



Development and Preliminary Validation of a Joint Attention Assessment Tool for Arabic-Speaking Preschoolers with ASD: Evidence from Algeria

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Abstract:

Joint attention (JA) is a fundamental developmental skill often impaired in children with autism spectrum disorder (ASD). Despite its diagnostic and therapeutic significance, culturally and linguistically adapted tools for assessing JA in Arabic-speaking preschoolers are lacking.

This study aimed to develop and conduct a preliminary validation of the Joint Attention Assessment Tool (JAAT), designed specifically for Arabic-speaking preschool children in Algeria.

The JAAT, composed of 24 items across four domains (initiating eye gaze, following eye gaze, initiating pointing, and following pointing), was jointly completed by clinicians and caregivers. A sample of 53 children with ASD participated in the validation phase, with 35 undergoing a second assessment to evaluate test-retest reliability. Psychometric analyses included exploratory

factor analysis (EFA), content validity index (CVI), item difficulty analysis, internal consistency, split-half reliability, and test-retest reliability.

EFA supported a clear four-factor structure, explaining 86.91% of the total variance. All items demonstrated strong communalities and domain clustering, confirming construct validity. Expert review established high content validity (CVI > 0.80). Item difficulty analysis indicated a balanced distribution across ability levels. The tool showed excellent internal consistency (Cronbach's alpha = .976), strong item-total correlations, and robust reliability coefficients (split-half = 0.810; test-retest $\rho = .981$, $p < .001$).

The JAAT demonstrated strong preliminary psychometric properties, confirming its validity, reliability, cultural relevance, and clinical utility for assessing joint attention in Arabic-speaking preschoolers with ASD. Future research should expand validation to larger, more diverse samples and explore its use in longitudinal and multi-informant contexts.

Keywords: Joint Attention Assessment, Autism Spectrum Disorder (ASD), Psychometric Validation, Preschool Children, Algeria.

Développement et validation préliminaire d'un outil d'évaluation de l'attention conjointe chez les enfants d'âge préscolaire arabophones atteints de TSA : données provenant d'Algérie

Résumé :

L'attention conjointe (AC) est une compétence développementale fondamentale souvent altérée chez les enfants présentant un trouble du spectre de l'autisme (TSA). Malgré son importance diagnostique et thérapeutique, les outils d'évaluation de l'AC adaptés au contexte culturel et linguistique des enfants d'âge préscolaire arabophones sont rares.

Cette étude visait à développer et à réaliser une validation préliminaire de l'Outil d'évaluation de l'attention conjointe (OEA), conçu spécifiquement pour les enfants d'âge préscolaire arabophones en Algérie.

L'OEA, composé de 24 items répartis en quatre domaines (initiation du regard, suivi du regard, initiation du pointage et suivi du pointage), a été rempli conjointement par les cliniciens et les aidants. Un échantillon de 53 enfants présentant un TSA a participé à la phase de validation, dont 35 ont subi une seconde évaluation afin d'évaluer la fidélité test-retest. Les analyses psychométriques comprenaient une analyse factorielle exploratoire (AFE), l'indice de validité de contenu (IVC), l'analyse de la difficulté des items, la



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cohérence interne, la fidélité par bissection et la fidélité test-retest. Résultats : L'analyse factorielle exploratoire (AFE) a confirmé une structure à quatre facteurs, expliquant 86,91 % de la variance totale. Tous les items ont démontré une forte communalité et un regroupement par domaine, confirmant la validité de construit. L'examen par des experts a établi une validité de contenu élevée (CVI > 0,80). L'analyse de la difficulté des items a indiqué une distribution équilibrée selon les niveaux de compétence. L'outil a montré une excellente cohérence interne (alpha de Cronbach = 0,976), de fortes corrélations item-total et des coefficients de fidélité robustes (test de la moitié = 0,810 ; test-retest $\rho = 0,981, p < 0,001$).

Le JAAT a démontré de solides propriétés psychométriques préliminaires, confirmant sa validité, sa fidélité, sa pertinence culturelle et son utilité clinique pour l'évaluation de l'attention conjointe chez les enfants d'âge préscolaire arabophones atteints de TSA. Les recherches futures devraient étendre la validation à des échantillons plus larges et plus diversifiés et explorer son utilisation dans des contextes longitudinaux et multi-informateurs.

Mots-clés : *Évaluation de l'attention conjointe, Trouble du spectre de l'autisme (TSA), Validation psychométrique, Enfants d'âge préscolaire, Algérie.*

Introduction:

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by challenges in social communication and interaction, alongside restricted, repetitive patterns of behavior and interests (American Psychiatric Association & American Psychiatric Association, 2013). One of the earliest and most distinguishing markers of ASD is an impairment in joint attention (JA), a nonverbal social-communicative skill that involves the ability to share attention with another person toward an object, event, or topic. Joint attention behaviors typically emerge between 6 and 18 months of age (Mundy & Newell, 2007).

Joint attention is composed of two primary components, Responding to Joint Attention (RJA) and Initiating Joint Attention (IJA). RJA refers to a child's ability to follow another's gaze, gestures, or head turns to locate and share attention toward an external focus. IJA, on the other hand, reflects a child's capacity to direct another person's attention for the purpose of sharing interest or affect, typically through behaviors such as pointing, showing, or alternating gaze between an object and a person (Carpenter et al., 1998a; Mundy & Newell, 2007). These nonverbal communicative acts are essential for building early social relationships and scaffolding language development.

Deficits in joint attention are well-documented in children with ASD and are often evident before the age of two (Kasari et al., 2006). Research consistently shows that these impairments are not merely developmental delays but are qualitatively different from those seen in other developmental disorders. Children with ASD often show reduced frequency and quality of gaze alternation, pointing,



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and showing behaviors, which impairs their ability to engage socially and learn through shared experiences(Charman, 2003).

Moreover, joint attention is strongly predictive of later language and cognitive outcomes, early and accurate assessment is vital for identifying children at risk for ASD and guiding intervention(Kasari et al., 2010). Despite its clinical significance, there is a notable lack of standardized assessment tools for joint attention within the Arabic-speaking context, particularly in Algeria. To date, no validated instruments are available for assessing joint attention in Algerian children with ASD.

This absence represents a major challenge for clinicians, educators, and researchers who are left to rely on imported tools that may lack cultural relevance.

Given the lack of culturally appropriate joint attention tools for Arabic-speaking children with ASD, the current study addresses this gap by conducting a preliminary psychometric validation of a newly developed instrument tailored for use in Algeria.

1. Method

1.1. Design

This study employed a quantitative, cross-sectional design.

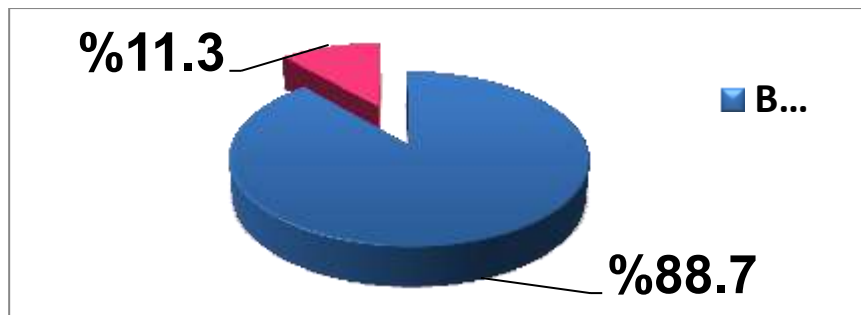
1.2. Participants

This study involved a total of 53 children aged between 3 and 5 years with autism spectrum disorder (ASD) (47 males, 06 females), all of whom had confirmed clinical diagnoses based on the Childhood Autism Rating Scale (CARS) and

comprehensive medical and developmental histories. A subset of 53 children from the ASD group (47 males, 06 females) participated in a test-retest reliability evaluation after a two-week interval to assess the temporal stability of the tool.

Given the limited sample size (N = 53), this study is positioned as a preliminary validation, intended to provide foundational evidence for future large-scale validation studies.

Figure 1: Percentage Distribution of the Study Sample by Gender



Note: The figure shows the percentage distribution of children with ASD by gender: 88.7% males (n=47) and 11.3% females (n=6).

Participants were recruited through purposive sampling from public and private clinics in cities of Ghardaïa, Ouargla, and Laghouat. Children were eligible for inclusion if they Algerian native speakers, (1) were aged between 3 and 5 years, (2) had a confirmed ASD diagnosis based on CARS, and (3) had no other major neurological or sensory impairments.



1.3. Measure Development

The tool consists of 24 structured items designed to be completed by parents and clinicians, based on the child's joint attention behaviors observed over the last 15 days, across four core domains: following eye gaze, following pointing, initiating eye gaze, and initiating pointing. Each item is rated on a 3-point scale: 1 (No response), 2 (Behavior observed 1 to 2 times) ,3 (Behavior observed 3 times or more).

Guided by a review of existing literature, a preliminary item pool was generated to capture developmentally appropriate JA behaviors. Content validity was evaluated by a panel of five experts, three clinical psychologists, two speech-language pathologists, resulting in a Content Validity Index (CVI) of 0.80 or higher for all items. Minor linguistic adjustments were made to five items for clarity. Additionally, feedback from ten parents helped ensure the ecological validity of the items, reflecting culturally and contextually relevant behaviors.

1.4. Procedure

Data collection was conducted between October 2022 and June 2025. Informed consent was obtained from the parents of all participants.

The assessment tool was administered by trained specialists in clinical psychology or speech-language pathology. assessments were conducted in structured sessions at public and private clinics, with the child's primary caregiver present, in the cities of Ghardaïa, Ouargla, and Laghouat.

To evaluate test-retest reliability, a subset of 53 children with ASD completed the assessment a second time, two weeks after the initial session.

1.5. Data Analysis

Data were analyzed using SPSS version 22 to evaluate the tool’s validity and reliability. Validity was assessed through exploratory factor analysis to establish construct validity, expert review to ensure content validity, and item difficulty analysis to further support construct validity. Reliability was examined using item-total and domain-total correlations to assess internal consistency, along with Cronbach’s alpha, split-half reliability, and test-retest reliability methods.

2. Validity Analysis

2.1. Construct Validity

Table 1. KMO and Bartlett’s Test of Sampling Adequacy

Test	Value
Kaiser-Meyer-Olkin Measure (KMO)	0.873
Bartlett’s Test of Sphericity	$\chi^2 = 1968.415$ df = 276 p < .001

Table 2. Total Variance Explained by Extracted Factors



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Factor	Eigenvalue	% of Variance	Cumulative %
1	15.54	64.76%	64.76%
2	3.09	12.88%	77.63%
3	1.16	4.84%	82.48%
4	1.07	4.44%	86.91%

Table 3. Extracted Communalities for Each Item

Range of Communalities	0.690 - 0.961
Extraction Method	Principal Axis Factoring

Table 4. Factor Loadings from the Rotated Pattern Matrix

Item Group	Factor	Loading
item19 - item24	1	0.68-0.88
Item7 - item12	2	0.71-0.90
item1 - item6	3	-0.72 to -0.83
item13 - item18	4	0.82-0.99

The Kaiser-Meyer-Olkin measure of sampling adequacy (Table 01) was 0.873, and Bartlett's test of sphericity was significant ($\chi^2 = 1968.415$, $df = 276$, $p < .001$), confirming the

suitability of the data for factor analysis. Four factors with eigenvalues (Table 02) greater than one were extracted, explaining a cumulative 86.91% of the total variance. High communalities (Table 03) (range: 0.690–0.961) indicated strong item–factor associations. Based on the pattern matrix (Table 04) and theoretical grounding, the factors were interpreted as: (1) Initiating Eye Gaze, (2) Following Eye Gaze, (3) Following Pointing, and (4) Initiating Pointing. Notably, items in Factor 3 showed negative loadings, suggesting an inverse relationship with task performance, indicating difficulty in responding to others’ pointing gestures.

2.2. Content Validity

Content validity was evaluated by a panel of five experts, three clinical psychologists, two speech-language pathologists, resulting in a Content Validity Index (CVI) of 0.80 or higher for all items. Minor linguistic adjustments were made to five items for clarity.

2.3. Item Difficulty Analysis

Table 5. Item Difficulty Indices

Item	Mean	Difficulty	Item	Mean	Difficulty
Item 1	2.3019	0.7673	Item 2	2.1509	0.7169
Item 3	2.1509	0.7169	Item 4	2.1698	0.7233
Item 5	2.2264	0.7421	Item 6	2.1132	0.7044
Item 7	2.2075	0.7358	Item 8	2.0943	0.6981
Item 9	2.0943	0.6981	Item 10	1.8679	0.6226
Item 11	1.9057	0.6352	Item 12	1.8302	0.6101
Item 13	1.9811	0.6604	Item 14	1.8113	0.6038
Item 15	1.8302	0.6101	Item 16	1.6981	0.5660
Item 17	1.7736	0.5912	Item 18	1.5849	0.5283



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Item 19	1.7925	0.5975	Item 20	1.6604	0.5535
Item 21	1.7358	0.5786	Item 22	1.6038	0.5346
Item 23	1.5660	0.5220	Item 24	1.5660	0.5220

The joint attention items (Table 05) demonstrate a mean score range from 1.57 to 2.30 on a 3-point scale, corresponding to item difficulty indices between approximately 0.43 and 0.77. This spread indicates a balanced difficulty level across items, with easier items such as item 1 (mean = 2.30; difficulty \approx 0.35) being accessible to most children, while more challenging items like item 18 (mean = 1.58; difficulty \approx 0.71) effectively discriminate among higher-performing individuals. The moderate distribution of difficulty ensures the tool is sensitive to a broad range of abilities within the 3–5-year age group.

3. Reliability Analysis

3.1. Internal Consistency

3.1.1. Item-Total and Domain-Total Correlations

Table6. Spearman’s Correlations Between domains and Total Score

Total	Following pointing	Following to eye gaze	Initiating pointing	Initiating eye gaze
	.846**	.859**	.734**	.858**

N = 53; All correlations are Spearman's rho. $p < .001$ (2-tailed).

Table7. Spearman’s Item-Total Correlations.

Item	R	Item	R	Item	R
Item 1	0.733**	Item 2	0.795**	Item 3	0.817**
Item 4	0.759**	Item 5	0.789**	Item 6	0.833**

Item 7	0.791**	Item 8	0.808**	Item 9	0.808**
Item 10	0.795**	Item 11	0.730**	Item 12	0.820**
Item 13	0.789**	Item 14	0.846**	Item 15	0.840**
Item 16	0.797**	Item 17	0.812**	Item 18	0.726**
Item 19	0.870**	Item 20	0.824**	Item 21	0.884**
Item 22	0.801**	Item 23	0.787**	Item 24	0.775**

N = 53; All correlations are Spearman's rho. $p < .001$ (2-tailed).

Based on (Table 06), the correlation between the total score and all domains (Spearman's ρ ranging from **.734** to **.859**, $p < .001$). The **highest correlations** were observed between the total score and **follow-eye gaze** ($\rho = .859$), and **eye gaze** ($\rho = .858$).

The Spearman's rho coefficients between individual items and the total score (Table 07), ranged from **0.726 to 0.884**, all statistically significant at the $p < .01$ level. These strong, positive correlations indicate that each item contributes meaningfully to the overall construct.

3.1.2. Cronbach's Alpha

Table 8. Reliability Analysis (Cronbach's Alpha) for the Items of the Scale

Item	Corr. Item-	α if Deleted	Item	Corr. Item-	α if Deleted
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	Total			Total	
item1	0.737	0.975	item2	0.795	0.975
item3	0.809	0.975	item4	0.748	0.975
item5	0.792	0.975	item6	0.825	0.975
item7	0.775	0.975	item8	0.782	0.975
item9	0.782	0.975	item10	0.774	0.975
item11	0.701	0.976	item12	0.795	0.975
item13	0.775	0.975	item14	0.839	0.975
item15	0.825	0.975	item16	0.772	0.975
item17	0.804	0.975	item18	0.711	0.975
item19	0.853	0.974	item20	0.795	0.975
item21	0.868	0.974	item22	0.775	0.975
item23	0.755	0.975	item24	0.737	0.975

The overall Cronbach’s Alpha coefficient (Table 08) was ($\alpha = .976$), the Corrected Item-Total Correlation values for individual items ranged from .701 (item11) to .868 (item21), also the “Cronbach’s Alpha if Item Deleted” reveals that removing any single item would not substantially increase the overall reliability.

3.2. Split-Half Reliability

Table9. Split-Half Reliability Statistics

Correlation					
Correlation Between Forms	0.680	Spearman-Brown (Equal	0.810	Guttman Split-Half Coefficient	0.810

		Length)			
Statistic					
Part 1 Alpha	0.970	Part 2 Alpha	0.975	Total	24 items

Table 10. Item-Total Correlations and Cronbach's Alpha if Item Deleted

Item	Corr. Item-Total	α if Deleted	Item	Corr. Item-Total	α if Deleted
item1	0.737	0.975	item2	0.795	0.975
item3	0.809	0.975	item4	0.748	0.975
item5	0.792	0.975	item6	0.825	0.975
item7	0.775	0.975	item8	0.782	0.975
item9	0.782	0.975	item10	0.774	0.975
item11	0.701	0.976	item12	0.795	0.975
item13	0.775	0.975	item14	0.839	0.975
item15	0.825	0.975	item16	0.772	0.975
item17	0.804	0.975	item18	0.711	0.975
item19	0.853	0.974	item20	0.795	0.975
item21	0.868	0.974	item22	0.775	0.975
item23	0.755	0.975	item24	0.737	0.975

Split-half reliability analysis (Table 9) indicated strong internal consistency, with a Spearman-Brown coefficient of 0.810 and a Guttman split-half coefficient of 0.810. The alpha values for each half of the test (Part 1 = 0.970; Part 2 = 0.975) were also high. Item-level analysis (Table 10) revealed corrected item-total correlations ranging from 0.701 to 0.868, with minimal fluctuation in Cronbach's alpha if any item was removed (range = 0.974–0.976).



3.3. Test-Retest Reliability

Table11. Test-Retest Reliability (Spearman Correlation)

Variables	ρ (Spearman)	Sig. (2-tailed)	N
test - r -test	$\rho = .981^{**}$	$p < .01$	53

As shown in (Table 11), the correlation between the first and second administrations was $\rho = 0.981$, $p < .01$, based on a sample of 53 participants, these findings provide strong evidence for the tool’s temporal reliability.

4. Discussion

The present study aimed to develop and validate the Joint Attention Assessment Tool (JAAT), a culturally and linguistically adapted measure designed to be completed by both clinicians and caregivers to assess joint attention (JA) behaviors in Algerian children aged 3 to 5 years, particularly those diagnosed with autism spectrum disorder (ASD). The findings provide strong psychometric evidence supporting the JAAT’s construct validity, internal consistency, and test-retest reliability.

The findings of the exploratory factor analysis, conducted to assess construct validity revealed a clear four-factor structure underlying the joint attention tool, accounting for 86.91% of the total variance. These factors were interpreted as Initiating Eye Gaze, Following Eye Gaze, Following Pointing, and Initiating Pointing, aligning well with established theoretical models that distinguish between *initiating* and *responding* forms of joint attention (Carpenter et al., 1998b; Mundy & Newell, 2007). The high communalities across items suggest strong internal coherence within each domain, supporting the construct

validity of the tool. Notably, items in the third factor, *Following Pointing* showed consistently negative loadings, indicating an inverse relationship between the factor and observed performance. This pattern is theoretically consistent with research showing that children with ASD often experience significant challenges in responding to deictic gestures such as pointing, which require interpreting another person's intentional and attentional cues (Cohen, 1995; Leekam & Ramsden, 2006).

The emergence of separate factors for both gaze and pointing, split into initiation and response underscores the multidimensional nature of joint attention. Initiating behaviors (e.g., initiating eye gaze or pointing) are typically associated with communicative intent and social motivation, while responding behaviors (e.g., following gaze or pointing) are more related to social perception and attention-following skills (Mundy & Newell, 2007). This differentiation has important implications for both diagnosis and intervention in autism, as impairments may be more pronounced in one domain than another (Charman, 2003). The strong factor loadings and domain separation observed in this analysis provide empirical support for treating joint attention as a multi-component skill set, rather than a unitary construct, reinforcing the need for domain-specific strategies when assessing or training joint attention in children with ASD.

Also, content validity was supported by an index greater than 0.80, indicating strong agreement among experts that the items and domains were representative of joint attention behaviors relevant to the study sample.

Moreover, The item difficulty analysis revealed a well-balanced range of item means, from 1.57 to 2.30,



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corresponding to difficulty indices between roughly 0.43 and 0.77. This distribution indicates that the JAAT can capture a wide spectrum of joint attention behaviors, from basic to more advanced. For instance, item 1 (mean = 2.30) was easily performed by most children, whereas more nuanced items like item 18 (mean = 1.58) effectively distinguished children with stronger joint attention skills. This variability enhances the tool's sensitivity while minimizing ceiling and floor effects, making it useful both for diagnostic differentiation and progress monitoring.

Furthermore, internal consistency was assessed using Spearman's item-total correlations, ranging from .726 to .884 ($p < .01$). indicates that each item meaningfully contributes to the overall construct of joint attention. Additionally, correlations between each domain and the total score, ranging from .734 to .859 ($p < .001$). Notably, following eye gaze ($\rho = .859$) and initiating eye gaze ($\rho = .858$) showed the strongest relationships with the total score, suggesting these behaviors are especially foundational in assessing joint attention during early childhood. Additionally, substantial intercorrelations among domains such as between following pointing and following eye gaze ($\rho = .784$) and between following eye gaze and initiating eye gaze ($\rho = .745$), point to shared underlying cognitive and social mechanisms.

One of the most notable findings was the exceptionally high internal reliability of the scale. The full 24-item JAAT demonstrated a Cronbach's alpha of .976, indicating excellent internal consistency. Each item exhibited strong corrected item-total correlations, ranging from .701 to .868, well above the acceptable threshold of .30. Additionally, the

"alpha if deleted" analysis showed that removing any item would not meaningfully improve reliability, confirming the scale's cohesive structure.

Split-half reliability analysis also indicated strong internal consistency, with a Spearman-Brown coefficient of 0.810 and a Guttman split-half coefficient of 0.810. The Cronbach's alpha values for each half of the test were also high (Part 1 = 0.970; Part 2 = 0.975). Item-level analysis revealed corrected item-total correlations ranging from 0.701 to 0.868, with minimal changes in Cronbach's alpha if any item was removed (range = 0.974–0.976), indicating that all items contributed meaningfully to the internal consistency of the scale.

Regarding temporal stability, the JAAT showed outstanding test-retest reliability. The Spearman correlation between initial and follow-up assessments was $\rho = .981$ ($p < .001$), indicating that children's performance remained highly consistent over time. This level of stability surpasses the standard reliability threshold ($\rho \geq .70$) and supports the tool's suitability for longitudinal studies and clinical monitoring. Split-half reliability analyses (Guttman = .810; Spearman-Brown = .810) further confirmed the scale's internal coherence across different forms of administration.

However, as a preliminary validation, the results should be interpreted with caution. Replication with larger, more diverse samples across Arabic-speaking regions is needed to confirm the tool's generalizability.

Together, these results establish the JAAT as a psychometrically sound and practically feasible instrument. Unlike structured observational tools that require clinical expertise and controlled settings, the tool provides a user-friendly alternative that maintains diagnostic sensitivity.



This is especially important in low-resource contexts where access to trained professionals and standardized environments may be limited, the tool also achieves strong ecological validity, enhancing its relevance and interpretability for local caregivers. This approach mirrors similar adaptations of instruments such as the EJAQ in Egypt and localized versions of the CSBS and ESCS (Muhammad et al., 2021; Mundy, 2003; Prizant & Wetherby, 2002), underscoring the value of cultural relevance in joint attention assessment.

From a developmental standpoint, the results align with established literature on the progression of joint attention skills from simpler to more complex forms. Item difficulty indices suggest that behaviors like gaze following emerge earlier and more consistently, while initiation behaviors, which require coordination of multiple social cues, develop later and vary more among children. This developmental trajectory is consistent with prior research linking joint attention development to later language and social outcomes (Gangi et al., 2014; Morales et al., 2000). Specifically, foundational skills such as eye gaze and facial expressions appear stable by around 30 months, whereas more complex joint attention behaviors continue to mature up to 54 months.

Practically, identifying items and domains that correlate most strongly with overall performance can inform intervention planning. For example, targeting eye gaze behaviors may be especially beneficial given their strong predictive power for joint attention functioning.

While other parent-report scales like the Social Communication Questionnaire (SCQ) and Childhood Joint

Attention Rating Scale (C-JARS) include elements of joint attention (Birkeneder et al., 2024; Snow, 2013) these tools often assess JA within broader social communication domains or are designed for older, verbal children. In contrast, the JAAT provides a focused, developmentally appropriate assessment of joint attention behaviors tailored specifically to preschoolers, improving sensitivity to early developmental differences critical for timely ASD diagnosis and intervention.

Conclusion

In conclusion, the findings support the tool's initial reliability and validity, suggesting its potential for use in early ASD assessment within Arabic-speaking contexts. However, further validation with larger samples is warranted. While its accessibility and contextual sensitivity make it a valuable resource for clinicians, educators, and researchers, future research should aim to validate the JAAT in larger and more diverse samples across Arabic-speaking regions to enhance its generalizability.

Longitudinal studies are also encouraged to examine how JAAT scores relate to developmental outcomes and intervention progress over time. Additionally, incorporating teacher and clinician observations alongside caregiver reports could strengthen the tool's value as a multi-informant assessment approach for early detection and support of children with ASD.

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Ethics, Conflict of Interest, and Funding

This study was conducted in full compliance with ethical research standards. Written informed consent was obtained from parents or legal guardians prior to the participation of children, and strict confidentiality and privacy were maintained throughout. The authors declare that they have no conflicts of interest. No external funding was received for the conduct of this research or the preparation of this manuscript.

Authors' Contributions

All authors contributed equally to the conception and design of the study, data collection, data analysis, and the writing of the manuscript. They share equal responsibility for the final version of the article.

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