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A mixed methods study investigation on theory of mind and social skill training on autistic teenagers in Otuocha education zone

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Abstract

This paper presents a mixed-methods investigation into the relationship between Theory of Mind (ToM) and social skills among autistic teenagers in the Otuocha Education Zone of Anambra State, Nigeria. Theory of Mind, defined as the cognitive ability to understand and interpret one's own mental states as well as those of others, plays a critical role in effective social interaction. This capacity is often impaired in individuals with Autism Spectrum Disorder (ASD), resulting in significant challenges in communication and social engagement. The study was motivated by the need to understand how autistic teenagers socialize and communicate within the sociocultural context of the Otuocha Education Zone. Many autistic children experience difficulties in language acquisition, which limits their ability to meet the communicative, educational, and social expectations of their communities. Although extensive research has examined these challenges in Western contexts, there remains a significant gap in culturally grounded studies within African settings, particularly those involving the Igbo language and sociocultural environment. A mixed-methods research design was employed to provide both breadth and depth of understanding. Quantitative data were collected using adapted Theory of Mind assessment tasks alongside standardized social communication rating scales administered to a purposive sample of autistic teenagers. Qualitative data were obtained through semi-structured interviews conducted with parents, teachers, and caregivers. The integration of quantitative and qualitative approaches enabled a comprehensive exploration of how Theory of Mind abilities influence real-life communication and how cultural and linguistic factors shape social experiences among autistic adolescents. The findings revealed varying levels of Theory of Mind development and notable challenges in social skills, underscoring the influence of cultural norms, language practices, and educational environments. The study contributes to the growing body of knowledge on autism, pragmatics, and social communication within African contexts. It recommends that educators, clinicians, and policymakers incorporate socio-cultural perspectives when designing interventions and support systems for autistic individuals in Nigerian educational settings.

Keywords: Theory of Mind, Social Skills, Pragmatics, Autism



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Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by persistent challenges in social interaction, communication, and patterns of behavior. One of the major cognitive theories associated with ASD is the Theory of Mind (ToM) deficit hypothesis. Theory of Mind refers to the ability to understand and interpret mental states—such as beliefs, intentions, emotions, and desires—of oneself and others. This capacity is essential for effective social communication, which includes pragmatic language use, conversational turn-taking, understanding non-literal language, and context-appropriate communication. Globally, a substantial body of research has established a strong relationship between Theory of Mind deficits and impaired social communication among individuals with autism. However, much of this research has been conducted in Western contexts, with limited investigation within African settings such as Nigeria. In these contexts, language, culture, and social norms significantly shape communication practices and may influence how Theory of Mind is expressed and assessed. For example, indirect speech acts, politeness conventions, and age-based respect norms in Igbo society require sophisticated perspective-taking abilities, which may present unique challenges for individuals with autism.

Individuals with Autism Spectrum Disorder often experience difficulties in emotional expression and in understanding the mental states of others, thereby limiting their social competence. Increasing evidence suggests that Theory of Mind serves as an important cognitive framework for understanding social communication and interaction skills among children with ASD. Nevertheless, relatively few studies have examined how the relationship between Theory of Mind and social skills influences overall social competence in individuals with autism. This study seeks to address this gap by examining the relationship between Theory of Mind abilities and social communication skills among autistic adolescents within the Otuocha Education Zone using a mixed-methods approach. The study integrates quantitative assessments with qualitative insights to provide a comprehensive understanding of how cognitive and social-pragmatic abilities interact within this unique sociocultural environment.

Despite growing awareness and improved diagnosis of autism in Nigeria, there remains a significant gap in research exploring the cognitive and communicative profiles of autistic adolescents, particularly in non-urban and linguistically diverse regions such as the Otuocha Education Zone. Many intervention strategies and assessment tools currently in use are adapted from Western contexts and may not adequately reflect the cultural and pragmatic realities of Nigerian adolescents. Autism has frequently been associated with deficits in Theory of Mind, a cognitive ability that typically develops around the age of four to six years in normally developing children. Unlike their typically developing peers, children with ASD often struggle with social-emotional reciprocity and may find it difficult to recognize that others possess beliefs, desires, and intentions different from their own. These challenges limit their ability to form and maintain social relationships and may negatively affect everyday functioning.

The concept of Theory of Mind was first introduced by Premack and Woodruff and refers to an individual's ability to attribute mental states—including intentions, beliefs, needs, and desires—to others and to interpret behavior based on these attributions. Theory of Mind is considered a foundational skill for the development of social relationships; deficits in this ability contribute to impairments in socialization, communication, and the presence of restricted and repetitive behaviors (RRBs). For instance, Jones et al. investigated the cognitive abilities of 100 adolescents with ASD using ten tasks assessing Theory of Mind and executive functioning and found that ToM ability was significantly associated with both social communication difficulties and restricted and repetitive behaviors.

The main objective of this study is to examine the relationship between Theory of Mind and social communication abilities in autistic teenagers within the Otucha Education Zone. The study is significant in several ways as it expands the application of ToM to non-Western, linguistically diverse populations, enriching the global literature on autism and communication.

It will aid teachers and school administrators in understanding the cognitive and communicative needs of autistic teenagers and designing inclusive practices. This study can inform special education policy and promote the development of indigenous, contextually grounded assessment tools and intervention programs. The scope of the study is limited to autistic teenagers aged 12-18 in the Otucha Education Zone, Anambra State. It focuses on their Theory of Mind abilities and social communication skills within the context of Igbo language use and cultural practices. While it does not generalize to all autistic individuals in Nigeria, it offers deep insights into this specific population and many serve as a tool for other culturally embedded studies.

Literature Review

Researchers have increasingly combined qualitative and quantitative approaches; however, mixed methods research represents a distinct methodological movement that emerged in response to the traditionally separate development of qualitative and quantitative research paradigms. Despite its growing relevance, limited literature exists on the application of polar coordinate analysis in psychotherapy research. This analytical approach offers the advantage of integrating qualitative and quantitative data while providing detailed insights into behavioral patterns. Therefore, the primary aim of this study was to apply a mixed methods framework to analyze patterns of social behavior among teenagers with Autism Spectrum Disorder (ASD). Specifically, the researcher sought to examine whether Theory of Mind (ToM) could be effectively integrated with social interaction processes and to investigate whether typical ASD behaviors demonstrate relational patterns similar to those observed in psychotherapy contexts. Over the past decade, research has consistently confirmed a strong relationship between Theory of Mind and social skills, identifying ToM as a critical mechanism for enhancing social communication and interaction abilities. Apperly (2012) argued that advanced Theory of Mind performance contributes to social competence beyond the influence of general cognitive factors such as language ability and executive functioning. Empirical evidence derived largely from studies involving typically developing children aged three to six years indicates a significant association between Theory of Mind, pro-social behavior, peer acceptance, and reciprocal friendships. During adolescence, social development becomes increasingly peer-oriented, as young individuals spend more time interacting with peers outside the family environment. Consequently, deficits in the ability to establish, manage, and maintain social relationships during early adolescence may result in poorer academic outcomes and later occupational difficulties.

Despite these implications, relatively few studies have focused on improving social competence among middle childhood and early adolescent individuals with ASD. Ozonoff and Miller (1995) examined the effectiveness of a social skills training program grounded in social-cognitive principles for adolescents with autism who possessed average intellectual functioning. Their findings demonstrated significant improvements in the treatment group compared with the control group. Similarly, Begeer et al. (2011) evaluated a ToM-based intervention and found that although adolescents with ASD showed improvement in conceptual Theory of Mind skills, their social communication abilities did not significantly improve. In line with these findings, Marraffa and Araba (2016) reported that ToM-focused interventions alone were insufficient to enhance social interaction skills among children with autism. More recently, Lecheler et al. (2021) investigated the effectiveness of the Teaching ToM curriculum. Their results indicated that parents perceived improvements in their children's social understanding following the intervention, although direct assessments of Theory of Mind did not reveal significant changes. Collectively, these findings suggest that interventions relying solely on Theory of Mind training do not consistently produce significant improvements in social competence.

Given the increasing need to reduce social interaction deficits among adolescents with autism, researchers have advocated for integrated intervention approaches. One study demonstrated the effectiveness of combining Theory of Mind instruction with social skills training within a unified intervention framework. Feng et al. (2008) integrated ToM components—such as desire-related emotions, basic beliefs, and false-belief understanding—with social skills training elements, including emotional expression and communication strategies, in an intervention involving an 11-year-old student with high-functioning autism. The study reported improvements in the student’s social competence, highlighting the potential effectiveness of combined intervention strategies. Furthermore, Feng et al. (2008) observed that individuals possessing perspective-taking abilities can move beyond their own viewpoints to consider others’ perspectives, a foundational skill underlying social behaviors such as praising others. Additionally, the ability to recognize situation-based emotions serves as a prerequisite for help-seeking behavior. As a core component of Theory of Mind, understanding desire-based emotions involves recognizing causal relationships linking desires, intentional actions, outcomes, and the emotional consequences that follow. Accordingly, integrating specific components of Theory of Mind with corresponding social interaction skills may enhance intervention effectiveness.

Nevertheless, limited empirical research has examined how the integration of Theory of Mind and social skills training influences social competence among teenagers with autism. This gap underscores the need for further investigation into combined intervention approaches targeting adolescents with ASD.

Methodology

Three Igbo adolescents diagnosed with Autism Spectrum Disorder (ASD) were purposively selected from a special education school in Anambra State. All participants met the following eligibility criteria: (1) assessment using the Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV); (2) absence of concurrent neurological disorders and no recent history of pharmacological treatment; (3) normal vision and hearing abilities, with basic verbal communication, listening, and comprehension skills; (4) no recent participation in any Theory of Mind (ToM) intervention programmes; and (5) provision of signed informed consent by both the participants and their parents or guardians prior to participation in the study. For all participants, parents completed the Igbo-adapted version of the Social Responsiveness Scale (SRS) and the Childhood Autism Rating Scale (CARS) to assess levels of social impairment and the severity of autism-related symptoms. In addition, the Test of Theory of Mind (TToM) was administered to the adolescents with ASD to determine the severity of their social–cognitive and social skill deficits.

This study adopts a convergent parallel mixed-methods research design. This design enables the simultaneous collection and analysis of both quantitative and qualitative data, which are subsequently integrated to provide a more comprehensive and nuanced understanding of the research problem. The quantitative method involves the use of standardized and culturally adapted ToM abilities and social communication levels among participants, while qualitative method involves semi-structured interviews and naturalistic observations were used to explore the lived experiences, communicative behavior, and cultural influences affecting social interaction among autistic teenagers. The target population comprises autistic teenagers aged 12 to 18 years in the Otuocah Education Zone of Anambra State, Nigeria. This includes students in inclusive education programs, special needs schools, and private centers offering therapy or specialized support services for autism. In addition, the study population includes teachers, parents, and caregivers of the autistic teenagers who provided supplementary information through interviews and observations. A total of 20 autistic teenagers were purposively selected. Purposive sampling was employed to select autistic participants who met inclusion criteria.

Research Instruments

1. Quantitative instruments: Theory of Mind Tasks (Adapted):
 - First-order false belief tasks (e.g., Sally-Anne Task)
 - Second-order false belief tasks (e.g., Ice cream Van Task)
 - Strange Stories Test (Happé, 1994), adapted with Igbo cultural references.
2. Qualitative instruments: semi-structured interview guide:
 - Used with teachers and parents
 - Topics included the child's communicative behavior, perceived ToM-related challenges, and cultural communication expectations.
3. Validity and reliability of instruments
 - Instruments were reviewed by expert in linguistics, psychology, and special education.
 - Cronbach's alpha was used to test internal consistency for the adapted SCQ ($\alpha = 0.83$), indicating high reliability.

Data

The data analysis followed a mixed method approach- quantitative results were statistically analyzed, while qualitative data were thematically examined. This dual analysis aimed to identify the nature of Theory of Mind (ToM) abilities, evaluate social communication competencies, and explore the relationship between both variables within the cultural and linguistic context of the study area.

1. Sally-Anne Task (First-order ToM)

English Version:

“Sally puts her ball in the basket and goes outside. While Sally is away, Anne moves the ball from the basket into the box. When Sally comes back, where will she look for the ball?”

Igbo version:

“Sally tinyere bọl ya n’ime akpa wee puo n’ezi. Mgbe Sally no n’ezi, Anne were bọl ahụ tinye ya n’ime igbe. Ugbu a, Sally laghachiri, ebee ka Sally ga-achọ bọl ya?”

2. Ice cream Van Task (Second-order ToM)

English Version:

“John and Mary are at the park. John hears the ice cream van is in church car park. Mary does not hear this. Where does Mary think the ice cream van is?”

Igbo version:

John na Mary no n’ogige. John nuru na ugboala ice cream no n’ogige ulo uka. Mary anughị ihe ahụ. Ebee ka Mary chere na ugboala ice cream dị?”

3. Strange Stories Task – Sarcasm.

English version:

“Amaka’s brother broke her plate. Later, Amaka said to him, ‘Well done, you’re so careful!’ Did Amaka really mean what she said?”

Igbo version:

“Nwanne nwoke Amaka gbajiri efere ya. Ka oge gachara, Amaka gwakwara ya, ‘o di mma! i na-ejizi ihe anya!’ Amaka o kwuru eziokwu n’ezie? O bu kwa ihe ozo ka o bu?”

ToM Task	Mean Score (Max = 10)	Standard Deviation
First-order False Belief	6.5	1.2
Second-order False Belief	4.2	1.6
Strange Stories (Contextualized)	5.3	1.4

Most participants performed moderately well on first-order ToM tasks, but scores decreased

significantly for second-order tasks requiring more complex mentalizing.

Sample Questionnaire: Social Communication Assessment Tool (Adapted from SCQ)

Instructions: Please tick the option that best describes the participant's behavior.

S/N	Behavior/Skill	Strongly Accepted	Accepted	Rejected	Strongly Rejected
1.	Ọ na-ebido mkparịta ụka ya n'onwe ya	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Ọ na-eji anya ele mmadu anya n'oge mkparịta ụka?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Ọ na-aza ekele mmadu nke oma?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Ọ na-ejikwa isiokwu mkparịta ụka ozugbo.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Ọ na-aghota egwu, okwu asusu, maobu okwu nti (dika, "o na-ezo mmiri nkita")	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Ọ na-eji ngosiputa ahụ di ka ife aka, iweli isi n'oge mkparịta ụka	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Ọ na-echere oge ya n'oge mkparịta ụka maobu n'out oru	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Ọ na-agbanwe okwu ya dika onye o na-akorita ya (dika okenye maobu ogbo ya)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Ọ na-aghota mmetuta site n'ihe oyiri ihu maobu ibe ya)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Ọ na-aza n'uzo ziri ezi mgbe mmadu ji okwu oma maobu okwu zoro ezo kwuo ihe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Descriptive Statistics for Social Communication Score (SCQ)

SCQ Domain	Mean Score (Max = 20)	Standard Deviation
Conversation initiation	11.2	2.3
Non-literal language interpretation	8.5	2.1
Response to social cues	9.3	2.5
Turn-taking and topic maintenance	10.7	2.0

Participants generally struggled most with interpreting non-literal language such as idioms, sarcasm, and proverbs – important in Igbo sociolinguistic contexts.

Correlational Analysis: ToM and Social Communication

Pearson Correlation Coefficient (r): A correlation analysis was conducted between overall ToM scores and total social communication scores. $r = 0.68, p < 0.01$

This indicates a moderate to strong positive correlation between Theory of Mind abilities and social communication skills. Teenagers with higher ToM performance tended to score higher in pragmatic language use, while those with lower ToM proficiency showed more communicative impairments.

Qualitative findings

ToM Deficits and Misinterpretation of Social Intentions

Teachers and parents reported frequent misunderstanding by autistic teenagers regarding others' intentions, particularly in group activities and unstructured play. This aligned with their low performance in second-order ToM task.

“When someone jokes with them, they get angry. They don't know it is a joke. They cannot understand when someone is teasing or being sarcastic.”

Struggles with Indirect Speech and Proverbs

Participants demonstrated difficulty with non-literal expressions, which are culturally common in Igbo communication.

“They cannot interpret proverbs; you must talk to them directly”.

Integration of Quantitative and Qualitative Data

The quantitative correlation between ToM and social communication was reinforced by qualitative evidence. Both data types demonstrated that:

- Higher ToM competence is associated with better pragmatic communication (e.g., turn-taking, recognizing sarcasm).
- Deficits in ToM negatively affect the ability to navigate culturally appropriate interaction norms.
- Cultural nuances (e.g., indirectness, proverbs) amplify challenges for autistic teenagers who already struggle with ToM.

Conclusion

This study investigated the relationship between Theory of Mind and social communication abilities in autistic teenagers in the Otuocha Education Zone using a mixed methods approach. The findings established that autistic teenagers possess varying degrees of ToM abilities, with complex mentalizing being particularly impaired. Social communication difficulties are prevalent, especially in interpreting non-literal language and maintaining context-sensitive interactions. A significant relationship exists between ToM proficiency and pragmatic language skills. Indirect language forms, the study revealed that autistic teenagers in the Otuocha Education Zone demonstrated moderate performance in first-order Theory of Mind (ToM) tasks, but significantly lower proficiency in second-order and advanced ToM assessments. Participants also showed uneven performance across the domains of social communication. While some could initiate conversation and engage in basic turn-taking, they generally performed poorly in interpreting non-literal language and responding to social cues. The difficulty in indirect language forms, such as proverbs and idioms, is particularly relevant in the Igbo sociolinguistic context, where these are common and culturally expected. The inability to process these expressions not only impairs communication but can also lead to misjudgment of autistic individuals as rude or disobedient. This finding emphasizes that ToM is a cognitive foundation for appropriate social behavior and conversational competence, especially in culturally complex settings like Otuocha. The study concludes that enhancing Theory of Mind in autistic teenagers is essential for improving social communication skills, particularly within culturally nuanced environment.

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