

## A Study on Meta-Pragmatic Language Characteristics of Children With High-Functioning Autism Spectrum Disorders

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**Purpose:** Children with high-functioning autism spectrum disorder (HF-ASD) have difficulty interacting with others due to a defect in pragmatic language skills. Accordingly, in this study, the pragmatic language characteristics of children with HF-ASD were compared with those of typically developing children.

**Methods:** Twenty-five children with HF-ASD aged 4 to 10 years old and thirty-three typically developing children who have matching chronological age were evaluated using the Korean Child Meta-Pragmatic Language Test (KOPLAC) for communication regulations, discourse and story information inferences and metalinguistics awareness (indirect expressions, references, ironies and metaphors). The KABC-II performance score was used as a covariate in an analysis of covariance (ANCOVA) to determine if the total KOPLAC score and the scores for each subdomain of the two groups were statistically significant. Furthermore, a two-way ANCOVA was performed to determine whether there was a difference in the pragmatic language features of the two groups based on age (pre-school age and school age).

**Results:** Children with HF-ASD performed significantly lower than typically developing children in all areas except irony and metaphor after analyzing whether there was a significant difference in the pragmatic language characteristics of the two groups. Furthermore, the findings of a comparison of the pragmatic language characteristics of the two groups according to their ages showed that interaction effects were significant in communication regulations, discourse, and story information inferences.

**Conclusions:** The pragmatic language characteristics of children with HF-ASD were examined by subdomain, and the possibility and necessity of intervention were discussed based on the results of the KOPLAC.

**Keywords:** Children with high-functioning autism spectrum disorder, meta-pragmatic language skills, KOPLAC

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**Received:** September 15, 2023

**Revision revised:** October 04, 2023

**Accepted:** October 31, 2023

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## 1. Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) of the American Psychiatric Association, the definition and diagnostic criteria for autism spectrum disorder (ASD) include deficits in social communication, and repetitive behaviors or interests. Due to defects in social communication, a critical criterion for ASD, it is difficult to have social interaction and conversation with others, and problems may occur in

verbal and non-verbal communication for social interactions. These social communication problems are closely related to pragmatic language skills in terms of language use.

Pragmatic language skills refer to the ability to use the language appropriately in the context of social interaction or context (Bates, 1976). Since such skills are essential factors for children to build relationships with family, teachers, and peers (Russell, 2007), they are considered one of the key elements of social skills, in addition to school life and academic achievement. It is universally acknowledged that pragmatic language difficulties are prevalent among children with ASD, although they show atypicality in various characteristics and domains of communication depending on their cognitive level or

language ability (Paul & Norbury, 2012). Especially, according to Song (2019), a group that requires particular attention in pragmatic language support is high functioning ASD (HF-ASD). A child with autism spectrum disorder who exhibits cognitive abilities in the low-average to above-average range is said to have high-functioning autism spectrum disorder (Sansosti et al., 2010). It is reported that children with HF-ASD have normal language development in general. They have less trouble understanding meaning and grammar but suffer from pragmatic language difficulties. Specifically, they demonstrate less intention to communicate, use inappropriate language in a given circumstance, or fail to take turns in conversation. They use straightforward expressions that can embarrass the opponent and ask questions constantly, attempting or maintaining the interaction. In addition, there is difficulty initiating, maintaining, switching, and ending a conversation due to a lack of communication skills (Mesibov & Schopler, 1992), and they show limited and repetitive interests, which is a common characteristic of children with ASD. Children with HF-ASD speak in a long-winded and repetitive manner, are unable to comprehend complex social interactions or understand others' emotional states, and have difficulty listening. Due to these deficiencies in pragmatic language skills, it is difficult to engage with friends and adjust to school life (Adams & Stephenson, 2016).

As mentioned above, it is necessary to evaluate pragmatic language skills in order to detect and intervene at an early stage for children with HF-ASD. Tools to evaluate pragmatic language skills are divided into indirect evaluation, in the form of questionnaires or checklists filled out by parents and caregivers, and direct evaluation, which induces specific responses in children (Song et al., 2016). Because the examination of pragmatic language skills is context- and situation-dependent, it analyzes how to conduct communication or conversation skills in natural scenarios whenever possible. For this reason, it is not easy to elicit and evaluate the ability to respond flexibly and appropriately to situations that change over time through a structured formal assessment procedure (Adams, 2002). Furthermore, in a constrained evaluation setting, there is a restriction on adequately recognizing pragmatic deficits in natural situations by dealing with a small number of particular communication partners, such as the examiner or the primary caregiver (Bishop & Adams, 1989; Kim et al., 2018; Song et al., 2016). As a result, meta-pragmatic language evaluation has lately become a viable alternative to pragmatic skills assessment that can also represent

situational or context-dependent pragmatic language characteristics and even offer implications for interventions (Kim et al., 2018).

Meta-pragmatic refers to the ability to recognize and explain the interaction rules of spoken language applied to a specific situation or context (Bernicot & Laval, 1996; Karmilof-Smith, 1986). In addition, meta-pragmatic is the ability to reflect the conventional rules of language use, a term that broadly includes the ability to reflect language depending on the context (Collins et al., 2014). According to Collins et al. (2014), the development of meta-pragmatic awareness in children with typical development begins from the age of 5 to 6, and meta-pragmatic ability begins to be fully displayed after the age of 7. In the lower grades of elementary school, meta-pragmatic skills are elaborated, and understanding of upper language skills such as indirect and idiomatic expressions develops as it becomes possible to grasp the speaker's perception of intention (Bernicot et al., 2007).

The task of evaluating these meta-pragmatic abilities consists of identifying pragmatic rules, judging the appropriateness of behaviors, and correcting and recommending inappropriate expressions (Collins et al., 2014). The meta-pragmatic ability of participants was assessed in this study using the Korean Meta-Pragmatic Language Assessment for Children (KOPLAC, Kim et al., 2018), which was established by reflecting these types of tasks. The Korean Meta-Pragmatic Language Assessment for Children (KOPLAC) is composed of subdomains such as communication regulations, discourse and story information inferences, and metalinguistic awareness. Communication regulations assess whether the speaker understands the rules that govern the content of communication in relation to the conversational partner or situation. According to previous research, this was also referred to as register variation. Register variation refers to the flexible use of one's language forms to suit the context of the situation. These include using polite language, speaking considering the age of the conversation partner, choosing vocabulary appropriate for the conversation partner, topic, and situation, and using age-appropriate language in peer relationships (Paul, 2007). Discourse and story information inferences examine factual information, inferences with text connections and missing information, problem solving and missing information recognition based on given audiovisual storytelling. The ability to infer information through stories begins to appear around the age of 3~4, and indirect meaning inference from conversations and stories becomes possible between the ages of 4~6 (Bernicot

et al., 2007). Metalinguistic awareness measures the ability to understand the concealed meaning intended by the speaker in a conversational scenario through indirect expression, reference ability to discover or explain the target suggested in the context, and irony and analogy recognition.

As discussed above, children with HF-ASD have difficulties interacting with family, peers, and teachers due to defects in pragmatic language, therefore, it is necessary to identify the pragmatic language characteristics of these children and implement effective intervention. As a result, this study attempts to compare the pragmatic language characteristics of children with HF-ASD to those of typically developing children in terms of communication regulations, discourse and story information inferences, and metalinguistic awareness.

Here are the research questions for this study:

1. Is there a significant difference in pragmatic language ability between children with high-functioning autism spectrum disorder (HF-ASD) and children with typical development?
2. Do children with high-functioning autism spectrum disorder (HF-ASD) and typically developing children show different pragmatic language abilities depending on preschool and school age?

## II. Methods

### 1. Participants

The study included twenty-five children with HF-ASD aged 4 to 10 from Seoul and Gyeonggi-do, as well as thirty-three typically developing children who matched the chronological age range. The typically developing child group was matched in language and chronological age with the HF-ASD group, and their language and intellectual abilities were reported to be normal by their parents or teachers. Other conditions were identical for both groups.

Children in the HF-ASD group qualified for the study if they were: (1) diagnosed with autism spectrum disorder in pediatric psychiatry using the DSM-5 diagnostic criteria (2) monolinguals who speak Korean as their mother tongue; and (3) had a functional intelligence score of 85 or above on the Kaufman Intelligence Test for Children-II nonverbal test (Kaufman Assessment Battery for Children-2nd edition: KABC-II, Subaek Mun, 2014), which assesses hand movement, triangle, visual analogy, location memory, and picture

sequence (4) scoring in the normal range (more than  $-1SD$ ) on the Receptive and Expressive Vocabulary Test (Kim et al., 2009) (5) demonstrating no sensory impairments such as vision and hearing as reported by the parents.

The average chronological age of the typically developing children group participating in this study was 7 years old ( $SD=17.85$ ), the average points of receptive vocabulary was 111.18 ( $SD=30.44$ ), the average points of expressive vocabulary was 110.63 ( $SD=31.34$ ), and the average performance index of intelligence was 121.78 ( $SD=7.77$ ). The average chronological age of the HF-ASD group was 6 years and 6 months ( $SD=16.99$ ), the average points of receptive vocabulary was 89.84 ( $SD=31.54$ ), the average points of expressive vocabulary was 87 ( $SD=26.15$ ), and the average performance index of intelligence was 107.40 ( $SD=13.07$ ). The two groups did not show a statistically significant difference in chronological age ( $t=1.335, p>.05$ ), but they did show a significant difference in KABC-II performance score ( $t=4.887, p<.05$ ). As a result of covariate analysis with the KABC-II performance score as a covariate, there was no statistical significance between receptive and expressive vocabulary ( $F=.9, p>.05$ ). Detailed information for each group is shown in Table 1.

**Table 1.** Participants' characteristics

	TD (N=33)	HF-ASD (N=25)	F	p-value
Age (months)	85.15 (17.85)	78.96 (16.99)		
REVT-receptive	111.18 (33.44)	89.84 (31.54)	.900	.347
REVT-expressive	110.63 (31.34)	87.00 (26.15)	2.587	.113
KABC-II	121.78 ( 7.77)	107.40 (13.07)		

*Note.* Values are presented as mean ( $SD$ ); HF-ASD=high-functioning autism; TD=typically developing children; REVT=Receptive & Expressive Vocabulary Test (Kim et al., 2009); KABC-II=Kaufman Assessment Battery for Children-2nd edition (Moon, 2014).

This study was conducted after receiving a review for human subject research from the Ewha Womans University Bioethics Committee (IRB approval number 96-6). Parents of participants were provided with information about the study and consented to participate in the study.

### 2. Experimental Task

The Korean Pragmatic Language Assessment for Children (Song et al., 2017) was conducted to examine the pragmatic language abilities of preschool and school-age children. This tool, for the purpose of evaluating

Table 2. Subtests of KOPLAC

Sub-domain	Purposes of the tasks	Number of items	
		Preschool	School
Communication regulations			
Communication partners	To test the ability to change grammatical forms according to conversational partners	29	
Situational context	To test the ability to change tones of voice or regulate expressions proper to conversational context	9	
Discourse & Story information inferences	To test the ability to understand the facts in a story, to find out absent information and to guess emotions or situations through the story	18	20
Metalinguistics awareness			
Indirect expressions	To test understanding of indirect expression and the ability to deal with the situation	12	
References	To test the ability to sum up various information and find out the referential target	9	
Irony & Metaphor	To test the meta-linguistic ability to understand ironical & metaphoric expressions	0	14
Total		77	93

pragmatic ability based on the DSM-5, is composed of three subdomains: communication regulations, discourse and story information inferences, and metalinguistic awareness. Communication rules are further subdivided into communication partners and situational context, whereas metalinguistic awareness includes indirect expressions, references, ironies, and metaphors. The characteristics of three subdomains are listed in Table 2.

Communication regulations refer to the ability to control speech in consideration of the overall context in which communication takes place. It evaluates whether the speaker manages the contents of speech in relation to the conversational partners and adjusts the volume of speech as well as the content of the conversation. Discourse and story information inferences examine the ability to understand the entire story context by listening to a short story and make inferences about the emotions of the characters, cause and effect, problem solving, and insufficient or missing information based on the understanding of the facts presented in the story. Finally, metalinguistic awareness measures the cognitive ability to recognize or use indirect expressions, referential expressions, ironic and figurative expressions.

The KOPLAC questionnaire established a specific communication environment and included background information about the situation as well as conversations between characters. Matching images for each question were developed, scripts for each question were recorded, and the software was created as a computer application (Appendix 1). The participant is expected to respond to

the problems presented by the examiner after encountering these audio-visual discourse tasks.

The construct validity of KOPLAC showed a correlation coefficient ranging from .346 to .809 with a significance level of .05 or less in all areas. The internal consistency of KOPLAC was measured using Cronbach's  $\alpha$ , and the  $\alpha$  coefficient was .94 for the preschool age group and .93 for the school age group (Kim et al., 2018).

### 3. Research Procedure

This study was conducted in the clinical laboratory of a university. All tests were conducted one-on-one between the child and the examiner, and the evaluation tasks were divided into two sessions. First, to select participating children, the KABC-II motor test and the receptive/expressive vocabulary test were conducted. As a result, only children with a motor intelligence score of 85 or higher were administered KOPLAC in two sessions.

### 4. Data Analysis

KOPLAC is conducted to record children's responses and score them systematically, and as a result, the following criteria were applied:

Communication regulations and metalinguistic awareness: indirect expressions are scored on a 0, 1, and 2 point system; indirect expressions are scored on a 0, 1, and 2 point system.

Discourse and story information references and

metalinguistic awareness: references are scored as 0 point for incorrect responses and 1 point for correct responses.

Communication regulations and metalinguistic awareness: among valid indirect responses, pragmatic expressions that match the context and are socially acceptable received 2 points, whereas expressions that fit the context but are less socially acceptable only received 1 point.

The KABC-II performance score was used as a covariate in an analysis of covariance (ANCOVA) to determine if the total KOPLAC score and the scores for each subdomain of the two groups were statistically significant. A two-way ANCOVA was also performed to evaluate the interaction between age groups (pre-school and school age) and the pragmatic language competence in typically developing children and children with HF-ASD.

### III. Results

This study evaluated the pragmatic language ability of children aged 4 to 10 years using KOPLAC, and investigated the differences between the characteristics of the pragmatic language of children with HF-ASD and typically developing children. The results are shown in Table 3.

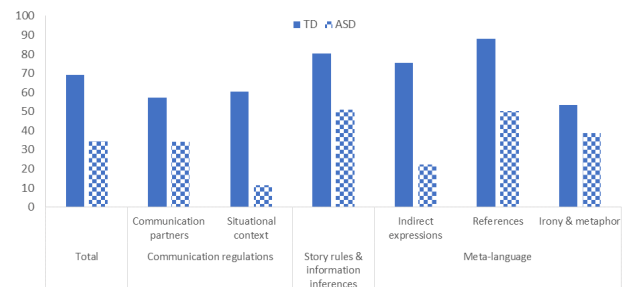
**Table 3.** Statistical results of KOPLAC

Sub-domain	Accuracy (%)	
	TD (N=33)	ASD (N=25)
<b>Communication regulations</b>		
Communication partners*	57.18 (21.19)	34.20 (27.59)
Situational context***	60.33 (23.16)	11.24 (10.54)
Discourse & Story information inferences**	80.30 (11.22)	50.93 (30.30)
<b>Metalinguistics awareness</b>		
Indirect expressions***	75.30 (19.34)	22.26 (22.26)
References***	87.93 (14.79)	50.22 (23.83)
Irony & Metaphor	53.36 (46.82)	38.58 (40.46)
<b>Total**</b>	<b>69.07 (17.51)</b>	<b>34.57 (19.47)</b>

Note. Values are presented as mean (SD); KOPLAC=Korean Pragmatic Language Assessment for Children; TD=typically developing; ASD=autistic spectrum disorders.  
\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Typically developing children’s average KOPLAC total score was 69.07 (SD=17.51), showing a significant difference compared to the average of 34.57 (SD=19.47) for HF-ASD

( $F=21.19$ ,  $p < .001$ ). In all subdomains, the average of the HF-ASD group was lower than those of typically developing children, and children with HF-ASD showed significantly lower results in all subdomains except for irony and analogy. In terms of communication regulations according to the conversation partners, typically developing children averaged 57.18 (SD=21.19), a significant difference from the HF-ASD average of 34.20 (SD=27.59) ( $F=4.693$ ,  $p < .05$ ), and typically developing children’s discourse and story information inferences averaged 80.30 (SD=11.22), which was significantly higher than the HF-ASD average of 50.93 (SD=30.30) ( $F=8.449$ ,  $p < .01$ ). The average difference between typically developing children and those with HF-ASD was more than 30 points, with statistically significant differences in communication regulations related to context ( $F=56.962$ ,  $p < .001$ ), metalinguistic awareness: indirect expressions ( $F=51.991$ ,  $p < .001$ ), and metalinguistic awareness: references ( $F=25.424$ ,  $p < .001$ ). The average scores for metalinguistic awareness: irony and metaphor in a typically developing group were 53.36 (SD=46.82), while the HF-ASD group averaged 35.58 (SD=40.46). Although there was a difference in average values, it was not statistically significant ( $F=.077$ ,  $p > .05$ ).



Note. KOPLAC=Korean Pragmatic Language Assessment for Children; TD=typically developing; ASD=autistic spectrum disorders.

**Figure 1.** Results of KOPLAC

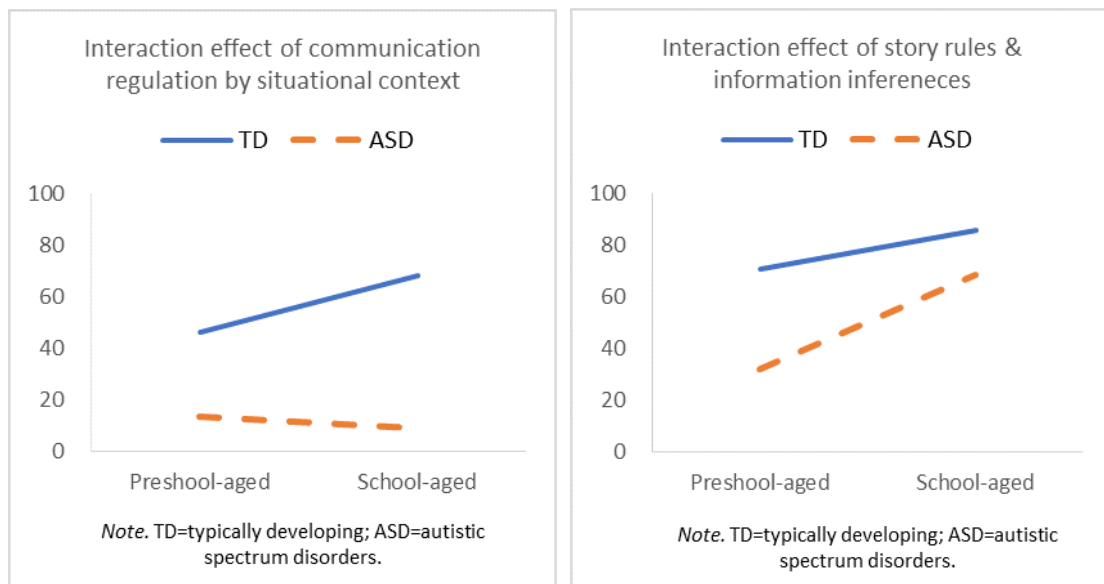
The participating children were divided into preschool and school-age groups, and the pragmatic language characteristics of the typically developing group and the HF-ASD group were examined. The results are shown in Table 4, and as a result of verifying significance, no interaction effect was identified in the total score ( $F=.011$ ,  $p > .05$ ). Therefore, the pragmatic language ability of both groups increased when they reached school-age compared to preschool age. The results are shown to be the same in communication regulations according to conversation partners ( $F=.049$ ,  $p > .05$ ), metalinguistic awareness: indirect expressions ( $F=.002$ ,  $p > .05$ ), and metalinguistics: references ( $F=3.324$ ,  $p > .05$ ). Metalinguistic

**Table 4.** Statistical KOPLAC results of group by age

Sub-domain	Accuracy (%)			
	TD (N=33)		ASD (N=25)	
	Preschool-aged (n=12)	School-aged (n=21)	Preschool-aged (n=12)	School-aged (n=13)
Communication regulations				
Communication partners	37.00 (17.41)	68.71 (12.96)	16.67 (20.18)	50.38 (23.62)
Situational context**	46.41 (15.88)	68.28 (23.18)	13.56 (12.75)	9.10 ( 7.93)
Discourse & Story information inferences*	71.00 ( 8.14)	85.61 ( 9.14)	31.94 (26.28)	68.46 (22.58)
Metalinguistics awareness				
Indirect expressions	61.83 (22.55)	83.00 (12.15)	11.47 (12.36)	32.22 (25.05)
References	81.41 (19.27)	91.66 (10.27)	36.10 (16.51)	63.26 (22.41)
Total	49.61 ( 7.32)	80.19 (10.21)	18.29 ( 9.24)	49.60 (13.04)

Note. Values are presented as mean (SD); KOPLAC=Korean Pragmatic Language Assessment for Children; TD=typically developing; ASD=autistic spectrum disorders.

\* $p < .05$ , \*\* $p < .01$



**Figure 2.** Interaction effects of group by age

awareness: irony and metaphors was not tested on preschool-age children since earlier research has indicated that irony and metaphors emerge in earnest beyond the school age.

However, the interaction effect was significant in communication regulations based on situational context ( $F=7.936$ ,  $p < .01$ ). In the case of children with HF-ASD, the school-age group average was lower than the preschool age group average, whereas typically developing children showed higher scores in the school-age group than the pre-school age group. Also, in both groups, the average of the school-age group was greater than the average of the preschool age group, and the average difference in

the HF-ASD group was significantly larger than the average difference in the typically developing children group ( $F=5.331$ ,  $p < .05$ ).

#### IV. Discussion

This study examined how the pragmatic language characteristics of children with HF-ASD differ from those of typically developing children aged 4 to 10 years. The results of the study showed that the total pragmatic language score of children with HF-ASD was significantly

lower than that of typically developing children. With the exception of irony and metaphor, children with HF-ASD showed significantly lower performance in subdomains than typically developing children. In addition, the participants were divided into preschool and school-age groups and the pragmatic language characteristics of the typically developing group and the HF-ASD group were examined. As a result, there was no interaction effect in the overall score of pragmatic language, communication regulations according to conversation partners, and metalinguistic awareness: indirect expression and metalinguistics: references. Interaction effects, on the other hand, were found to be substantial in communication regulations, discourse and discourse and story information inferences according to the situational context.

The total pragmatic language score of children with HF-ASD was significantly lower than that of typically developing children. This is consistent with the results of previous studies showing that children with HF-ASD showed lower performance than typically developing children in pragmatic skills such as topic maintenance and switching, speech correction, premise and reference ability, intention and function of communication, and information reasoning (Klin & Volkmar, 2000; Norbury et al., 2004; Simmons et al., 2014). The following is a discussion of the outcomes for each sub-area.

First, the ability to coordinate communication according to the conversation partners was significantly lower in children with HF-ASD than in typically developing children. This is consistent with studies showing that children with HF-ASD experience difficulty adequately expressing coordination according to their partners in conversational situations (Volden & Sorenson, 2009; Volden et al., 2007).

Second, children with HF-ASD had significantly lower scores in the capacity to coordinate communication based on situational context than typically developing children. Furthermore, because of their weak central cohesion, children with HF-ASD process information by focusing on a tiny section of the picture, making it difficult for them to understand the overall picture or scenario (Happé et al., 2001).

Third, children with HF-ASD had significantly lower scores in discourse and story information inferences than typically developing children. As previously stated, children with HF-ASD may have difficulty understanding and inferring the entire story due to their weak central cohesiveness (Beaumont & Newcombe, 2006; Norbury et al., 2014).

Fourth, metalinguistic awareness: indirect expressions

also showed significantly lower performance in children with HF-ASD than typically developing children. This is due to the tendency to interpret the expressed words literally rather than through context, as well as the difficulty in interpreting the speaker's intention (Happé, 1993; Happé et al., 2001; Norbury & Bishop, 2002).

Fifth, children with HF-ASD were found to have significantly low metalinguistic awareness: references. This is due to referential communication deficits that children with HF-ASD display by failing to recognize the interests of their conversation partners and responding and sharing information in accordance with their interests (Resches & Pérez Pereira, 2007; Sidera et al., 2016).

Finally, children with HF-ASD performed lower than typically developing children in metalinguistic awareness: irony and metaphor, but there was no statistically significant difference. This is inconsistent with the prior research findings which demonstrated that children with HF-ASD comprehend settings literally and have more difficulty understanding idiomatic expressions or metaphors than typically developing children (Caillies & Le Sourn-Bissaoui, 2008; Lee et al., 2014). These findings suggest that irony and metaphor comprehension reflect the sophistication and complexity of meta-pragmatic language perception, and that it should be taken into account that even typically developing children begin to develop in earnest at school age and continue until the age of 17.

Children with HF-ASD show greater achievement when they reach school age, just as typically developing children do, with the exception of communication regulations that vary depending on the situational context. Although the degree of accomplishment varies by subdomain, children with HF-ASD demonstrated greater achievement in pragmatic language skills. According to Moody (2014)'s pragmatic language intervention study, it is necessary to explicitly support the rules of language use, and in order to do so, the cognitive ability that enables such rule learning is required. In other words, intervention is possible for children with HF-ASD because there is no difference in cognitive ability from that of typically developing children, despite significant differences in pragmatic language. According to the findings of this study, performance in communication regulations and metalinguistic awareness (indirect expressions and references) depending on the conversational partners grew with reaching school age compared to preschool age, and this aspect did not differ from typically developing children. These accomplishments suggest that developmental and educational effects can be anticipated in children with HF-ASD whose cognitive

capacities are within the normal range.

On the other hand, in discourse and story information inferences, both groups' performance improved as they approached school age, although the range of improvement was substantially greater than that of typically developing children. According to Bernicot et al. (2007), the ability to infer information from stories begins to appear around the age of 3~4, and indirect meaning inferences from conversations and stories become possible between the ages of 4~6. Furthermore, while the ability to employ discourse markers diversifies by the age of 7, reference expressions emerge concurrently, and clear reference expressions in basic situations demonstrate adult-level abilities at about the age of 6 (Davies et al., 2015). Despite having average cognitive ability, children with HF-ASD, who are deficient in information inference and indirect semantics, do not process information based on social cognition as much as their peers do before entering school. However, when children reach school age, their ability to understand emotions and make causal inferences improves considerably; a significant intervention effect can be expected in this area.

Besides discourse and story information inferences, another area where the interaction effect between preschool and school-age shows is communication regulations based on situational context. According to Song et al. (2017), typically developing children showed less than 50% accuracy in the first half of school age, started to show more than 50% accuracy only when they reached school age, and reached less than 80% accuracy even at the age of 9. Situational context includes both language and non-linguistic components to actualize the speaker's purpose and corresponding expressions in public and private contexts. While aspects other than language are incorporated, communication regulation is a challenging process even for typically developing children, and it is a particularly difficult task for children with HF-ASD who have social awareness deficiencies. Song and Kim (2018) conducted a social communication intervention for school-aged children with HF-ASD, and the mediation effect on context coordination was not identified after examining progress before and after the intervention using KOPLAC. According to the findings of this study, the average social communication of children with HF-ASD at school age was lower than at preschool age. It can be stated that the characteristics of children with HF-ASD who exhibit core deficits in social communication are reflected in these results, emphasizing the importance of appropriate intervention based on the situational context.

The understanding of idioms such as irony and metaphor is one aspect of the elaboration and complexity of metaphorical cognition, which begins to develop in earnest at school age and continues until the age of 17 (Spector, 1996). For this reason, ironies and metaphors for KOPLAC were conducted only for school-age children. There was no significant difference between peers in group comparison results, but previous studies also showed that they fail to consider social context and tend to interpret expressions literally, because autistic children find it hard to make contextual inferences in everyday speech (Dennis et al., 2001). Literal interpretation has been found to be a factor that makes understanding idioms difficult (Kerbel & Grunwell, 1998). However, considering the number of participants (21 school-age typically developing children and 13 children with HF-ASD), this remains a limitation of the study.

A follow-up study would need to increase the number of participants, specifically by dividing the school age into sub-age groups and recruiting enough participants for each group to examine how pragmatic language development continues after school age and differs from that of typically developing children. Also, it is necessary to determine the difference between the results of metapragmatic language by using alternative methods of pragmatic language evaluation rather than only a comparative study with clinical groups demonstrating pragmatic language difficulties.

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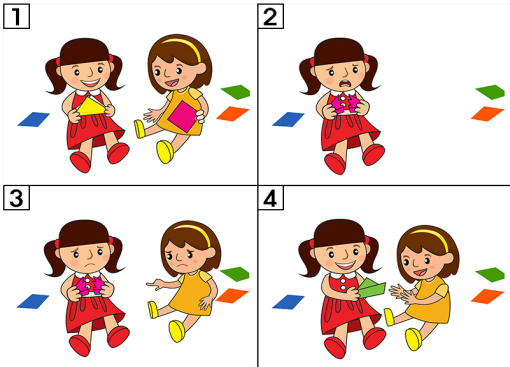
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Appendix 1. Examples items of KOPLAC

Subdomains	Examples
<p>Communication regulation</p>	<p>Conversation partner</p> <p>E.g., The phone rang and Hayoung answered the phone. The grandmother called Hayoung to ask if she was doing well.                      Hayoung: Grandma, I miss you.                      Grandma: <u>Yes, I miss you too. How is your brother (she used an honorific expression in the question)?</u></p> <p>Judgmental Question) Is what Grandma said right? Or is it inappropriate?                      Correction Question) Please correct if you think this is not right.</p>  <hr/> <p>Situational context</p> <p>E.g., Hayoung took the elevator to go to the supermarket with her mother. There were many people in the elevator. <u>"Mom, there are too many people. I want to all of them to get off"</u></p> <p>Judgmental question) Is what Hayoung said right? Or is it inappropriate?                      Correction question) Please correct if you think this is not right.</p> 
<p>Discourse &amp; Story information inferences</p>	<p><b>Picture#1:</b> Jiwoo was doing origami at Saetbyeol's house.  <b>Picture#2:</b> Saetbyeol made a red paper boat and went to the bathroom. But while Saetbyeol was gone, Jiwoo played with the paper boat and broke it.  <b>Picture#3:</b> Saetbyeol saw the boat she made was broken.  <b>Picture#4:</b> Saetbyeol felt better after Jiwoo gave Saetbyeol a new paper boat and apologized.</p> <p>Missing information inferencing question) What did Jiwoo say to Saetbyeol?</p> 

	<p>Indirect expressions</p>	<p>E.g., It was a hot summer. Dad and Minsu were having fun playing ball in the park and resting.                  Dad: Oh, it's hot today!                  Minsu: Ah, ice cream is perfect for times like this!</p> <p>Understanding intention question) What does Minsu mean?                  Alternative question) What would you do if you were Minsu's dad?</p> 
<p>Metalinguistics awareness</p>	<p>References</p>	<p>Description question) Jiwon went to the toy store and bought a dice game to play with my friend's birthday party today. Guess who Jiwon is in the picture.</p> <p>Alternative question) Please explain so that the teacher can find the friend shown in the picture.</p> 
	<p>Irony &amp; Metaphor</p>	<p>E.g., It was lunch time. Minsu, who was hungry, wanted to get a meal quickly. The lady who serves lunch only gave him two sausages. After receiving a meal, Minsu said to his friend,                  Minsu: <u>They serve a lot of food for lunch</u>                  What did Minsu mean?</p> 