THE JOURNAL OF CHILD PSYCHOLOGY AND PSYCHIATRY
ACAMH THE ASSOCIATION FOR CHILD AND ADOLESCENT MENTAL HEALTH
Journal of Child Psychology and Psychiatry 55:4 (2014), pp 363–373 doi:10.1111/jcpp.12158

Spontaneous peer conversation in preschoolers with high-functioning autism spectrum disorder versus typical development

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Background: In typical development, early peer talk is crucial for pragmatic development. The pragmatic deficit, reflected in remarkably deficient conversational capabilities, is considered the hallmark of the language deficit in autism spectrum disorder (ASD); yet, spontaneous peer talk in preschoolers with ASD was rarely explored. **Method:** We conducted comparative assessment of spontaneous peer talk during 10-min free-play scenarios in preschoolers with high-functioning ASD (HFASD; n = 27) versus those with typical development (n = 30). Groups were matched on SES, verbal/nonverbal MA, IQ, and CA. Correlations with CA, IQ, VMA, and NVMA were examined. We compared the two groups' interactions with a friend-partner versus a nonfriend partner; in addition, in the HFASD group, we examined interactions with a typical partner (mixed dyads) versus a partner with HFASD (nonmixed dyads). Children's conversations were videotaped and coded to tap pragmatic capabilities and conversational quality. **Results:** Findings revealed group differences in pragmatic abilities and conversational quality, with the typical group showing more intact capacities than the HFASD group. However, in the HFASD group, interactions with friends surpassed interactions with nonfriends on several key pragmatic capabilities and on all conversational quality measures (meshing, assertiveness, and responsiveness), thus suggesting that friendship may enable children to converse in a more socially complex and coregulated way. Also, children with higher cognitive capabilities, especially in the HFASD group, demonstrated more intact pragmatic capacities. **Conclusion:** Despite the robust pragmatic deficit in HFASD, reflected in conversational capabilities, involvement in friendship relationships and high cognitive capabilities were linked to more intact pragmatic capacities. Theoretical and therapeutic implications are discussed. **Keywords:** High-functioning children with autism spectrum disorder (ASD), preschool, friendship, pragmatics, social conversation.

Introduction

Notwithstanding that early child–child talk has received less attention in the literature than child–adult talk, wide consensus exists that peer talk is crucial for pragmatic development (e.g., Garvey, 1984). Peer talk offers children a wide range of opportunities for mutual learning of social-interactive as well as linguistic skills (Blum-Kulka & Snow, 2004; Garvey, 1984). The situational embeddedness of preschoolers' talk varies greatly, differing in the degree to which it is tied to the activity at hand and generating different conversational types within various social settings, such as "interpersonal sharing" of personal experiences and feelings, "argumentative discussion" of a topic from different viewpoints, and "activity talk" that focuses on current activity (e.g., Blum-Kulka, Huck-Taglicht, & Avni, 2004; Vernon-Feagans, 1996).

Although developmental sequences in typical pragmatic development are not well established, yet accumulative literature (e.g., see review in Adams, 2002; Clark, 2008; Garvey, 1984) shows that children's early social exchanges revolve mainly around joint attention to objects and adults, followed by rapid development of the ability to communicate intents. Infants use preverbal paralinguistic skills (e.g., gestures, eye contact, vocalization, pointing) to attract adults' attention to their interests and needs (see review in Adams, 2002; Clark, 2008). By the age of 3–5 years, typically developing children can already express various speech acts like remarking, requesting, responding to a question, protesting, and asking WH and yes/no questions, but advanced speech acts like promising and persuading may not be fully mastered until age 9 or later (Hoyle & Adger, 1998). Moreover, 3- to 5-year olds can already correctly identify and produce rules of conversational turn-taking, start to understand inference, use discourse markers according to context, and generate narratives (Adams, 2002). Typical preschoolers can also match discourse to listener characteristics, identify linguistic cues, repair unclear messages, and understand hidden meaning. A recent study (O'Neill, Main, & Ziemski, 2009) focusing on topic initiations in peer talk during snack time among typical preschoolers (3:5–5:4 years) demonstrated that most initiations were person-related; most conversations began by commenting on something or directing the listener's attention to look at or do something rather than asking questions; and conversation initiations were as often on topics relevant to listeners as to speakers. Moreover, almost one third of initiations were related to mental states (i.e., beliefs) in self and peers, suggesting that children as young as

Conflict of interest statement: No conflicts declared.

3.5 years can already adapt their utterances to listeners' perspectives.

Children's conversations become increasingly sophisticated and frequent with age, and it is not until the school years that children begin to master conversations (Clark, 2008), in terms of topic development, listening responses, and discourse markers (see review in Hoyle & Adger, 1998). Some skills, like metapragmatic reflection on one's own communicativeness, acquisition of idiomatic language, narrative competence, and use of polite forms, continue to develop into adolescence (Adams, 2002; Clark, 2008). Nonetheless, children as young as preschool age can already demonstrate fairly complex forms of listener-directed peer talk.

Social conversation in autism spectrum disorder (ASD)

The pragmatic deficit, reflected in remarkably deficient conversational capabilities, is considered the hallmark of the language deficit in ASD (see review in Stefanatos & Baron, 2011). Unfortunately, despite its importance, spontaneous peer talk in preschoolers with ASD has rarely been explored to date; rather, most of what we know is based on child–adult conversation and on older children. Overall, available research has shown that children and adolescents with ASD tend to limit conversations to their own areas of interest (where personal preoccupations often predominate) and are often preservative, engaging in excessive questioning and the use of pedantic or stereotyped language during conversations with adults (e.g., de Villiers, Fine, Ginsberg, Vaccarella, & Szatmari, 2007; Paul, Orlovski, Marcinko, & Volkmar, 2009). Youth with ASD experience difficulties in choosing topics appropriate to the setting and conversational partner, and in deciding what to say and what is relevant during a conversation (Paul et al., 2009).

Recently, Nadig, Lee, Singh, Bosshart, and Ozonoff (2010) showed that when children with high-functioning ASD (HFASD) talk about their own peculiar areas of interest with an adult, discourse is less reciprocal, including fewer contingent utterances and more monologue-style speech than the talk of typical age-mates (CA = 10.10 years). Based on their difficulties in intuitive reading of social situations and of social partners' mental states, children with ASD also exhibit problems in initiating and maintaining conversations that are sensitive to the social context and to others' interests and previous knowledge (Jones & Schwartz, 2009; Paul et al., 2009). Especially limited are children's abilities to develop or expand interactions by taking turns within ongoing conversation or by switching topics to accommodate conversational partners' perspectives (Paul et al., 2009). In Jones and Schwartz's (2009) study of a family dinner, young children with HFASD (IQ >70; CA = 3.5–7.0 years) initiated fewer bids for interaction, commented less often, continued ongoing interactions through fewer conversational turns, and responded less often to family members' communications than age-mates with typical development (TYP). Finally, children with ASD more frequently "walk away" from conversations without coherently ending them with friendly closures that account for others' perspectives (e.g., Rubin & Lennon, 2004). This major pragmatic deficit in conversational ability, consistently presented by available research on discourse with adults and mostly on older children with ASD, seems likely to render tremendous impact on younger children's ability to participate in productive peer interactions.

Current study

Despite its importance for development of adequate social functioning and peer involvement, spontaneous peer talk during free play was not yet specifically examined in the preschool period. The current study's major aim was to close this knowledge gap about characteristics of the pragmatic deficit in ASD by examining spontaneous peer talk in preschoolers with HFASD versus preschoolers with TYP. Considering that prior scales tapping the pragmatic deficit in ASD were developed to code either the talk of parents of children with ASD (e.g., Landa et al., 1992; Ruser et al., 2007) or child–adult interactions among older children at ages 12–18 years (e.g., Paul et al., 2009) or 8:8–15:2 years (e.g., Lam & Yeung, 2012), we performed modification of the scale by Landa et al. to preschoolers. We were also interested in learning about the role of the interaction partner as contributing to pragmatic capabilities, due to prior studies' reports of higher mutual social engagement, responsiveness, and reciprocal verbal exchanges in interactions with friends than with nonfriends (e.g., Dunn & Cutting, 1999; Newcomb & Bagwell, 1995). Thus, we compared peer talk according to the partner's friendship status (friend/nonfriend). More specifically, this study aimed to examine:

1. Group effects (HFASD/TYP) and partner effects (friend/nonfriend) in pragmatic deficit during spontaneous peer interaction.
2. Group effects (HFASD/TYP) and partner effects (friend/nonfriend) in conversation quality during spontaneous peer interaction.
3. Pragmatic capabilities and conversational quality as linked with developmental variables in both groups and partner types: verbal MA (VMA), nonverbal MA (NVMA), IQ, and CA.
4. Contribution of partner's diagnostic status to the pragmatic deficit and conversational quality, in the HFASD group only. Among preschoolers with HFASD, some friend-partners had an HFASD diagnosis themselves; therefore, we compared mixed dyads (typical partner) with nonmixed dyads (HFASD partner).

Method

Participants

This study was part of a larger study exploring social relationships in preschoolers with HFASD and TYP that received permission from the Israeli Ministry of Education and included written parental consent for participation. The current study included 171 children aged 3–6 years: (a) 57 recruited research participants (4 girls per group) comprising 27 target children with HFASD (IQ >75) and 30 target children with TYP, (b) 57 children who were identified by teachers and mothers as friends of the target children, and (c) 57 children who were classmates, but not identified friends of the target participants (see Table 1 for participants' description). Each trio of children (target, friend, and nonfriend) attended the same preschool.

HFASD target group (n = 27). All target children with HFASD were previously diagnosed by licensed psychologists unassociated with the current study, based on the *DSM-IV-TR* (American Psychiatric Association, 2000). Clinical diagnoses were PDD-NOS (3.7%, $n = 1$), HFASD (37%, $n = 10$), and Asperger syndrome (59.2%, $n = 16$). All 27 children met criteria for autism on the Autism Diagnostic Interview–Revised (ADI-R; Rutter, Le Couteur, & Lord, 2003), which was completed with parents to verify diagnosis. To assess children's IQ and MA scores, Mullen Scales of Early Learning (Mullen, 1995) were administered to all target children, except for five children with HFASD who had undergone recent IQ testing less than 1 year earlier using WISC-R (Wechsler, 1974) or WPPSI-III (Wechsler, 2002). Only participants with an IQ of 75 or above were included, to denote high functioning in ASD.

TYP target group (n = 30). This TYP group was matched to the HFASD group (see Table 1) on maternal education, CA, IQ, VMA, and NVMA (based on Mullen, 1995).

Friends (n = 57). For each target child in both groups, a close friendship of at least 4 months' duration was identified according to reports by the child's teacher and verification by the child's mother. Howes's (1996) criteria for friendship were utilized (1) mutual preference during spontaneous interaction along different activities (i.e., on playground); (2) demonstration of mutual interest; (3) maintenance of close proximity; (4) showing affection (eye contact and smile, touch); (5) shared fun; and (6) sharing objects during play. Children in both groups had same-age friendships, but the friends' disability status differed between the groups, with 59% of the friends of children with HFASD having a disability (16 pairs), whereas no friends of children with TYP had a disability. More detailed information about the friends is presented in Bauminger-Zviely and Agam-Ben-Artzi (2013).

Nonfriends (n = 57). A classmate who did not meet Howes's (1996) friendship criteria (henceforth a "nonfriend") was matched by age and diagnostic status to each target child's friend. That is, same-age nonfriends with TYP were matched to friends with TYP, and same-age nonfriends with HFASD were matched to friends with HFASD.

Table 1 Sample characteristics for target preschoolers with high-functioning autism spectrum disorder (HFASD) and with typical development (TYP)

	HFASD ($n = 27$)		TYP ($n = 30$)		Group differences
	M	*SD*	*M*	*SD*	*F* (1, 56)
CA (months)	59.44	11.26	55.30	10.97	1.97
Verbal MA[a]	60.30	11.45	58.68	10.53	.29
Nonverbal MA[a]	61.54	11.38	55.87	11.66	3.30
IQ[a]	105.14	17.22	107.60	14.13	.35
Mother's education[b]	4.96	0.97	5.23	0.94	1.13

[a]Based on Mullen (1995) age-equivalent subscales. Verbal MA, verbal receptive and verbal expressive; Nonverbal MA, visual perception and fine motor.
[b]Calculated on 6-point scale: 1 = less than 8th grade; 2 = some high school; 3 = high school with diploma; 4 = some college; 5 = college degree (e.g., BA); 6 = graduate degree (e.g., masters or above).

Measures

Experimental free-play scenario. To evaluate spontaneous conversations during peer interaction in a free-play social scenario, target children (HFASD and TYP) were observed in their preschools for two 10-min free-play interactions, once with the friend and once with the nonfriend, in counterbalanced order. During this videotaped free-play break between structured activities, children were provided with snacks and drinks as well as several age-appropriate toys, such as means–end games, toys for pretend play, and fine-motor games like bead threading. Children received no specific instructions; they were just told that they could do whatever they felt like doing. Children's videotaped spontaneous conversations with their peer partners were assessed for pragmatic capabilities and for conversation quality.

Pragmatic Rating Scale-young (PRS-Y). Inasmuch as no standard instruments existed to assess natural peer conversation in preschoolers with HFASD, we modified the original PRS (Landa et al., 1992) to our preschoolers' conversational acts. The PRS was originally developed for parents of children with ASD (Landa et al., 1992) and previously used for older youth with HFASD aged 12–18 years (e.g., Paul et al., 2009).The version by Paul et al. identified 30 pragmatic behaviors reflecting abnormalities in conversation reported to typify autism, divided into three main categories. *Pragmatic behaviors* (19 items) focus primarily on topic management and

reciprocity (e.g., "overly talkative," "unresponsive to interlocutor," "topic preoccupation/perseveration," "little reciprocal conversational to-and-fro"). *Speech and prosodic behaviors* (8 items) concern the form of the speaker's production (e.g., "scripted, stereotyped sentences or discourse," "intonation is unusual," "awkward expression of ideas," "unusual timing of responses, reformulations"). *Paralinguistic behaviors* (4 items) include the physical nonverbal behaviors that accompany speech, such as gestures, facial expression, physical distance, and gaze.

Three expert speech therapists evaluated the original PRS items' aptness for young preschoolers' free-play peer conversation in HFASD. Consequently, two of the original PRS items from the pragmatic category were excluded from the PRS-Y: "Greeting" was inappropriate to the free-play break scenario, and "vague" was combined with "inadequate clarification" from the same category. We also added three items based on modification of the PRS by Ruser et al. (2007) for 10-year olds: "dominating conversation" and "inappropriate reference to the other's emotions" (pragmatic category), and "grammatical errors and speech complexity" (speech category). The expert speech therapists confirmed these and inserted one additional item ("inefficient use/not optimizing strategies for resolving conflict" – pragmatic category) as important characteristics of young preschoolers' peer conversation in HFASD. Thus, our final PRS-Y scale included 32 items: 19-item pragmatic, 9-item speech/prosodic, and 4-item paralinguistic categories (see Table 2 for complete list of behaviors rated).

Children's videotaped peer conversations were coded for PRS-Y behaviors every 2 min over the 10-min interaction, thereby yielding five codings that were averaged into one mean score. At each coding interval, each PRS-Y behavior was rated on a 3-point scale: 1 = *Almost never occurs*, 2 = *Occurs sometimes, but does not seriously interfere with conversation flow*, 3 = *Occurs almost always, seriously interfering with conversation flow*. Higher scores indicated more severe pragmatic deficit.

Two observers who were blind to children's HFASD/TYP diagnosis were trained to code PRS-Y behaviors while jointly coding a randomly selected sample of 25% of the HFASD and TYP groups. Interobserver agreement of 80% or higher was obtained for all PRS-Y items. Coders (experienced speech therapists with expertise in children with ASD) then worked independently on the remaining data.

Reliabilities (Cronbach alphas) were .78 for pragmatic, .50 for speech/prosodic, and .76 for paralinguistic behaviors. After data coding, five items were removed because they were not coded for any child in either group: "strikingly candid", "overly direct or blunt," "inappropriately formal," "inappropriately informal" (from pragmatic category), and "unusual rating of speech, such as stuttering" (from speech category). The new Cronbach alphas for the 27-item final scale were .79 for pragmatic (15 items) and .61 for speech/prosodic (8 items), with the same alpha (.76) for paralinguistic behaviors (4 items).

General assessment of conversation quality. Deriving from Adams, Green, Gilchrist, and Cox (2002), we assessed three general categories of target children's conversational quality within the dyad during spontaneous peer talk (excerpts below taken from TYP group). *Meshing* assessed goodness-of-fit of the target child's socio-communicative interaction vis-à-vis the partner (e.g., Partner: "Do you want to switch games?" Target child: "Let's switch. You'll be first and I'll be second"). *Assertiveness* assessed the target child's tendency to initiate exchanges in a conversation (e.g., Target child: "We are having fun, right?"). *Responsiveness* assessed the target child's ability to respond to the partner's solicitations for information (e.g., Partner: "Why is the floor sticky?" Target child: "Because the juice is sticky"). Coders first observed the entire 10-min interaction and then provided a global evaluation for each of the three categories along a 5-point scale: 1 = *Not appearing at all*; 2 = *Very little*, 3 = *Sometimes*, 4 = *Very often*, 5 = *A lot*. Higher scores indicated higher conversational quality. The same two blind PRS-Y coders jointly coded conversational quality (in fixed order after coding the more detailed PRS-Y) for a randomly selected sample of 25% of the HFASD and TYP groups, obtaining interobserver agreement level of 90% or higher. Coders then worked independently on the remaining data.

The current study included two complementary scales: (1) The PRS tapped detailed pragmatic abnormalities characterizing ASD, whereas the conversational quality scale provided general evaluation of three pivotal pragmatic aspects of conversation (initiations, responses, and partners' goodness-of-fit). (2) This study was the first to administer the PRS with young children; therefore, a second scale was warranted to provide another perspective on preschoolers' pragmatic abilities. (3) Correlations between the two scales were moderate, indicating only partial overlap and close, but not identical, constructs (e.g., conversational–*meshing*: $r = -.43$ with PRS-*pragmatic*, $r = -.43$ with PRS-*prosody*, $r = -.66$ with PRS-paralinguistic; conversational–*assertiveness*: $r = -.47$ with PRS-pragmatic, $r = -.48$ with PRS-prosody, $r = -.62$ with PRS-paralinguistic; conversational–*responsiveness*: $r = -.54$ with PRS-pragmatic, $r = -.49$ with PRS-prosody, $r = -.62$ with PRS-paralinguistic ($p < .001$, in all cases).

Results

Group effects (HFASD/TYP) and partner effects (friend/nonfriend) in pragmatic competencies and conversation quality

Pragmatic competencies. We examined group and partner differences for the specific PRS-Y behaviors

Table 2 Group (HFASD/TYP) and partner (friend/nonfriend) differences on specific behaviors in Pragmatic Rating Scale-Young

Behaviors	HFASD		TYP		Group		Partner		Group × partner	
	Nonfriend *M (SD)*	Friend *M (SD)*	Nonfriend *M (SD)*	Friend *M (SD)*	*F* (1, 55)	η^2	*F* (1, 55)	η^2	*F* (1, 55)	η^2
Pragmatic category										
Overly talkative	1.20 (.48)	1.05 (.14)	1.05 (.11)	1.02 (.08)	3.13	.05	3.92[c]	.07	1.94	.03
Irrelevant/inappropriate detail	1.17 (.26)	1.14 (.16)	1.01 (.05)	1.01 (.03)	21.31[a]	.28	.48	.01	0.16	.00
Out-of-sync content/ unannounced topic shifts	1.45 (.46)	1.27 (.26)	1.02 (.08)	1.03 (.07)	35.66[a]	.40	4.13[c]	.07	5.52[c]	.09
Confusing accounts	1.11 (.20)	1.12 (.17)	1.01 (.05)	1.01 (.05)	16.72[a]	.24	0.89	.01	0.09	.00
Topic preoccupation/ perseveration	1.26 (.41)	1.30 (.28)	1.02 (.06)	1.03 (.10)	25.56[a]	.32	0.22	.01	0.10	.00
Unresponsive to interlocutor	1.80 (.61)	1.37 (.27)	1.13 (.22)	1.11 (.15)	52.32[a]	.50	10.12[a]	.16	8.38[b]	.13
Little reciprocal conversational to-and-fro	2.33 (.50)	1.60 (.48)	1.30 (.43)	1.02 (.08)	85.13[a]	.61	38.04[a]	.41	13.48[a]	.20
Terse	1.18 (.33)	1.17 (.28)	1.18 (.35)	1.03 (.10)	2.06	.04	2.89	.05	2.40	.04
Odd humor	1.07 (.18)	1.07 (.17)	1.03 (.09)	1.02 (.06)	2.17	.04	0.31	.00	0.03	.00
Insufficient background information	1.19 (.27)	1.15 (.20)	1.02 (.07)	1.00 (.00)	22.90[a]	.30	0.89	.02	0.12	.00
Failure to reference pronouns, terminology	1.03 (.09)	1.01 (.04)	1.00 (.00)	1.00 (.00)	3.46[.07]	.06	2.15	.04	2.15	.04
Inadequate clarification, vague	1.17 (.33)	1.08 (.16)	1.04 (.11)	1.02 (.06)	8.41[b]	.13	2.26	.04	0.75	.01
Dominating conversation	1.11 (.36)	1.13 (.27)	1.05 (.16)	1.03 (.10)	2.32	.04	0.01	.00	0.24	.00
Inefficient strategies for resolving conflict	1.07 (.18)	1.14 (.24)	1.03 (.08)	1.02 (.06)	6.93[b]	.11	2.26	.04	3.19	.06
Inappropriate reference to the other's emotion	1.30 (.30)	1.13 (.22)	1.03 (.13)	1.01 (.03)	18.92[a]	.26	7.02[b]	11	3.22[·]	.06
Speech/prosodic category										
Scripted, stereotyped sentences/discourse	1.25 (.27)	1.11 (.19)	1.00 (.00)	1.00 (.00)	32.86[a]	.38	5.88[c]	.10	5.88[c]	.10
Awkward expression of ideas	1.08 (.20)	1.04 (.08)	1.00 (.00)	1.00 (.00)	10.87[b]	.17	1.61	.03	1.61	.03
Indistinct speech/ mispronunciation	1.24 (.38)	1.11 (.25)	1.27 (.32)	1.22 (.37)	0.74	.01	4.26[c]	.07	0.98	.02
Too rapid/slow rate of speech	1.16 (.31)	1.09 (.24)	1.00 (.00)	1.00 (.00)	9.26[b]	.15	1.29	.02	1.29	.02
Unusual intonation	1.92 (.49)	1.73 (.52)	1.01 (.04)	1.00 (.00)	115.59[a]	.68	3.53	.06	3.06	.08[·]
Inappropriate volume (too loud/soft)	1.12 (.25)	1.11 (.25)	1.05 (.14)	1.04 (.13)	2.15	.04	0.17	.00	0.06	.00
Unusual timing of response, reformulation	1.05 (.12)	1.02 (.08)	1.01 (.04)	1.00 (.00)	6.13[c]	.10	2.03	.04	0.89	.02
Grammatical errors and speech complexity	1.13 (.30)	1.10 (.20)	1.07 (.15)	1.05 (.12)	1.27	.26	0.66	.01	0.01	.00
Paralinguistic category										
Inappropriate physical distance	1.23 (.39)	1.08 (.27)	1.03 (.09)	1.01 (.05)	11.37[a]	.15	2.67	.04	1.82	.03
Inappropriate gestures	1.49 (.52)	1.26 (.35)	1.01 (.05)	1.01 (.03)	33.43[a]	.37	4.59[c]	.08	4.05[c]	.07
Inappropriate facial expression	1.72 (.37)	1.54 (.42)	1.00 (.00)	1.00 (.00)	108.85[a]	.65	5.78[c]	.09	5.78[c]	.09
Gaze, unusual eye contact	2.12 (.47)	1.47 (.43)	1.16 (.22)	1.04 (.08)	109.42[a]	.66	45.05[a]	.45	21.39[a]	.28

HFASD, high-functioning autism spectrum disorder; TYP, typical development.
[a]$p < .001$; [b]$p < .01$; [c]$p < .05$.

and for the three main conversation categories (pragmatic, speech/prosodic, and paralinguistic).

PRS-Y specific behaviors. To examine group and partner differences on specific pragmatic behaviors, we conducted a series of 2(HFASD/TYP) × 2(friend/nonfriend) ANOVAs for all but six of the PRS-Y items. As seen in Table 2, more abnormality in pragmatic behavior emerged for the HFASD group than for the TYP group. The most severely affected specific pragmatic behaviors in HFASD versus TYP were "little reciprocal conversational to-and-fro" ($\eta^2 = .61$) and "unresponsive to interlocutor" ($\eta^2 = .50$) from the pragmatic category; "intonation is unusual" ($\eta^2 = .68$) from the speech/prosodic category; and "inappropriate facial expression" ($\eta^2 = .65$) and "gaze, unusual eye contact" ($\eta^2 = .66$) from the paralinguistic category. Overall, children with TYP scored very low on most of the specific behaviors, demonstrating more intact pragmatic capabilities than children with HFASD.

Regarding partner effects (see Table 2), significant friend/nonfriend differences emerged in 10 of the 27 behaviors (37%), comprising 5 pragmatic-category behaviors; 2 speech/prosodic behaviors; and 3

paralinguistic behaviors. Overall, more intact pragmatic capabilities emerged during interaction with a friend versus a nonfriend, with the most robust partner differences found for reciprocity in a conversation ($\eta^2 = .41$) and for use of eye gaze ($\eta^2 = .45$). However, as seen in Table 2, the group × partner statistical interaction effect was significant for all but 3 of the aforementioned 10 behaviors found significant for partner effect (i.e., overly talkative – pragmatic, inappropriate reference to other's emotions – pragmatic; indistinct speech/mispronunciation – speech/prosody). Simple effect tests to explore sources of statistical interactions yielded significant partner effects only in the HFASD group for the following behaviors: out-of-sync: F (1, 26) = 4.48, $p < .05$, $\eta^2 = 0.15$; unresponsive to interlocutor: F (1, 26) = 9.37, $p < .01$, $\eta^2 = 0.27$; stereotypic speech: F (1, 26) = 5.09, $p < .05$, $\eta^2 = 0.17$; and facial expression: F (1, 26) = 5.23, $p < .05$, $\eta^2 = 0.17$. Reciprocal conversation and use of eye contact were significant in both groups, but effect sizes were much larger for the HFASD than for the TYP group; for reciprocal conversation, HFASD: F (1, 26) = 30.47, $p < .001$, $\eta^2 = 0.55$; TYP: F (1, 29) = 5.74, $p < .05$, $\eta^2 = 0.16$; for eye gaze, HFASD: F (1, 26) = 35.43, $p < .001$, $\eta^2 = 0.59$; TYP: F (1, 29) = 8.42, $p < .01$, $\eta^2 = 0.22$. Simple effect test for gesture use revealed nonsignificant within-partner effects, when examined separately for each group. Altogether, the specific PRS-Y behaviors revealed a less pronounced pragmatic deficit in children with HFASD when interacting with friends than with nonfriends. The same direction of findings emerged for the TYP group, but differences between friend and nonfriend interactions were smaller.

Pragmatic competencies: Overall PRS-Y categories. To examine group and partner differences on the three PRS-Y categories, we conducted 2(HFASD/TYP) × 2(friend/nonfriend) multivariate analyses of variance (MANOVA), followed by univariate ANOVAs. The MANOVA results yielded a significant effect of group, F (3, 53) = 56.13, $p < .001$, $\eta^2 = .76$; significant effect of partner, F (3, 53) = 13.10, $p < .001$, $\eta^2 = .43$; and significant group × partner interaction, F (3, 53) = 7.82, $p < .001$, $\eta^2 = .31$. As seen in Table 3, univariate ANOVAs revealed that the HFASD group surpassed the TYP group on all three categories (pragmatic, speech/prosodic, and paralinguistic), attesting to the HFASD group's more severe pragmatic deficit compared with TYP group. Partner (friend/nonfriend) effect was significant for two of the PRS-Y categories (pragmatic, paralinguistic), demonstrating that, in interaction with friends, children in both groups showed higher pragmatic and paralinguistic capabilities versus interactions with nonfriends (see Table 3). However, further univariate analyses on the group × partner statistical interaction revealed significant interaction effect only for the paralinguistic PRS-Y category, F (1, 55) = 24.34, $p < .001$, $\eta^2 = .31$. Simple effect tests revealed significant partner differences in both groups, HFASD: F (1, 26) = 29.75, $p < .001$; TYP: F (1, 29) = 8.47, $p < 0.01$. Yet, the effect size was much larger in HFASD ($\eta^2 = .53$) than in TYP ($\eta^2 = .23$), demonstrating greater difference between friend and nonfriend interactions in HFASD than in TYP regarding use of paralinguistic skills like gestures, facial expressions, and eye gazes (used more appropriately when interacting with friends than with nonfriends).

Conversation quality. The 2(group) × 2(partner) MANOVA conducted to examine group and partner differences on global conversational quality yielded significant effects for group, F (3, 53) = 17.59, $p < .001$, $\eta^2 = .50$, and for partner, F (3, 53) = 10.79, $p < .001$, $\eta^2 = .38$. Univariate ANOVAs for each of the three categories (meshing, assertiveness, responsiveness) revealed significantly lower conversational quality among children with HFASD than among children with TYP (see Table 3). Yet, when interacting with friends, children in both groups showed greater conversational adequacy, more initiations of conversational exchanges, and more responsiveness to information elicited by the partner than when interacting with a nonfriend.

Correlations of pragmatic and conversational measures with developmental variables

We examined how developmental variables (CA, VMA, NVMA, and IQ) correlated with the three PRS-Y categories (pragmatic, speech/prosodic, paralinguistic) and with the three global conversational quality categories (meshing, assertiveness, responsiveness) in each group with nonfriend and with friends. Overall, higher linguistic and cognitive capabilities correlated with a less severe pragmatic deficit. More specifically, in the HFASD group (see Table 4), during an interaction with a nonfriend, VMA significantly correlated negatively with paralinguistic behaviors (PRS-Y) and positively with meshing (conversation quality). Thus, higher VMA was linked with fewer inappropriate nonverbal behaviors and better synchronization between children during the interaction. Furthermore, IQ significantly correlated with five of the six categories: negatively with speech/prosodic and paralinguistic behaviors (PRS-Y) and positively with all three conversational quality categories (meshing, assertiveness, and responsiveness). Children with a higher IQ showed better conversational quality and less severe speech/prosodic and paralinguistic deficits. Neither CA nor NVMA correlated significantly with any pragmatic measure. Interestingly, fewer measures correlated significantly with developmental variables for friend interactions than for nonfriend interactions (see Table 4), but overall Z-Fisher scores revealed nonsignificant differences in correlation coefficients between friend and nonfriend.

In the TYP group (see Table 4), during interaction with a nonfriend, VMA, NVMA, and CA correlated negatively with the speech/prosodic category

Table 3 Group and partner differences on the PRS-Y and conversational quality categories

	HFASD		TYP		*F* (1, 55)	
Categories	Nonfriend (*n* = 27)	Friend (*n* = 27)	Nonfriend (*n* = 30)	Friend (*n* = 30)	Group η^2	Partner η^2
Pragmatic Rating Scale-young						
Pragmatic						
M	1.30	1.21	1.06	1.03	68.43***	7.12**
SD	0.16	0.19	0.07	0.02	.55	.11
Speech/prosodic						
M	1.25	1.16	1.05	1.04	24.72***	.04
SD	0.15	0.09	0.06	0.06	.31	.12
Paralinguistic						
M	1.64	1.34	1.05	1.01	161.72***	39.02 ***
SD	0.26	0.23	0.06	0.02	.75	.41
Conversation quality						
Meshing						
M	2.52	3.37	3.93	4.31	36.41***	18.77***
SD	0.80	0.84	1.08	0.85	.40	.26
Assertiveness						
M	2.52	3.52	3.96	4.51	48.70***	24.03***
SD	0.85	0.85	1.06	0.74	.47	.31
Responsiveness						
M	2.74	3.59	3.90	4.55	41.35***	27.34***
SD	0.59	0.88	1.06	0.63	.43	.34

HFASD, high-functioning autism spectrum disorder; TYP, typical development; N, friend–nonfriend.
***$p < .001$; **$p < .01$.

Table 4 Developmental characteristics' links with pragmatic competencies and conversational quality in both groups

	Pragmatic Rating Scale-young						Conversational quality					
	Pragmatic		Speech/ Prosodic		Paralinguistic		Meshing		Assertiveness		Responsiveness	
Developmental characteristic	NF	F	NF	F	NF	F	NF	F	NF	F	NF	F
Preschoolers with high-functioning autism spectrum disorder (*n* = 27)												
CA	−.01	.16	.003	.19	−.15	.18	.11	−.02	−.10	.04	−.07	.10
VMA[a]	−.27	−.18	−.21	−.21	−.54**	−.10	.45*	.19	.22	.03	.29	.16
NVMA[a]	−.16	.08	−.26	.08	−.24	.04	.32	.04	.19	−.02	.26	−.01
IQ[a]	−.11	−.31	−.39*	−38*	−.39*	−.31†	.39*	.14	.37*	.07	.38*	
Preschoolers with typical development (*n* = 30)												
CA	−.21	−.06	−.59**	−.32*	.20	.20	.01	.08	.01	.19	−.05	.18
VMA[a]	−.32*	−.26	−.69**	−.41**	.15	.25	.12	.23	.17	.24	.05	.26
NVMA[a]	−.24	−.17	−.66**	−.38*	.17	.10	.01	.15	.04	.25	−.05	.21
IQ[a]	−.22	−.50***	−.17	−.16	−.14	−.10	.19	.42**	.26	.38*	.13	.31*

NF, nonfriend partner; F, friend-partner.
[a]Based on Mullen (1995).
***$P < 0.001$; **$p < .01$; *$p < .05$; †$p = .06$.

(PRS-Y). Thus, older children with higher VMA and NVMA showed better speech/prosodic capabilities. Only VMA negatively correlated with the pragmatic category (PRS-Y), linking higher VMA with better pragmatic capabilities. Interestingly, during interaction with friend, IQ correlated negatively with the PRS-Y pragmatic category and positively with all three conversational quality categories (meshing, assertiveness, responsiveness), whereas these correlations were nonsignificant for interactions with a nonfriend (see Table 4). Yet, *Z*-Fisher scores calculated to examine differences in correlation coefficients yielded nonsignificant differences.

Z-Fisher scores calculated to examine differences in the two groups' correlations (HFASD/TYP) yielded only three significant differences: (1) VMA and PRS-Y speech/prosodic ($z = 2.23$, $p < .05$); (2) VMA and PRS-Y paralinguistic ($z = 2.61$, $p < .001$); and (3) CA and PRS-Y speech/prosodic ($z = 2.40$, $p < .01$).

Contribution of the partner to pragmatic deficit in HFASD: within-group analysis

A 2(mixed/nonmixed dyads) × 2(friend/nonfriend partner) MANOVA, with repeated measures for friend/nonfriend on the three PRS-Y categories (pragmatic, speech/prosodic, paralinguistic) and on the conversation quality categories (meshing, assertiveness, responsiveness), yielded only a significant friend/nonfriend effect, F (3, 23) = 9.05, $p < .001$,

$\eta^2 = .54$; F (3, 23) = 11.31, $p < .001$, $\eta^2 = .59$, respectively. Results for friend/nonfriend differences are reported above. No significant effect emerged for mixed/nonmixed dyads.

Discussion

This study is novel in its investigation of spontaneous peer conversation in preschoolers with HFASD and TYP. Despite the importance of peer talk to language development and the well-documented pragmatic deficit in HFASD, peer talk is an overlooked study domain. We first examined characteristics of the pragmatic deficit in HFASD versus TYP during spontaneous peer talk and secondly explored the role of friendship as contributing to pragmatic capabilities, in HFASD and TYP, by comparing peer talk of friends versus acquaintances. To help explain individual differences in pragmatic abilities, we also scrutinized associations between preschoolers' pragmatics and their developmental (CA) and verbal–cognitive capabilities (VMA, NVMA, IQ).

Group differences in pragmatic abilities: HFASD versus TYP

As predicted, analysis of observed spontaneous peer conversations revealed a more severe pragmatic deficit in HFASD versus more intact pragmatic capabilities in TYP, for almost all of the pragmatic behaviors and conversational quality dimensions. The most severely affected pragmatic behaviors in HFASD included verbal behaviors (e.g., limited reciprocal conversation, unresponsiveness to interlocutor's cues, unusual intonation) and nonverbal social-gesture behaviors (e.g., inappropriate facial expression, poor eye contact and gaze). These significant differences coincide with previous findings concerning the HFASD profile and underscore the core deficit in autism regarding reciprocity and nonverbal communication (American Psychiatric Association, 2013). When examining pragmatic language deficits in ASD, a stated hallmark is impairment in social responsivity and reciprocity (Stefanatos & Baron, 2011). Poor conversational quality emerged in previous studies, including one-sidedness, low quality of facial expression, and less nonreciprocal gaze (Bauminger et al., 2008; Nadig et al., 2010). Intonation – part of the prosodic behavior fostering speakers' production abilities – was found to be of lower quality in HFASD than in TYP (Paul et al., 2009), thereby substantiating the characteristic profile where pragmatics and prosody are impaired to a greater extent in ASD than in TYP (Stefanatos & Baron, 2011).

When examining links between pragmatic characteristics and developmental variables during interaction with a nonfriend, we found that, overall, higher linguistic and cognitive capabilities correlated with better pragmatic abilities (or, in this case, less severe pragmatic deficit) in both groups, but this finding was more robust in the HFASD group. Moreover, in HFASD, full-scale IQ correlated with most PRS-Y and conversational quality categories. Preschoolers with HFASD with higher cognitive capabilities showed fewer inadequate prosodic and paralinguistic behaviors, more responsiveness to the partner, more active involvement in the conversation by initiating exchanges with the partner, and more coregulated conversation. Higher VMA also contributed to better paralinguistic capabilities and more coregulated conversation. These findings support the cognitive "compensation hypothesis," which assumes that children with HFASD use their relatively high cognitive capabilities to compensate for their low social–emotional functioning (Hermelin & O'Connor, 1985). These findings substantiate previously documented links between cognition and language (e.g., Kjellmer, Hedvall, Fernell, Gillberg, & Norrelgen, 2012). Two additional findings can contribute to discussion on the "cognitive compensation hypothesis" in ASD. First, fewer significant correlations with IQ or VMA emerged during interactions with friends versus nonfriends, which may imply that interactions with friends are possibly more spontaneous due to familiarity and personal preferences and therefore may require less cognitive effort. Second, interestingly, higher cognitive and/or linguistic capabilities did not correlate with the PRS-Y pragmatic category, including behaviors, such as out-of-sync topic shifts, confusing verbal accounts, failing to provide sufficient background information, or providing inadequate/vague clarifications. This indicates the limitation of the cognitive compensation hypothesis and demonstrates the severity of these children's deficits in language and in understanding others' mental states (theory of mind) (e.g., Tager-Flusberg, 2001).

In the TYP group, during interaction with a nonfriend, VMA correlated negatively with the pragmatic category, whereas CA, VMA, and NVMA all correlated negatively with the speech/prosodic category. Thus, better pragmatic behaviors emerged in preschoolers with higher VMA, and more appropriate prosodic behaviors emerged in older preschoolers with better VMA and NVMA. However, differently from the HFASD group, in the TYP group, IQ positively correlated with all the conversational quality categories only for interactions with a friend. This suggests that perhaps higher and more developmentally complex pragmatic behaviors characterize interactions with friends (e.g., more idiomatic language, more complex narratives) than with nonfriends, thus requiring cognitive sophistication. Indeed, all three categories were rated higher for interactions with friends than with nonfriends (as discussed below), but because the conversational scale tapped initiations, responses, and partners' fitness, it is difficult to learn about the complexity of pragmatic behavior for this group. Hence, future studies are needed to elucidate possible links among pragmatic sophistication, cognitive capabilities, and partner type.

Considering the core deficits in autism, the significant differences between groups concerning characteristics of the pragmatic deficit in ASD are not surprising, for they, in fact, construe the crux of these preschoolers' social disability. Our examination of the interaction partner's role aimed to shed further light on this pragmatic deficit.

The role of the partner (friend/nonfriend) in HFASD and TYP groups

The current study yielded novel findings on the role played by a friend-partner versus nonfriend partner for preschoolers with both HFASD and TYP; yet, partner effects were more robust in the HFASD than in the TYP group regarding the PRS-Y scale, which focused mainly on the pragmatic deficit characterizing ASD. Importantly, for preschoolers with HFASD, 30% of specific PRS-Y behaviors were more intact in interactions with friends than in interactions with nonfriends, spanning all three pragmatic categories, versus only 18.5% of specific behaviors in the TYP group. In HFASD, interactions with friends were characterized by longer reciprocal conversations that were more responsive to the partner's information-seeking and emotional state and were less overly talkative (pragmatic behaviors) than interactions with nonfriends. Moreover, interactions with friends showed less stereotypic discourse and mispronunciations (speech and prosody aspect) as well as more appropriate facial expressions and eye contact (paralinguistic category) than interactions with nonfriends. Thus, altogether, when conversing with a friend, these preschoolers with HFASD demonstrated higher levels of social complexity, fewer pragmatic pitfalls, and more adequate conversations.

Inasmuch as the PRS-Y assessed pragmatic deficits characterizing ASD, children with TYP scored very low overall, thus limiting the scale's ability to yield partner effects for specific behaviors. Only eye contact and conversational reciprocity were found to be more frequent with friends than with nonfriends for the TYP group. The three overall PRS-Y category scores provided better indication of partner effects in TYP, where interactions with friends had better pragmatic quality and more adequate use of paralinguistic behaviors than interactions with nonfriends.

With regard to the conversation quality scale, which tapped global intactness of pragmatic core components of conversation, interactions with friends surpassed interactions with nonfriends for both groups. Findings pinpointed better dyadic quality of interaction with a friend than with a nonfriend, demonstrating more coregulated and responsive conversations, as well as more initiations of conversational exchanges. Altogether, these unique findings add breadth to the growing body of literature underscoring the significance of friendship and the role of friends in HFASD (see review in Bauminger-Zviely, 2013 and Kimhi & Bauminger-Zviely, 2012) and in TYP (e.g., Newcomb & Bagwell, 1995). Lastly, interactions with a partner who was diagnosed with HFASD (nonmixed dyads) did not differ significantly from interactions with a partner with TYP (mixed dyads). This is surprising, especially in light of former outcomes on preadolescents' conversational flow during free play in typical dyads versus mixed and nonmixed dyads, which revealed the lowest level of conversational flow in nonmixed dyads (two peers with HFASD) versus the two other groups (e.g., Bauminger et al., 2008). Notwithstanding, one should interpret these findings with caution due to age differences between the studies (preadolescence vs. preschool). Conceivably, during preadolescent conversations, partners may require much higher skills, including the understanding of subtleties that may well be beyond the grasp of preschoolers with HFASD, without the aid of a child with TYP who can act as a role model. Perhaps, also, the number of participants in the HFASD group (27) was not large enough to detect those differences. Future studies should explore this issue and developmental trajectories further.

Our study has two limitations to be noted (a) selectiveness of the sample, comprising preschoolers with HFASD with identified friends, thus perhaps limiting generalization to other subgroups of preschoolers along the spectrum and (b) small number of preschoolers in within-group analyses, calling for replications on larger groups of preschoolers with HFASD.

On the whole, despite these shortcomings, the contribution of the current study is twofold: theoretical and therapeutic. Theoretically, the current robust pragmatic deficit found in peer talk of preschoolers with HFASD substantiates former results based on older children with ASD, mainly during interactions with adults, thus supporting the neuropsychological profile of HFASD. However, the current study uniquely demonstrated the importance of the friend-partner in possibly mitigating this robust pragmatic deficit in HFASD. Findings also provided support for the link between high cognitive capabilities and pragmatic capabilities in peer talk. Therapeutically, the present outcomes hold significant implications for early intervention because friendship is rarely targeted in such interventions, nor is spontaneous peer conversation. Emphasizing friendship and pragmatic capabilities during spontaneous peer talk in early intervention may lead to better elicitation of pragmatic capabilities in young preschoolers with HFASD. Early peer talk is crucial for social involvement, and it seems that facilitation of peer talk within the context of friendship may perhaps lead to fuller peer relations in HFASD.

Acknowledgements

This research was partially supported by the Israel Science Foundation through grant given to the first

author. Special thanks are extended to the children who took part in this study. The authors would like to express their appreciation to Dee B. Ankonina for her editorial contribution and to Dov Har–Even for his statistical assistance.

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Key points

- Early peer talk is crucial for pragmatic development. In ASD, pragmatic deficit is the hallmark of language deficit.
- Researchers did not yet comparatively evaluate spontaneous peer talk in preschoolers with ASD versus typical development, or the partner's (friend's vs. nonfriend's) contribution in mitigating the pragmatic deficit. Prior studies examined older children and child–adult talk.
- Typical preschoolers revealed more intact pragmatic profiles than preschoolers with high-functioning ASD (HFASD), but the latter group's interactions with friends (HFASD or typical) were more pragmatically intact and coregulated than with nonfriends. Also, high cognitive capabilities compensated for some peer-talk difficulties in HFASD.
- Clinically, emphasizing friendship in early intervention may help elicit more adequate pragmatic capabilities and presumably fuller peer relations in preschoolers with ASD.

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Accepted for publication: 2 September 2013
Published online: 25 October 2013