participants of mixed cognitive levels. For example, Rutherford et al. (2007) demonstrated that joint-attention ability significantly predicted pretend play performance in preschoolers with ASD of mixed cognitive capabilities (mean CA = 57.6 months, mean MA = 12.25-56.25 months). In addition, executive-function generativity was found to be most predictive of pretend play performance in very young children with ASD of mixed cognitive functioning levels (mean CA = 33.93 months, mean MA range: 11.5-41.75 months; e.g., Rutherford & Rogers, 2003). Furthermore, ToM was found to correlate with pretend play in Lam and Yeung (2012) among young children with ASD (mean CA = 6.11 years; Peabody Picture Vocabulary Test score = 70, Dunn & Dunn, 1997). Notably, though, these studies examined pretend play solely in the child-adult context (when mother or experimenter played with the child), not the peer pretend play context. In addition, based on parental reports, repetitive behaviors were associated with child-adult play in the more cognitively able children with ASD between 2 and 8 years; those who demonstrated few repetitive behaviors engaged in more play activities than those who demonstrated frequent repetitive behaviors (e.g., Honey, Leekam, Turner, & McConachie, 2007).

In research on children with ASD, social play was found to be highly structured, rigid, and stereotyped, most often taking the form of learned routine rather than a genuinely playful engaging experience (Hobson, Lee, & Hobson, 2009; Jordan, 2003). Play activities in ASD ranged from manipulating objects and enacting elaborate routines to pursuing obsessive and narrowly focused interests, including high rates of inappropriate and inflexible toy use. Free-play situations involving peers were shown to pose particular difficulties for children with ASD, who may avoid or resist social overtures, passively enter play with little or no self-initiation, or approach peers in an obscure and one-sided fashion (e.g., Wolfberg, 1999). Greater structure in a social environment, involving adults' scaffolding, was found to elicit higher rates of responsive communication acts, such as more responsiveness or compliance behaviors and increased following of pointing gestures and gaze in young preschoolers between 2 to 5 years (mean CA = 45 months, mean nonverbal MA = 27.5 months), compared to free-play situations with peers that involved various games (e.g., jack-in-the-box, modeling clay, birthday cake and associated materials such as candles and a knife, bubble gun with soapy liquid), but these were preschoolers with LFA (Clifford, Hudry, Brown, Pasco, & Charman, 2010). Manning and Wainwright (2010) demonstrated similar results for older children with HFASD too (mean CA = 8.25 years).

In sharp contrast to the rich thematic variations of play in children with TYP, the restricted range of interests and the obsessive insistence on sameness in ASD often result in pretend play that is highly repetitive and seems almost obsessive in its literal repetition of identical acts (e.g., Bass & Mullick, 2007). Play in ASD is sometimes defined as “*echoplaliya*” – immediate or delayed literal repetition of others' play behaviors and unimaginative repetitions of play acts – which are analogous to echolalia, stereotyped repetitions of utterances (e.g., Schuler & Wolfberg, 2000; Wolfberg, 1999). Likewise, social play in ASD includes fewer novel play acts and less elaboration and diversity compared to age-mates with TYP (e.g., Murdock & Hobbs, 2011). Jordan (2003) asserted that after accounting for general cognitive difficulties, what seems to hinder the development of creative playful acts in children with ASD is their lack of joint play with others, which is important to create variety and flexibility in the play interaction. According to Hobson et al. (2009), these children's impairment in social play stems from

their deficit in the understanding of self as creating symbolic and functional meaning for and with others. Jordan summarized that play patterns in ASD are not just delayed or deficient in their cognitive complexity but also are deficient in their social competencies, mainly in co-regulating play behaviors with others. Friendship in young children with TYP evolves mostly from the context of social play. Likewise, deficits in social play will probably predict difficulties in friendship formation among young children with HFASD. In the next section, friendship in HFASD will be described.

**Friendship and peer interaction in preschoolers with HFASD.** Stable friendships that are based on mutual affection and provide emotional support have been well documented for preschoolers with TYP (Howes, 1996). Also, in TYP, interactions with friends reveal greater social complexity than interactions with acquaintances. Friend versus non-friend comparisons revealed that social play with friends is characterized by more positive affect, higher levels of social interaction, and more effective forms of conflict management (Newcomb & Bagwell, 1995). However, we know very little about friendship in young children with HFASD. Likewise, friendship development is a neglected aim in early interventions.

In light of the scarcity of research on friendship in preschoolers with HFASD, we recently undertook two comprehensive studies in my Behavioral Research Laboratory on this population of young children ages 3 to 6 years. The first study compared preschoolers with HFASD and with TYP (Bauminger, & Agam Ben-Artzi, 2012), with the following aims: (a) identifying the two groups' friendship characteristics, (b) exploring group differences in the quality of those friendships, (c) examining within-group differences on friendship type for the HFASD group – non-mixed friendships (of two children with HFASD) versus mixed friendships (of a child with HFASD and a child with TYP), and (d) investigating within-group differences on interaction partner type for both HFASD and TYP – a friend versus a non-friend. The study included 177 preschoolers in three groups: (a) 59 recruited (target) research participants (HFASD:  $n = 29$ , mean IQ = 103.52; TYP:  $n = 30$ , mean IQ=107.60); (b) 59 of these participants' friends, defined as friends by the following criteria: mutual preference during spontaneous interaction along different activities (i.e., playground), mutual interest, close proximity, showing affection (touch), and sharing objects during play (Howes, 1996); and

(c) 59 preschool classmates who were not participants' friends according to the same criteria and who were matched to the friends by age and diagnostic status.

In the Bauminger and Agam Ben-Artzi study (2012), friendship was explored based on semi-structured observations of children's interactions with a friend versus non-friend partner (classmates) during three main dyadic social situations in their preschool. The social situations comprised: (1) Free play during snack time: Pairs were provided with snacks and drinks and with age-appropriate toys such as means-end games, toys for pretend play, and fine-motor games. (2) Shared construction game: Pairs constructed a shared design using ramps, connectors, and blocks. After completion, they rolled balls down their design structure. (3) Shared drawing: Pairs created a shared design on a large blank sheet of paper using a box of colored markers, magazines, scissors, glue, and stencils. Parents also reported about their children's friendships.

With regard to identifying preschoolers' friendship characteristics, we found that most of the friends of the target children with HFASD held the same diagnostic status – HFASD (62%,  $n = 18$  pairs) – that is, were non-mixed friendships – but a significant number had mixed friendships with a peer with TYP (38%,  $n = 11$  pairs). In both groups, most friends were of a similar age as the target children, and most friendships were fairly durable and stable according to parental reports (duration of 4-60 months;  $M = 13.00$  for HFASD;  $M = 18.60$  for TYP; stability of 79.3% in HFASD and 83% in TYP). Most of the friends met both at home and at the preschool (69% HFASD; 76.7% TYP).

The exploration of group differences between HFASD and TYP in their quality of friendships revealed that the preschoolers with TYP shared and conversed more with their peer partner (friend and non-friend) during the three social situations than the preschoolers with HFASD. The children with TYP also showed a higher frequency of positive affect while interacting with a peer and a higher level of social play, as in collaborative pretend play. The preschoolers with TYP also outperformed their HFASD counterparts regarding the quality of their dyadic interactions; they had more shared fun, revealed more interrelatedness while playing, and were more responsive to each other.

These group differences were unsurprising in light of the major difficulties in intersubjective sharing and the social deficits in play and conversation characterizing young children with HFASD (APA, 2000); however, the results for the friend versus non-

friend comparison were intriguing. Both in HFASD and TYP, interactions with friends showed a higher dyadic quality (shared fun, closeness, and reciprocity) as compared to interactions with a non-friend, and the interactions with friends included a higher level of social collaborative play and collaborative pretend play than the interactions with a non-friend. These findings for the HFASD group suggest that friendship is a feasible and meaningful experience in these young children and that friendship may offer a valuable context contributing to the evolvment of important capabilities in complex social play and intersubjectivity (sharing, interrelatedness). Finally, in line with this study's last aim of exploring the interactions of mixed versus non-mixed friendships within the HFASD group (Bauminger & Agam Ben-Artzi, 2012), findings demonstrated that the mixed dyads (a child with HFASD and a friend with TYP) exhibited a higher level of social complexity in their interactions, were more reciprocal, collaborated at a higher level, and showed a higher level of collaborative pretend play than the non-mixed dyads (a child with HFASD and a friend of the same diagnosis).

The second study examining preschoolers' friendships in my Behavioral Research Laboratory (Kimhi & Bauminger, 2012) focused on the context of collaborative problem solving (CPS) – the ability for partners to work together to solve a problem leading to a joint outcome (e.g., Fawcett & Garton, 2005; Kumpulainen & Kaartinen, 2003). CPS requires children to cooperate with one another and coordinate their behaviors. As two children collaborate to solve a problem, they must share their goals, attention, and intentions (e.g., Liebal et al., 2008). Considering that the social and cognitive underpinnings of CPS are deficient in ASD (e.g., executive functions and the ability for ToM, social interaction), research on CPS offers a unique opportunity to complement other empirical studies on social play and conversation and to highlight the role of cognitive deficits in hampering social interaction.

Research showed that in children with TYP, CPS is more effective when the partner is a friend than when the partner is not a friend (e.g., Cooper, 1980). However, prior to the Kimhi and Bauminger (2012) study, no research had yet compared friend versus non-friend dyads in preschoolers with HFASD. Thus, using the same sample of 177 preschoolers from the Bauminger and Agam Ben-Artzi (2012) study (59 target children with HFASD or TYP, 59 friends, and 59 non-friends), Kimhi and Bauminger

aimed to examine: (a) the differences and similarities in CPS between preschoolers with HFASD and preschoolers with TYP; (b) the differences in CPS with a friend versus with a non-friend; (c) the group differences in ToM (e.g., false belief) and executive functioning (planning and cognitive flexibility); and (d) the links between CPS, ToM, and executive functioning. CPS was examined by exposing each dyad to balancing scales and blocks that varied in color and in weight. Dyads' task was to locate pairs of blocks that would balance the scales. Each target child solved the problem twice, once with a friend and once with a non-friend, in counterbalanced order.

As expected, Kimhi and Bauminger's (2012) findings revealed group differences in CPS; dyads in the HFASD group solved the block-balancing problem slower and showed more irrelevant behaviors while solving it, in comparison to the dyads with TYP. In addition, the dyads with HFASD used fewer sharing comments and demonstrated fewer attempts to coordinate their actions with their partners' actions by aid of gestures, in comparison to the dyads with TYP. However, surprisingly, the HFASD preschoolers were more responsive to their partners in comparison to the TYP preschoolers.

Regarding CPS with a friend versus a non-friend, the study outcomes demonstrated advantages to the interaction with a friend over the interaction with a non-friend. Beyond the effect of HFASD/TYP group differences, when target children in both groups solved the block-balancing problem with a friend, they were more responsive to the friend's suggestions and comments, had more shared fun, and exhibited a higher level of reciprocity than when solving the problem with a non-friend. Also, more focus on object manipulation rather than on the interaction emerged when working with a non-friend partner.

Group differences were also found with regard to these young children's ToM and executive-function capacities, where children with HFASD showed lower capabilities on ToM and on executive function – cognitive flexibility and planning. Yet, examination of the link between ToM and CPS yielded informative data. Target preschoolers with TYP and with HFASD who had higher ToM capabilities surpassed their counterparts with lower ToM on their understanding of the block-balancing problem (i.e., understanding that color and weight were key to solving the problem), despite the fact that these ToM subgroups showed no significant differences in IQ. Interestingly, ToM levels correlated

differently with preschoolers' speed of processing the problem, yielding a positive correlation in the HFASD group and a negative correlation in the TYP group: Those children with TYP who had higher ToM capabilities solved the problem quickly, whereas those children with HFASD who had higher ToM capabilities solved it slowly. This finding seems to indicate that for young children with HFASD, taking another's perspective into account is a very demanding task, requiring cognitive efforts and slowing down processing time. Slower processing time during a collaborative interaction may reflect these children's difficulties in negotiating the dynamic, rapidly changing ongoing peer interaction. It also supports the hypothesis that children with HFASD compensate cognitively for their socio-emotional deficits when dealing with socio-cognitive tasks like ToM (investing more cognitive efforts into deciphering the partner's mental state, Hermelin, & O'Connor, 1985).

Fewer significant correlations emerged between CPS and executive functioning, but, overall, in both groups, better executive-function skills were linked with preschoolers' better CPS skills. More specifically, better planning skills (as measured by the Tower of London; Shallice, 1982) were linked with a more efficient solution to the problem in the HFASD group, with faster problem solving in the TYP group, and with higher levels of understanding of the problem in both groups. Cognitive shifting, as measured by the Flexible Item Selection Task (Jacques & Zelazo, 2001), significantly correlated with only one CPS measure for each group: with better understanding of the problem in HFASD and with faster problem solving in TYP.

To sum up the overall results in both studies (Bauminger & Agam Ben-Artzi, 2012; Kimhi & Bauminger, 2012), interacting with a friend is an advantageous setting that can lead to cognitive growth of important social competencies as well as intersubjectivity. Hence, early intervention planners should seriously consider friendship as a valuable context not only for enhancing key social skills in young children with HFASD such as social play, but also as a goal in itself, to promote such friendships' quality. Peer friendships at young ages may also contribute to a reduction in rates of depression and anxiety at older ages. Lack of play experience with peers influences the development and characteristics of later peer relations (Manning & Wainwright, 2010).

Indeed, our studies demonstrated the importance of such a context for peer relations in HFASD; however, it should be noted that our sample was biased in that it only included children who already did have friends. Overall, friendship is an infrequent experience for these children; therefore, support from significant caregivers and professionals in the child's environment seems crucial for the development of friendship in HFASD (see Chapter 2 for expansion on peer friendship in HFASD).

**Summary of social functioning in toddlerhood and preschool.** Overall, during the early childhood period, children with HFASD show areas of possible strength alongside major difficulties in socio-communicative functioning. They have difficulties in ToM and in major executive functions like cognitive shifting and planning. The quality of their peer interactions and their social play skills are lower compared to their age-mates with TYP. However, some of these young children with HFASD are able to develop friendships with peers (TYP and/or HFASD), thereby creating a context conducive to the development of complex play behaviors, despite their deficits in ToM and executive functioning. A review of the currently available research pinpoints the fact that the processes by which friendship is formed at early ages, as well as the identification of those children who are capable of developing early friendships, are areas still in great need of further exploration. At the same time, more efforts should be directed toward designing early interventions to help these young children develop fruitful friendships and social play experiences with peers.

### **School Transitions: Trajectories and Predictors**

School transitions pose a considerable challenge for children with HFASD. During school years, social functioning increases in complexity in children with TYP, requiring more advanced language and pragmatic skills to establish and maintain peer conversation, higher representational skills to observe and make sense of peer behavior, more sophisticated levels of social and emotional understanding, and greater executive-function skills such as planning and cognitive flexibility in adapting to diverse social interactions and situations.

Longitudinal observational examinations of peer interaction processes to trace the transition from preschool to school ages in HFASD do not yet exist. Most of what we know is based on prospective and retrospective studies that evaluated outcome results

based mainly on quantitative interview-based scales such as Lord, Rutter, and LeCouteur's (1994) ADI-R (e.g., Charman et al., 2005; Fecteau, Mottron, Berthiaume, & Burack, 2003; Moss, Magiati, Charman, & Howlin, 2008; Staar, Szatmari, Bryson, & Zwaigenbaum, 2003; Szatmari, Bryson, Boyle, Streiner, & Dukul, 2003) and Sparrow et al.'s (1984) VABS (e.g., Klin et al., 2007; Szatmari et al., 2003). These studies have presented mixed results with regard to the trajectories of the social deficits in ASD from early ages to the school-age period.

Staar et al. (2003) prospectively examined ADI-R (Lord et al., 1994) outcomes over a 2-year period (from ages 4-6 to 6-8 years) for two groups: 41 children diagnosed with HFASD (nonverbal IQ scores in the non-retarded range) and 17 children diagnosed with Asperger Syndrome (IQ > 70). The ADI-R symptoms were based on the three main domains (social, communication, and repetitive behaviors) related to the increasing social demands and social complexity facing children along the spectrum in the early school years. Staar et al. found significant differences between the groups over time, with the Asperger Syndrome group showing fewer symptoms than the HFASD group in all three domains at both time periods. On the ADI-R communication and social domains summary scores, the results showed a greater decrease in communication symptom severity between preschool and early elementary school in the HFASD group than in the Asperger Syndrome group, as well as a larger increase in social symptoms over time.

The profile of change on the specific symptoms helps delineate these children's social complexities as they enter the school years (Staar et al., 2003). Analysis of individual ADI-R items indicated that the HFASD group improved over time on six items in the communication domain (i.e., complexity of nonechoed utterances, immediate echolalia, use of neologisms, use of instrumental gestures, head shaking, and unusual preoccupations) and one item in the social domain (offering comfort). On the other hand, both groups (HFASD and Asperger Syndrome) revealed a significant increase in symptom severity on three items from the social domain (i.e., greeting, range of facial expression, and use of inappropriate facial expression) when comparing their symptoms at ages 4-6 and at ages 6-8. Moreover, the Asperger Syndrome group also deteriorated between the two time periods in three other social symptoms: vocal expression, sharing others' pleasure and excitement, and appropriateness of social response. The group of

children with Asperger Syndrome showed improvement on only two symptoms over time: use of immediate echolalia and unusual preoccupations. These declines in social functioning may stem from greater exposure to peers during the early school years and from the environment's higher expectations for appropriateness of social interaction among school-age children in both the HFASD and Asperger Syndrome groups, thereby possibly making their social difficulties more noticeable and severe.

Using the same sample as in Staar et al.'s (2003) study but adding a follow-up period at ages 10-13 years, Szatmari et al. (2003) examined the contribution of early cognitive predictors (verbal and nonverbal IQ) and early language predictors (linguistic knowledge, mainly vocabulary and grammar) at ages 4-6 years to two later factors in middle school among these children with HFASD and Asperger Syndrome: (a) the explanation of the social and communication deficits (based on the VABS, Sparrow et al., 1984); and (b) the clinical diagnosis based on a composite score as measured by the Autism Behavior Checklist (Krug, Arik, & Almond, 1980), including autistic symptoms such as abnormal language, abnormal body and object use, difficulties relating to others, sensory issues, and social and self-help difficulties. The advantage of the Asperger Syndrome group over the HFASD group in the socialization domain at ages 10-13 years resembled the outcomes reported by Staar et al. for the first two time periods. The explanatory power of the cognitive and language predictor variables was most substantial for the VABS communication scores (60%), weaker for the VABS socialization scores (40%), and to a lesser extent explained the Autism Behavior Checklist autistic symptoms (22%). Also, the power of the cognitive and language predictors remained stable over time, at least until preadolescence (CA = 10-13 years). However, in general, early language skills were stronger predictors of middle-school outcomes for the HFASD group than the Asperger Syndrome group in three domains: communication, socialization, and autistic symptoms. Other studies highlighted the importance of intellectual functioning and early language in young children with ASD, with an emphasis on the development of meaningful speech by the age of 5-6 years, as predictors of positive social outcomes in later childhood (e.g., Sigman & Ruskin, 1999). Interestingly, several prospective (e.g., Charman et al., 2005; Moss et al., 2008) and retrospective (Fecteau et al., 2003) examinations of trajectories of the social deficit from

early ages to school age in LFA (based on the ADI-R; Lord et al., 1994) showed a reduction in social symptoms.

To sum up the trajectories from early to later childhood, based mainly on the ADI-R and VABS results, it seems that young children who function below the normative IQ level (i.e., with LFA), who probably start at a more severe basic level of social functioning at early ages (compared to children with HFASD), make more significant progress in their social symptoms and functioning by later childhood, whereas the more cognitively able children on the spectrum appear to begin at a more advanced level of early social functioning and therefore their progress on social symptoms is highly varied. Some of this variance may reflect the higher expectations from these children with HFASD and the more complex social milieu with which they must cope in inclusive settings (e.g., interactions with peers with TYP).

Support for this supposition comes from the discrepancy in results between IQ and the overall adaptive scores on the VABS (Sparrow et al., 1984). VABS scores are consistently lower than IQ scores in children with ASD; furthermore, the VABS socialization subdomain is the most delayed in comparison to the communication and daily living skills domains (e.g., see review in Charman, 2011). This gap between IQ and adaptive capabilities is most noticeable in HFASD; for example, Kiln et al. (2007) found that the standard scores for the socialization domain were 2 to 3 standard deviations below the full-scale IQ scores in two independent HFASD samples. This study also found that adaptive skills (in terms of standard scores) decreased with age, suggesting that the “lag” between measured intelligence and everyday coping widened with development for these children (Szatmari et al., 2003). It seems that school-age children who are more cognitively able show difficulties in coping with the increasingly complex demands of school age compared to earlier ages, including developing peer interactions and relationships, managing the peer social environment, and coping with school's academic demands. At a later point in the lifespan, social demands do not become easier with the transition from school to young adulthood, as described in the following section.

**The Transition from School to the "Real" World:  
From Adolescence to Adulthood**

Extensive work by Seltzer and her colleagues (e.g., Esbensen, Seltzer, Lam, & Bodfish, 2009; Seltzer et al., 2003; Shattuck et al., 2007) followed a large cohort of individuals with ASD from adolescence to adulthood, mainly using maternal reports about children's diagnosis based on the ADI-R (Lord et al., 1994) and about participants' repetitive and maladaptive behaviors. Along the different studies, 50% to 75% of participants were HFASD, and the remainder were LFA. A general trend emerged from this research series: As individuals with ASD aged, from adolescents to adulthood, they showed poorer reciprocal social interactions but fewer repetitive behaviors and stereotyped interests based on the ADI-R (Seltzer et al., 2003; Shattuck et al., 2007; see also Gillespie-Lynch et al., 2012, for an increase in social interaction symptoms from adolescence to young adulthood). The ADI-R communication profile showed mixed results; adults seemed more impaired than adolescents in their ability to communicate nonverbally, in their ability to engage in reciprocal conversations, and in their overall level of language; however, in verbal symptoms adolescents performed more poorly than adults, particularly regarding their likelihood of making inappropriate statements (Seltzer et al., 2003). When considering specific symptoms, the greatest improvement emerged for speaking in phrases of at least three words, and the lowest improvement emerged for having friendships. Overall, as age increased, greater impairment appeared in nonverbal communication and social reciprocity than in verbal communication and in repetitive behaviors and stereotypic interests in ASD. It seems that the social reciprocity deficit is a central and persistent deficit in ASD, more than the communication or repetitive diagnostic domains.

An interesting differential age profile was identified for the various types of repetitive behaviors and stereotyped interests, in a study that included follow-up on children from preschool up to adulthood (Esbensen et al., 2009). Restricted interests were the most prevalent symptom that persisted across development, and self-injuries were the least. Stereotyped movements were common among young children with ASD, more so than rituals and compulsions, but they became less prevalent than rituals and compulsions in adulthood. Thus, repetitive behaviors and stereotyped interests seemed to be a heterogeneous phenomenon in ASD.

Cognitive functioning level in individuals with ASD seems to play an important role in the progress of symptoms with age. Individuals with autism who had an IQ in the intellectual disability range (i.e., LFA) demonstrated more autism symptoms and maladaptive behaviors than those with IQ over 70, and they improved less over time (e.g., Esbensen et al., 2009; Shattuck et al., 2007). However, several recent studies by Taylor and Seltzer (2010, 2011a, 2011b) indicated that the period after high school exit seems to be a time of especially increased risk, surprisingly, for those individuals with HFASD, probably because their families are under-resourced. Apparently, greater resources are directed toward the adults with the more severe cognitive impairments, who function below the intellectual disability level.

Overall, leaving school appears to be linked with a slowing rate of improvement across the whole spectrum, but high-functioning individuals seem to experience the greatest slowing of phenotypic improvement (Taylor & Seltzer, 2010). This may stem from a scarcity of structured settings and environmental supports available for young adults with ASD who are not diagnosed with LFA. For example, Taylor and Seltzer (2011b) found that young adults with HFASD were three times less likely to have day activities than their age-mates with LFA. Moreover, only 18% of young adults with HFASD were receiving some sort of employment or vocational services (e.g., supported employment, sheltered workshop) compared to 86% of young adults with LFA (Taylor & Seltzer, 2011b).

In addition, mother-adolescent relationships (e.g., warmth) continued to improve in high school but slowed or stopped after exiting school, and indeed those young adults with HFASD who had more unmet service needs evidenced the least improvement in relationships with the mother after exiting school (Taylor & Seltzer, 2011a). Furthermore, following school exit, maternal warmth toward young people with ASD decreased more for youth with HFASD than for youth with LFA. Interestingly, sex played a role in mother-youth relationships after school exit, where mothers of daughters with ASD reported greater increases in positive affect in the mother-child relationship over time, relative to mothers of sons (Taylor & Seltzer, 2011a). One possible explanation for the HFASD group's greater deterioration in relationship qualities after school exit may be these parents' disappointment based on unmet expectations from their high-functioning

youth to become independent—living independently, finishing college, and attaining a job. Also, expectations from sons to be independent may likewise be higher than expectations from daughters. Notably, a mother-child relationship that becomes less positive over time, coupled with slowing of improvements in the behavioral phenotype, along with a scarcity of community supports, may place youth with HFASD at high risk for poor outcomes in the years immediately following their exit from the secondary school system, and possibly beyond.

Employment that leads to and is related to independence poses an enormous challenge and area of difficulty for individuals with HFASD. A substantial percentage of adults with HFASD are unemployed or underemployed, making less money than their counterparts with TYP and holding less prestigious jobs that demand lower cognitive capabilities and offer fewer prospects for future advancement, even for those individuals who attain postsecondary educational experience (Howlin, 2000). Adults with HFASD also demonstrate difficulties in maintaining steady employment, switching jobs frequently. Adjusting to the workplace environment is difficult, especially with regard to managing interpersonal connections with coworkers and supervisors (e.g., Cederlund, Hagberg, Billstedt, Gillberg, & Gillberg, 2008; Hurlbutt & Chalmers, 2004; Jennes-Coussens, Magill-Evans, & Koning, 2006).

Some have emphasized the socio-communication difficulties in interpersonal connections in HFASD as the primary obstacle to successful job performance (e.g., see review in Hendricks, 2010), in areas such as the inability to understand instructions and follow rules, socio-cognitive deficits (e.g., understanding social norms and non-literal language; emotional understanding; reading facial expressions, body gestures, and tone of voice), as well as difficulties in social interactive behaviors (e.g., making inappropriate comments, demonstrating odd behaviors, having difficulty working in cooperation with coworkers). A mixture of psychiatric difficulties (anxiety, depression) and rigid and stereotyped behaviors also hamper their ability to function efficiently in the workplace, presumably based on major difficulties in executive functioning such as poor decision-making ability (e.g., Cederlund, Hagberg, & Gillberg, 2010). Taking it altogether, adults with HFASD require specific supports in the work environment; however, it seems that a wider variety and quantity of services are available targeting the needs of the lower

functioning adults on the spectrum than targeting those with HFASD, thus leaving the more able individuals to face poor outcomes.

Educational outcomes may be somewhat more promising for adults with HFASD. Taylor and Seltzer (2011b) reported that nearly half of the adults in their sample (8 of 17) pursued a post-secondary educational degree, but Cederlund et al. (2008) found that only 10 out of the 66 adults with Asperger Syndrome in their study completed some university studies (15%), and only two of those attained a university degree (in computer science and civil engineering). White, Ollendick, and Bray (2011) recently explored the prevalence of HFASD among 667 undergraduate students in a large technology-oriented public university in the southeastern USA. They found 13 students who met criteria for HFASD (1.9%), most of whom majored in engineering and computer science (54% in HFASD versus 28% in students without HFASD). Interestingly, these adults with HFASD showed high academic excellence (according to grade point average) but less satisfaction from university and from life overall and higher rates of social anxiety compared with the non-identified students. Symptoms of HFASD correlated with scores on social anxiety, depression, and aggression. It seems that in the educational arena, as found for the work arena, the real challenge for these young adults with HFASD is to cope with the social-interpersonal demands of being a university student, rather than with its cognitive and intellectual challenges. These young adults may experience social isolation, loneliness, and depression, based on their peculiar social behaviors and odd interests (e.g., White et al., 2011).

Individuals with ASD who do not function below the intellectual disability level (i.e., HFASD) are more likely to present better outcomes in terms of employment, social relationships, and post-secondary education relative to those with LFA (e.g., Cederlund et al., 2008; Eaves & Ho, 2008; Engstrom, Ekstrom, & Emilsson, 2003; Howlin et al., 2004). However, many adults with HFASD do not obtain these developmental milestones in a satisfactory way, and they reach sub-optimal outcomes with respect to making friends, attaining a decent job, and maintaining independent living; indeed, most continue to need extensive support (e.g., Cederlund et al., 2008; Eaves & Ho, 2008; Taylor & Seltzer, 2011b).

For example, Cederlund et al. (2008) compared outcomes for adults with Asperger Syndrome (IQ > 70, mean CA = 21.5 years, CA range: 16-34 years) versus adults with LFA (83% had IQ below 70) and found that 64% of those who were age 23 or older in the Asperger Syndrome group ( $n = 22$ ) lived independently, versus only 8% in the LFA group ( $n = 40$ ). However, all of those living away from their parents continued to remain dependent on the parents for some support. Of those adults with Asperger Syndrome who were age 23 or older, 3 (14%) held long-term romantic relationships, and an additional 10 (43%) had maintained such relationships for varying periods of time in the past. In the group of LFA, all of those who lived independently continued to rely on their parents for intensive support. Only 2 adults (5%) with LFA had a long-term relationship (1 currently, 1 in the past). Overall psychosocial adjustment was "good" for 27% of these adults with Asperger Syndrome (i.e., either paid or voluntary employment with some degree of support in daily living and some friendships or acquaintances), "fair" for 47% of them (i.e., achieving some supported independence and having acquaintances but no close friendships), and "poor" for 23% of them (i.e., requiring a high level of support and having few social contacts); and 3% held very restricted lives, had no friends, and had no occupation of any type. In contrast, in the LFA group, 76% showed "poor" psychosocial adjustment, only 7% showed "fair," and none showed "good" outcomes. All in all, the adult Asperger Syndrome group, which evidenced the higher IQs, achieved better outcomes. Yet, a significant portion of individuals in this group lagged far behind their peers with TYP.

In a like manner, Engstrom et al. (2003) examined psychosocial functioning in a group of Swedish adults with Asperger Syndrome and HFASD (mean CA = 30.8). Only 12% obtained good results; 75% had fair outcomes; and 12% had poor outcomes. Although the majority lived independently, only one adult (6.25%) was employed, few had close relationships, none was married or had children, and only a few had some friends. Most of these cognitively high-functioning adults nevertheless required a great deal of public and/or private support.

In her review of older studies that included HFASD samples (from 1985 to 1999), Howlin (2000) reported that the various studies presented high variability in outcomes. The proportion of adults with HFASD who were employed ranged from 5% to 44%;

those living independently ranged from 16% to 50%; assessment of “good” outcomes ranged from 16% to 44%; and rates of psychiatric disturbance ranged from 11% to 67%. Howlin attributed these wide ranges to the variability in the measures researchers used to assess outcomes as well as in amount of services provided in each geographical area. In a later longitudinal study, Howlin et al. (2004) examined individuals with IQ over 50 at two time points: in childhood (mean CA = 7 years, range: 3-15) and in adulthood (mean CA = 29 years, range: 21-48). They found that, overall, only 12% of the adults were rated as having “very good” outcomes (i.e., having residential and employment independence and some friendships); 10% were rated as “good;” 19% were rated as “fair;” and the majority (46%) was rated as “poor” (i.e., requiring a high level of support and having few social contacts); an additional 12% was even rated “very poor” (i.e., living in a hospital/institution). Altogether, a significant proportion of the adults with HFASD remained highly dependent on others for support. Individuals with a childhood performance IQ of at least 70 had a significantly better outcome than those with an IQ below 70; however, within the normal IQ range, outcomes varied widely, and on an individual level neither verbal nor performance IQ proved to be a consistent prognostic indicator.

**Summary of the transition from adolescence to adulthood.** Consideration of the existing literature suggests that the social deficit is the most persistent difficulty for adults with HFASD, hampering their ability to fully meet their cognitive-academic potential in work and educational settings. A substantial proportion of young adults do not have friends or social networks once they leave school. The period after school exit seems to be one of high risk for these more able adults on the spectrum, calling for the design of appropriate external support services to meet their specific needs. Predictors for successful adult social functioning were examined in several studies; however, only a few predictors specifically investigated this question in HFASD. Full-scale IQ and verbal IQ seem to contribute to a higher level of adult psychosocial adjustment, including employment status and independence level in adults with Asperger Syndrome (e.g., Cederlund et al., 2008).

Yet, in a different study on adults with LFA (mean CA = 26.6 years; Gillespie-Lynch et al., 2012), intellectual functioning did not contribute specifically to better social

functioning, whereas early measures of childhood language level and responsiveness to joint attention (both collected at mean CA = 3.9 years) did contribute. Gillespie-Lynch et al. (2012) highlighted responsiveness to joint attention as an important predictor of adult social behavior because it reflects children's ability to learn from the environment. Although this study's participants were mostly LFA, its results may signify that IQ (full or verbal) cannot fully compensate for the social deficit in adulthood, explaining the relatively high percentages of adults with normative IQ level who still show restricted social functioning, as reviewed above. It also may explain why these adults continue to present major difficulties in making friends and having appropriate and satisfactory social networks. A deeper look at other characteristics beyond early language and IQ may yield a better understanding of those adults with HFASD who reach good social outcomes versus those who do not. Such characteristics may include socio-cognitive capabilities like ToM and joint attention, affective capabilities such as emotional understanding and regulation, and cognitive capabilities like executive functions and central coherence (all overviewed in the introductory chapter). This thorough examination should also include evaluation of the available community support services provided for adults with HFASD in the individuals' locale as well as the characteristics of the interaction quality with the individuals' main caregivers.

### **Summary and Conclusions**

The investigation of social development in HFASD to discern trajectories for the social-emotional deficit reveals a rather complicated profile, with no clear pattern of change across development. Overall, social-emotional functioning poses a great challenge for individuals with HFASD at various developmental periods, from very early ages up to adulthood. Early markers of the social deficit in ASD comprise major social-communication deficiencies that may already appear at the age of 12 months and possibly even start between 6 to 12 months. Such deficiencies may include, among others, reduced social responsiveness and reactivity, limited social interest, limited expression of positive affect, delay in gestures for communication, and distortions in play. At the toddlerhood and preschool ages, difficulties in social play are observed, regarding ToM, executive functioning, and quality of friendship.

However, alongside these major difficulties, strengths can also be observed in some young children (e.g., preschoolers) who are able to develop friendships that qualitatively differ from interactions with acquaintances. Yet, the processes by which such friendships form at early ages, as well as the individual differences among children who are and are not able to develop such friendships with peers, have not yet been uncovered.

When looking at older ages, we can see evidence that shows some degree of social advantage for adolescents with HFASD over adults, and it seems that the exit from school is a period of great risk, especially for the abler individuals on the spectrum, possibly because they have far fewer appropriate services to meet their needs. The social difficulty seems to be a key obstacle to successful adjustment in adult work and study environments. Thus, individuals with higher IQ (i.e., those with HFASD) do indeed show better results as compared to individuals with LFA, but those who are high functioning nevertheless lag way behind adults with TYP in terms of achieving residential independence, education, and social life. Thus, adults with HFASD are still in great need of support at the family and community levels, in order to fully meet their high potential of becoming independent citizens in society.