Developmental Relationship between Social Competence and Autistic Symptoms among Children with Autism Spectrum Disorder

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Abstract

This study investigated the developmental relationship between autistic symptoms and social competence in children with Autism Spectrum Disorder (ASD), a neurodevelopmental condition characterised by impairments in social interaction, communication, and restricted and repetitive behavioural patterns. While previous research has demonstrated that interventions can reduce autistic symptoms, the extent to which these improvements translate into enhanced social competence—defined as the ability to effectively interact, communicate, and form relationships—remains an important area for investigation. The central hypothesis examined whether reducing autistic symptoms through therapy is associated with increased social competence, as reflected by improvements in Social Quotient (SQ) scores.

Using a Correlational research design, the study recruited children diagnosed with ASD from the General Service Unit of Government tertiary rehabilitation center in Secunderabad. Developmental functioning was assessed using the Developmental Screening Test (DST) to obtain Developmental Quotient (DQ) scores, while social competence was measured through the Vineland Social Maturity Scale (VSMS). Autistic symptoms were evaluated using the Indian Scale for Assessment of Autism (ISAA), and Spearman's rho correlation analyses were conducted to examine the relationships between DQ and SQ domains and ISAA subdomains.

The findings revealed that DQ demonstrated strong positive correlations with total SQ ($\rho = 0.834$, $p < 0.01$) and several specific social competence domains, including Self-Help General (SHG), Occupation (OCC), Communication (COM), and Locomotion (LOC). Notably, no significant correlation was observed between DQ and total ISAA scores or most ISAA sub domains, suggesting that while developmental level is strongly related to social competence, it shows less direct association with autism symptom severity. These results indicate that developmental functioning and social competence are closely linked in children with ASD. While interventions aimed at reducing autistic symptoms may indirectly enhance social competence, targeted social skills training remains an essential component of comprehensive treatment approaches. Future research should employ longitudinal designs to examine causal relationships, incorporate larger samples for moderator analysis, and develop intervention studies testing the independence of developmental functioning and autism symptom improvements.

Keywords: Autism Spectrum Disorder, Social Competence, Developmental Quotient, Social Quotient, ISAA, Therapy, Spearman Correlation.

Introduction

Autism Spectrum Disorder (ASD) is a complex, heterogeneous neurodevelopmental condition characterised by persistent deficits in social communication and social interaction across multiple contexts, alongside restricted, repetitive patterns of behaviour, interests, or activities (American Psychiatric Association, 2013). The spectrum nature of this disorder reflects the considerable variability in symptom severity and functional abilities observed among affected individuals, necessitating individualised assessment and intervention strategies tailored to each person's unique profile of strengths and challenges.

Global prevalence estimates of ASD have demonstrated a substantial increase in recent decades, with the Centers for Disease Control and Prevention (2023) reporting that ASD affects approximately 1 in 36 children in the United States. While comprehensive prevalence data from India remain limited, emerging regional studies suggest comparable rates, although early identification continues to face significant obstacles related to cultural, social, and infrastructural factors that may delay diagnosis and intervention access (Rudra et al., 2017).

Central to understanding ASD's impact on individuals and families is the concept of social competence, broadly defined as the effectiveness of an individual's interactions with others across various social contexts (Rose-Krasnor, 1997). Social competence encompasses a multifaceted array of skills including communication abilities, cooperation, empathy, self-help capabilities, and meaningful participation in social roles. For individuals with ASD, impairments in social competence frequently manifest as difficulties in forming and maintaining friendships, participating effectively in group activities, and achieving successful integration into educational and community environments (Kasari et al., 2011). These challenges often stem from core deficits in joint attention, perspective-taking abilities, and pragmatic language use, which collectively hinder the natural development of social skills that typically developing children acquire through everyday interactions with peers, family members, and community participants.

The manifestations of social competence difficulties in children with ASD are diverse and pervasive, including challenges in initiating and sustaining conversations, interpreting nonverbal communicative cues such as facial expressions and vocal tones, engaging in imaginative play scenarios, and participating meaningfully in group-based activities. These deficits frequently result in social isolation, reduced opportunities for peer-mediated learning experiences, and long-term challenges in achieving independent living skills and community integration (Howlin et al., 2009).

Considerable research attention has focused on the effectiveness of early intervention strategies in reducing the core symptoms of ASD, with substantial evidence supporting various therapeutic approaches, including applied behaviour analysis, developmental social-pragmatic interventions, speech-language therapy, and occupational therapy (Dawson et al., 2010). These interventions have demonstrated measurable positive effects on communication abilities, adaptive skill development, and cognitive functioning. However, the relationship between symptom reduction and corresponding improvements in social competence presents a complex picture that challenges simplistic assumptions about therapeutic outcomes.

Emerging evidence suggests that while therapeutic interventions can effectively reduce repetitive behaviours, enhance joint attention capabilities, and improve language functioning, the extent to which these improvements generalise to real-world social interactions varies considerably across individuals (Kanne et al., 2011). This phenomenon has led researchers to investigate potential dissociations between symptom reduction and functional gains, with studies by Liss et al. (2001) indicating that adaptive functioning, including social competence, does not always improve proportionally with reductions in core autism symptoms. Such findings suggest that targeted social skills training may be necessary as a complementary intervention component, rather than assuming that symptom reduction will automatically translate into enhanced social functioning.

Measuring developmental functioning and social competence in ASD populations requires culturally

appropriate and psychometrically sound assessment tools. The Developmental Quotient (DQ), derived from comprehensive developmental assessments such as the Developmental Screening Test, represents the ratio of developmental age to chronological age multiplied by 100, serving as an indicator of a child's cognitive and adaptive developmental status. Similarly, the Social Quotient (SQ), as measured by instruments such as the Vineland Social Maturity Scale, assesses social competence across multiple domains, including self-help skills, communication abilities, locomotion, socialisation patterns, and occupational capabilities (Sparrow et al., 2005).

In the Indian context, the Indian Scale for Assessment of Autism (ISAA) provides a culturally validated measure of autism symptom severity across six critical domains: social relationship and reciprocity, emotional responsiveness, speech-language communication, behaviour patterns, sensory aspects, and cognitive components. This comprehensive assessment tool enables clinicians and researchers to evaluate symptom severity patterns that can inform diagnostic decisions, disability certification processes, and intervention planning.

The complex interrelationships among developmental functioning, autistic symptom severity, and social competence have garnered increasing research attention, yielding important insights that challenge conventional assumptions regarding therapeutic outcomes. Sparrow et al. (2005) demonstrated positive associations between developmental level and social competence, with children achieving higher DQ scores tending to exhibit superior social quotients regardless of their autism symptom severity profiles. Conversely, Kanne et al. (2011) revealed only modest correlations between symptom severity measures and adaptive functioning indicators, suggesting that comprehensive intervention approaches must address both symptom reduction and functional skill development as distinct but related therapeutic targets.

The role of therapeutic intervention as a potential mediator in these relationships requires careful consideration, as studies indicate that while therapy can influence both symptom reduction and functional skill acquisition, improvements in one domain do not automatically translate to gains in the other unless explicitly targeted through intervention design (Howlin et al., 2009). This finding has significant implications for treatment planning and outcome measurement, suggesting that successful intervention programs must incorporate multiple assessment domains and strategies to achieve comprehensive improvements in adaptive functioning.

Within the Indian rehabilitation context, understanding these complex relationships is crucial for developing culturally appropriate and effective therapeutic interventions. The utilisation of validated Indian assessment instruments, including the Developmental Screening Test, Vineland Social Maturity Scale, and Indian Scale for Assessment of Autism, provides a unique opportunity to examine correlations among developmental functioning, symptom severity, and social competence within a culturally relevant framework. The fundamental assumption underlying this research approach is that the systematic reduction of autistic symptoms through evidence-based therapeutic interventions should correspond with measurable improvements in social competence, thereby enhancing overall adaptive outcomes and quality of life for individuals with ASD and their families.

Purpose of the Study

The primary purpose of this study is to investigate the developmental relationship between autistic symptoms and social competence among children diagnosed with Autism Spectrum Disorder (ASD). This research is guided by the hypothesis that reducing autistic symptoms through therapeutic interventions is associated with corresponding improvements in social competence.

Objectives

- To examine the relationship between developmental functioning (DQ) and social competence (SQ) in children with ASD.
- To explore the association between developmental functioning and autistic symptom severity as measured by the Indian Scale for Assessment of Autism (ISAA).

- To identify which specific domains of social competence demonstrate the strongest associations with developmental functioning.
- To determine how therapeutic improvements in autistic symptoms influence adaptive functioning and social outcomes to inform evidence-based intervention strategies.

This study aims to contribute to the understanding of the interconnected nature of developmental functioning, autistic symptoms, and social competence, ultimately supporting the development of targeted and effective therapeutic interventions for children with ASD.

Methods

Research Design

This study employed a quantitative, cross-sectional correlational design to examine the developmental relationship between social competence and autistic symptoms in children diagnosed with Autism Spectrum Disorder (ASD). Correlational designs are particularly well-suited for investigating relationships between variables in populations where experimental manipulation is ethically or practically challenging (Creswell & Creswell, 2017). The selection of this design allowed for the statistical evaluation of relationships among three main variables: Developmental Quotient (DQ) as an indicator of overall developmental functioning, Social Quotient (SQ) and its subdomains as indicators of social competence, and Indian Scale for Assessment of Autism (ISAA) scores as indicators of autistic symptom severity.

Cross-sectional Correlational studies have been widely utilised in autism research to understand the complex relationships between developmental factors and behavioural outcomes without the need for longitudinal tracking or intervention manipulation (Lord et al., 2018). This approach is particularly valuable when examining vulnerable populations such as children with ASD, where experimental designs may raise ethical concerns regarding withholding potentially beneficial treatments (American Psychological Association, 2017). The primary hypothesis guiding the design was that if autistic symptoms are reduced through therapy, then social competence will increase, reflecting the theoretical framework that suggests interconnected developmental domains in autism spectrum disorders (Mundy et al., 2009).

The Correlational design enables researchers to identify patterns of association that may inform future intervention studies while respecting the ethical imperative to provide appropriate care to all participants (Kazdin, 2017). This methodology has been successfully employed in previous autism research to establish foundational understanding of relationships between symptom severity and functional outcomes (Klin et al., 2007).

Participants and Settings

The study sample comprised 60 children clinically diagnosed with Autism Spectrum Disorder according to DSM-5 criteria (American Psychiatric Association, 2013). Participants were recruited from the General Service Unit of a multidisciplinary rehabilitation government institute in Secunderabad. This sample size is consistent with previous Correlational studies examining developmental relationships in children with ASD, where samples ranging from 20 to 60 participants have been considered adequate for detecting moderate to large effect sizes (Cohen, 1988; Field, 2013).

The demographic characteristics of the sample reflected typical patterns observed in autism spectrum disorder populations. Participants ranged in age from 4 to 12 years, with a mean age of 7.1 years, which aligns with the developmental period when social competence skills typically emerge and can be reliably assessed (Sparrow et al., 2016). The gender distribution consisted of 43 males (71.67%) and 17 females (28.33%), which is consistent with the well-documented higher male prevalence in ASD, where males are diagnosed approximately three to four times more frequently than females (Loomes et al., 2017; Maenner et al., 2020). All diagnoses were confirmed by qualified rehabilitation psychologists or psychiatrists, with additional validation through ISAA scores meeting the established threshold for ASD, thus ensuring diagnostic reliability and adherence to standardised assessment protocols (Juneja et al., 2014).

The inclusion criteria required children to be between 4 and 12 years of age, possess a clinical

diagnosis of ASD confirmed through a standardised assessment, and have attended therapy programs at the institution for at least three months prior to data collection. This three-month therapy attendance requirement was established to ensure that participants had sufficient exposure to intervention services, allowing for the potential observation of developmental changes (Rogers & Vismara, 2008). Exclusion criteria were implemented to minimise confounding variables that could affect the test performance or data validity. Children with severe comorbid neurological conditions, such as uncontrolled epilepsy, were excluded due to the potential impact on cognitive and behavioural assessments (Tuchman & Cuccaro, 2011). Additionally, participants with uncorrected sensory impairments, including hearing loss or blindness, were excluded, as these conditions could significantly affect performance on standardised developmental and social competence measures (Mukaddes et al., 2007). Finally, the lack of parental consent served as an exclusion criterion, ensuring ethical compliance with research standards for studies involving minors (Fisher et al., 2016).

The dependent variable was conceptualised as social competence, measured using the Vineland Social Maturity Scale (VSMS) total Social Quotient (SQ) and its eight subdomains. These subdomains encompass Self-Help General (SHG), which assesses general self-care abilities; Self-Help Eating (SHE), which evaluates independent eating skills; Self-Help Dressing (SHD), which measures dressing and grooming independence; Self-Direction (SD), which assesses autonomous decision-making and planning abilities; Occupation (OCC), which evaluates engagement in age-appropriate activities and responsibilities; Communication (COM), which measures expressive and receptive communication skills in social contexts; Locomotion (LOC), which assesses mobility and movement skills; and Socialisation (SOC), which evaluates interpersonal relationships and social interaction abilities (Doll, 1965; Sparrow et al., 2016). The VSMS has been extensively validated and remains a widely used measure of adaptive behaviour and social competence in individuals with developmental disabilities (Harrison & Oakland, 2015).

To control for the potential confounding effects of overall developmental level, the study incorporated the Developmental Quotient (DQ) as a control variable, measured through the Developmental Screening Test (DST). The inclusion of DQ as a control variable is methodologically important because children with ASD often exhibit heterogeneous developmental profiles, and differences in overall developmental functioning can influence both social competence outcomes and the manifestation of autistic symptoms (Lord et al., 2018). The DST provides a standardised assessment of developmental functioning across multiple domains and has been validated for use in the Indian population (Bharath& Kumar, 2008). By controlling for developmental level, the study aimed to isolate the specific relationships between autistic symptom severity and social competence, independent of general developmental differences that might otherwise confound the results (Mundy et al., 2009).

Instruments

Developmental Screening Test (DST): Developed by Bharat Raj in 1977, the DST measures developmental quotient based on mental and motor development milestones using the formula DQ = (Developmental Age / Chronological Age) × 100, providing a standardized assessment of overall developmental functioning in children.

Vineland Social Maturity Scale (VSMS): Originally developed by Edgar A. Doll in 1935 and subsequently adapted for the Indian population by Malin in 1965, the VSMS assesses adaptive behavior across eight distinct domains to yield a comprehensive total Social Quotient (SQ) score that reflects social competence and independent functioning abilities.

Indian Scale for Assessment of Autism (ISAA): Developed by the Ministry of Social Justice and Empowerment, Government of India in 2015, the ISAA comprises 40 items distributed across six domains that assess autism severity using a 5-point Likert scale, providing a culturally appropriate and standardized measure for evaluating autistic symptoms in Indian children.

Data Collection Procedure

The data collection procedure began by obtaining written informed consent from all parents or guardians of the participating children, ensuring compliance with ethical standards for research involving minors (Fisher et al., 2016). Assessment was conducted systematically using three standardised instruments: the Developmental Screening Test (DST) to measure Developmental Quotient (DQ), the Vineland Social Maturity Scale (VSMS) to assess Social Quotient (SQ), and the Indian Scale for Assessment of Autism (ISAA) to evaluate autism severity. All assessment scores were recorded in a secure database with subdomain-wise categorisation to facilitate comprehensive analysis. The study adhered to established ethical guidelines for research involving human participants, with particular attention to maintaining confidentiality of participant information and ensuring voluntary participation throughout the research process (American Psychological Association, 2017).

Data Analysis

Data analysis was conducted using Spearman's rho correlation coefficient, selected because the data were ordinal in nature and exhibited non-normal distribution patterns, making this non-parametric approach most appropriate for assessing monotonic relationships between variables (Field, 2013; Siegel & Castellan, 1988). The analytical procedure comprised three sequential steps: first, descriptive statistics, including mean, standard deviation, and range, were calculated for all variables to characterise the sample; second, correlation analyses were performed between DQ and each SQ subdomain, DQ and total SQ, DQ and each ISAA subdomain, and DQ and total ISAA score; and third, statistical significance was evaluated using established criteria, where $p < 0.05$ indicated statistical significance and $p < 0.01$ represented highly significant relationships (Cohen, 1988).

Results

This analysis examined the developmental relationships between social competence (measured by the Vineland Social Maturity Scale Social Quotient and its domains), developmental functioning (measured by Developmental Screening Test Developmental Quotient), and autistic symptoms (measured by Indian Scale for Assessment of Autism total and sub domain scores) in 60 participants with autism spectrum disorder.

Spearman's rho correlation coefficients were employed to assess the strength and direction of associations between variables. This non-parametric approach was selected because of the moderate sample size (N=60), ordinal nature of the assessment data, and violations of the normality assumptions typically required for Pearson's correlation analysis.

Table 1 Spearman's rho Correlations between DQ and VSMS Domains (N = 60)

Variables	DQ	SHG	SHE	SHD	SD	OCC	COM	LOC	SOC	Total SQ
DQ		0.656**	0.323	0.475*	0.395	0.631**	0.507*	0.530*	0.430	0.834**
SHG		1	0.245	0.403	0.075	0.555*	0.112	0.228	0.157	0.535*
SHE				0.776**	0.067	0.115	0.200	0.312	0.02	0.446*
SHD				1	0.388	0.235	0.393	0.178	0.048	0.627**
SD						0.267	0.453*	-0.04	0.161	0.385
OCC						1	0.496*	0.564**	.465*	0.556*
COM							1	0.363	0.105	0.639**
LOC								1	0.443	0.570**
SOC										0.432
Total SQ										1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The most striking finding was the robust positive correlation between Developmental Quotient and Total Social Quotient ($\rho = 0.834$, $p < 0.001$). This large effect size indicates that approximately 69.6% of the variance in social competence can be explained by developmental functioning level. This suggests that children with higher developmental abilities demonstrate significantly better overall social adaptive skills, reinforcing the foundational role of developmental capacity in social functioning in individuals with ASD.

Several specific social competence domains showed statistically significant positive correlations with DQ:

Self-Help General (SHG): This strong correlation ($\rho = 0.656$, $p = 0.002$) suggests that as developmental skills improve, children become more capable of managing basic self-care tasks such as personal hygiene, grooming, and general independence activities. The large effect size indicates that developmental level is a crucial predictor of self-help capability.

Occupation (OCC): The strong association between DQ and occupational skills ($\rho = 0.631$, $p = 0.003$) demonstrates that higher developmental functioning translates to better engagement in purposeful activities, task completion, and work-related behaviors. This finding has significant implications for educational and vocational planning.

Communication (COM): This moderate-to-strong correlation ($\rho = 0.507$, $p = 0.022$) indicates that developmental improvements are associated with enhanced communication abilities, including both receptive and expressive language skills and nonverbal communication competencies.

Locomotion (LOC): The significant relationship between DQ and locomotion ($\rho = 0.530$, $p = 0.016$) suggests that developmental progress supports improved motor planning, coordination, and independent mobility skills.

Self-Help Dressing (SHD): This moderate correlation ($\rho = 0.475$, $p = 0.034$) indicates that developmental advances contribute to improved dressing skills and related self-care activities, although the relationship is somewhat weaker than other self-help domains.

Two social competence domains did not reach statistical significance:

Self-Help Eating (SHE): The lack of significant correlation ($\rho = .323$, $p = 0.164$) suggests that eating-related self-help skills may be influenced by factors beyond general developmental level, such as sensory sensitivities, food preferences, family feeding practices, or specific behavioral patterns commonly associated with ASD.

Self-Direction (SD): While showing a moderate positive trend, the relationship between DQ and self-direction ($\rho = 0.395$, $p = 0.085$) did not achieve statistical significance. This suggests that independent decision-making and self-management skills may develop through different pathways or be influenced by additional factors, such as executive functioning, environmental structure, or specific behavioural interventions.

Socialization (SOC): Despite approaching significance, the socialisation domain showed only a trend-level relationship with DQ ($\rho = 0.430$, $p = 0.059$). This finding is particularly noteworthy given that social difficulties are a core feature of ASD, suggesting that social skills may require targeted interventions beyond general developmental support.

Table 2 Spearman's rho Correlations between DQ and ISAA Domains (N = 60)

Variables	DQ	SRR	ER	SLC	BP	SA	CC	Total ISAA
DQ	1.00	0.04	0.21	0.22	0.04	-0.12	-0.12	0.06
SRR		1.00	0.30	0.11	0.38	0.33	0.39	0.74
ER			1.00	0.08	0.70	0.54	0.10	0.65
SLC				1.00	-0.14	-0.23	-0.08	0.28
BP					1.00	0.64	0.35	0.74
SA						1.00	0.60	0.53
CC							1.00	0.49
Total ISAA								1.00

The analysis revealed no statistically significant correlations between DQ and any ISAA sub domain or the total ISAA score (all p-values > .05). This finding has several important implications. The negligible correlation (ρ = 0.06, p = 0.800) indicates that overall autism symptom severity operates independently of developmental functioning level. A child may demonstrate high developmental capabilities while still exhibiting significant autistic behaviours, or conversely, may show lower developmental functioning with relatively mild autistic symptoms. The consistently non-significant findings across all ISAA domains suggest that developmental quotient does not predict the severity of core autistic symptoms in any specific area.

This pattern of results supports the conceptual distinction between developmental capacity and autism symptom expression. It aligns with previous research indicating that adaptive functioning and autism symptom severity represent relatively independent dimensions of ASD presentation. The analysis revealed no statistically significant correlations between DQ and any ISAA sub domain or the total ISAA score (all p-values > .05). This finding has several important implications. The negligible correlation (ρ = 0.06, p = 0.800) indicates that overall autism symptom severity operates independently of developmental functioning level. A child may demonstrate high developmental capabilities while still exhibiting significant autistic behaviors, or conversely, may show lower developmental functioning with relatively mild autistic symptoms. The consistently non-significant findings across all ISAA domains suggest that developmental quotient does not predict the severity of core autistic symptoms in any specific area.

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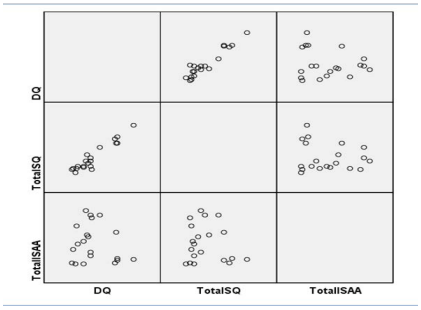

Figure 1 Visual Analysis of Key Variable Relationships

The scatter plot matrix provides a comprehensive visual representation of the bivariate relationships between the three primary variables: Developmental Quotient (DQ), Total Social Quotient (Total SQ), and Total Indian Scale for Assessment of Autism (Total ISAA) scores across all 60 participants.

The scatter plot (Upper Left Panel) reveals a clear, strong positive linear relationship between DQ and Total SQ scores. The data points form a relatively tight upward-sloping pattern with minimal scatter around the implied regression line. This visual pattern strongly supports the statistical finding that developmental functioning and social competence are closely linked in children with ASD. Higher developmental abilities consistently translated to better adaptive social skills across the sample.

The scatter plot (Lower Left Panel) shows a notably different pattern - a random, cloud-like distribution of points with no discernible linear trend or systematic relationship. This visualisation dramatically illustrates the independence of developmental functioning from autism symptom severity. Children with similar developmental levels can present with vastly different autism symptom profiles, and vice versa.

Similar to the DQ-ISAA relationship, this panel (Lower Right Panel) shows a scattered distribution without clear linear association, though with some subtle clustering patterns. This pattern reinforces the notion that social adaptive skills and autism symptom severity represent distinct dimensions of functioning that require separate assessments and intervention considerations.

The visual patterns strongly support the need for multidimensional assessment approaches in

ASD. The clear DQ-SQ relationship suggests these measures may capture overlapping constructs, while the independence of ISAA scores indicates that autism-specific symptom assessment provides unique diagnostic information.

Discussion

The findings of this study provide compelling evidence for the complex developmental relationships between social competence, developmental functioning, and autistic symptom severity in children with Autism Spectrum Disorder. The most significant finding was the robust positive correlation between Developmental Quotient and Total Social Quotient ($\rho = 0.834$, $p < 0.001$), which suggests that developmental functioning serves as a fundamental predictor of social adaptive abilities in children with ASD. This finding aligns with the research by Sparrow et al. (2016), who demonstrated that developmental capacity provides the foundation upon which social competence skills are built, regardless of specific diagnostic categories.

The strong relationship between developmental functioning and social competence domains, particularly Self-Help General ($\rho = 0.656$, $p = 0.002$) and Occupation ($\rho = 0.631$, $p = 0.003$), supports the theoretical framework proposed by Rose-Krasnor (1997) that social competence represents a multifaceted construct encompassing various adaptive skills. These findings suggest that interventions targeting overall developmental functioning may yield broad benefits across multiple domains of socially adaptive behaviour. The significant correlations with Communication ($\rho = 0.507$, $p = 0.022$) and Locomotion ($\rho = 0.530$, $p = 0.016$) further reinforce the interconnected nature of developmental domains, consistent with dynamic systems theory approaches to understanding autism spectrum disorders (Mundy et al., 2009).

Particularly noteworthy is the absence of significant correlations between Self-Help Eating and developmental functioning, which may reflect the complex sensory and behavioral factors that influence feeding behaviors in children with ASD. Research by Cermak et al. (2010) has documented that feeding difficulties in autism often stem from sensory processing differences and ritualistic behaviors rather than developmental capacity limitations. Similarly, the non-significant relationship with Self-Direction suggests that executive functioning skills may develop through distinct pathways, as supported by findings from Pellicano (2012) who identified executive function deficits as a core feature of ASD that may persist despite improvements in other developmental domains.

The most striking finding was the complete absence of significant correlations between Developmental Quotient and any domain of autistic symptom severity as measured by the ISAA. This pattern of results challenges simplistic assumptions about the relationship between developmental progress and autism symptom reduction, supporting the position advanced by Liss et al. (2001) that adaptive functioning and autism symptom severity represent relatively independent dimensions of ASD presentations. The negligible correlation between DQ and total ISAA scores ($\rho = 0.06$, $p = 0.800$) demonstrates that children may exhibit high developmental capabilities while maintaining significant autistic behaviors, or conversely, show lower developmental functioning with relatively mild symptom expression.

This independence between developmental functioning and autism symptom severity has profound implications for understanding the heterogeneous nature of ASD. The findings support the dimensional model of autism proposed by Lord et al. (2018), which conceptualizes autism as involving multiple independent factors that contribute to overall presentation. The lack of correlation between developmental level and specific ISAA domains such as Social Relationship and Reciprocity, Emotional Responsiveness, and Behavioral Patterns suggests that these core autism features operate through distinct neurobiological and developmental mechanisms.

The visual analysis through scatter plot matrices provides compelling support for these statistical findings, clearly illustrating the tight linear relationship between developmental functioning and social competence while demonstrating the random, scattered distribution characteristic of independent variables when examining the relationship between developmental functioning and autism symptom

severity. This visual evidence reinforces the conceptual distinction between these constructs and supports the need for multidimensional assessment approaches in clinical practice.

The findings also illuminate the complex relationship between therapeutic intervention outcomes and functional improvements. While the original hypothesis suggested that reducing autistic symptoms would correspond with increased social competence, the results indicate that these relationships are more nuanced than initially proposed. The strong correlation between developmental functioning and social competence suggests that interventions targeting overall developmental capacity may be more predictive of adaptive functioning improvements than those focused solely on symptom reduction. This aligns with the research by Dawson et al. (2010), who found that comprehensive developmental interventions produced broader functional gains than approaches targeting specific autism symptoms.

The findings of this study have significant implications for clinical assessment and intervention planning in autism spectrum disorders. The robust relationship between developmental functioning and social competence suggests that comprehensive developmental assessment should be prioritized as a foundation for understanding each child's adaptive potential. Clinicians should recognize that Developmental Quotient serves as a strong predictor of social adaptive functioning, indicating that interventions targeting core developmental skills may yield broad benefits across multiple domains of social competence.

The independence of autism symptom severity from developmental functioning suggests that clinical assessment protocols must incorporate both dimensions to provide a complete understanding of each child's profile. The ISAA assessment provides unique diagnostic information that cannot be predicted from developmental level alone, emphasizing the importance of comprehensive evaluation approaches that examine both developmental capacity and autism-specific symptom patterns. This finding supports the use of multidimensional assessment batteries rather than relying on single measures to characterize children with ASD.

Intervention planning should reflect the distinct nature of these constructs by incorporating both developmental enhancement strategies and autism-specific symptom management approaches. The strong correlations between developmental functioning and specific social competence domains such as Self-Help General, Occupation, and Communication suggest that interventions targeting these areas may be particularly beneficial for children with higher developmental capacity. However, the lack of correlation with socialization skills indicates that social interaction abilities may require specialized intervention approaches regardless of developmental level.

The findings support the implementation of individualised intervention approaches that consider both developmental capacity and autism symptom profiles. Children with higher developmental functioning may benefit from more complex social skills training programs, while those with lower developmental quotients may require more fundamental skill-building approaches. The independence of autism symptoms from developmental level suggests that sensory processing interventions, behavioural support for repetitive behaviours, and emotional regulation strategies should be considered for all children with ASD, regardless of their developmental functioning level.

Educational programming for children with ASD should reflect the complex relationships identified in this study between developmental functioning and social competence. The strong correlation between Developmental Quotient and academic-relevant domains, such as Occupation and Communication, suggests that educational placement decisions should heavily weigh developmental capacity assessments. Children with higher developmental functioning may be candidates for more inclusive educational environments with appropriate support, while those with lower developmental quotients may require more specialised educational programming with intensive support services.

The finding that autism symptom severity operates independently of developmental functioning has important implications for classroom accommodation planning. Teachers and educational teams should not assume that children with higher

developmental abilities will necessarily require fewer autism-specific supports. Sensory accommodations, behavioural intervention plans, and social skills instruction may be necessary, regardless of cognitive or developmental level. This finding supports the individualised education program approach mandated by federal legislation, emphasising the need for comprehensive assessment-based programs.

The significant correlations between developmental functioning and Communication skills suggest that speech-language therapy services should be calibrated to developmental level, with more sophisticated intervention approaches appropriate for children with higher developmental quotients. However, the independence of autism symptoms indicates that pragmatic language intervention and social communication training should be provided based on autism-specific assessment results rather than developmental level alone.

Suggestions and Implications

The findings from this study necessitate significant revisions to current clinical practice guidelines for autism spectrum disorder assessment and intervention. Healthcare providers should adopt a multidimensional assessment framework that systematically evaluates both developmental functioning and autism-specific symptom patterns as independent constructs. This approach requires the routine use of validated instruments such as the Developmental Screening Test, Vineland Social Maturity Scale, and Indian Scale for Assessment of Autism as standard components of comprehensive evaluations.

Clinical teams should establish protocols that recognise the strong predictive relationship between developmental functioning and social competence, while simultaneously acknowledging that autism symptom severity provides unique diagnostic and intervention planning information. Treatment planning should incorporate both developmental enhancement strategies and autism-specific interventions, with the understanding that improvements in one domain may not automatically translate to gains in the other.

Healthcare systems should invest in training programs that educate clinicians about the independence of developmental functioning and autism symptom severity. This training should emphasise the importance of avoiding assumptions about intervention needs based solely on cognitive or developmental assessments, ensuring that autism-specific support is considered for all individuals with ASD, regardless of their developmental level.

Educational policies for children with autism spectrum disorder require fundamental restructuring to reflect the complex relationships identified in this research. School districts should mandate comprehensive assessments that evaluate both developmental capacity and autism symptom profiles before making placement decisions or developing individualised education programs (IEPs).

The strong correlation between developmental functioning and academic-relevant skills suggests that educational placement decisions should heavily weight developmental capacity assessments. However, policies should explicitly require that autism-specific accommodations and support be considered independently of developmental level, ensuring that children with higher cognitive abilities receive appropriate sensory, behavioural, and social communication interventions when needed.

Professional development programs for educators should focus on understanding the multidimensional nature of autism spectrum disorder, emphasizing that academic potential and autism support needs represent distinct considerations in educational planning. Teacher training should include specific modules on recognizing that developmental capacity does not predict the severity of autism-specific challenges.

The independence of developmental functioning and autism symptom severity has significant implications for resource allocation in both healthcare and educational systems. Service delivery models should be restructured to provide parallel streams of support: developmental enhancement services calibrated to cognitive capacity and autism-specific interventions based on symptom profiles.

Funding mechanisms should recognize the need for dual-track intervention approaches, ensuring that children with higher developmental functioning continue to have access to autism-specific supports while those with lower developmental capacity

receive both intensive developmental interventions and appropriate autism symptom management services.

Community-based service providers should develop specialised programs that address the unique needs identified in this study, including social skills training programs that are appropriately matched to developmental levels and sensory processing interventions that are available regardless of cognitive capacity.

Future Research Directions

Longitudinal Research Design

The cross-sectional nature of this study limits conclusions about the developmental trajectories of the relationships between social competence, developmental functioning, and autism symptom severity. Future research should implement longitudinal designs that track these relationships over extended periods and examine how the associations between these constructs change as children mature and receive various interventions.

Longitudinal studies should investigate whether the independence of developmental functioning and autism symptom severity persists across different developmental stages, from early childhood to adolescence and adulthood. Such research would provide crucial insights into the stability of these relationships and inform the development of appropriate intervention strategies.

Intervention Research

Research examining the long-term outcomes of different intervention approaches could illuminate whether targeting developmental functioning produces sustained improvements in social competence and whether autism-specific interventions maintain their effectiveness independently of developmental gains. These studies would provide essential evidence for optimising intervention timing and intensity.

The findings of this study suggest the need for randomised controlled trials specifically designed to test the independence of developmental functioning and improvement in autism symptoms. Such studies should compare comprehensive developmental interventions with autism-specific behavioral interventions and examine whether combined approaches produce superior outcomes compared to single-focus treatments.

Future intervention research should investigate the optimal sequencing and integration of developmental enhancement and autism-specific interventions. Studies examining whether certain intervention combinations produce synergistic effects can inform the development of more effective treatment protocols.

Research should also explore the development of novel intervention approaches that explicitly target the relationships identified in this study, such as programs that systematically build social competence skills while simultaneously addressing autism-specific challenges through integrated rather than parallel approaches.

Neurobiological and Genetic Studies

The independence of developmental functioning and autism symptom severity suggests that different neurobiological mechanisms may underlie these constructs. Future research should employ neuroimaging techniques to examine whether distinct neural networks support developmental capacity and autism-specific behaviours.

Brain imaging studies could investigate the structural and functional differences associated with high developmental functioning combined with significant autism symptoms compared to profiles showing low developmental functioning with mild autism presentations. Such research could illuminate the biological basis for the relationships identified in this study.

Genetic and epigenetic studies examining the hereditary factors contributing to developmental functioning versus autism symptom expression could provide insights into the mechanisms underlying their independence and inform the development of personalized intervention approaches.

Cross-Cultural Research

Although this study utilised culturally adapted assessment instruments within an Indian population, the generalisability of the findings across different cultural contexts requires systematic investigation. Future research should replicate these analyses using

equivalent measures in diverse cultural settings to examine whether the relationships between developmental functioning, social competence, and autism symptom severity are universal or culturally specific.

Cross-cultural studies should pay particular attention to how different cultural values and practices influence the expression and measurement of social competence, potentially revealing cultural variations in the strength and nature of relationships between these constructs.

Research examining cultural differences in intervention effectiveness could inform the development of culturally sensitive treatment approaches that account for varying conceptualisations of social competence and developmental expectations across communities.

Methodological Advancements

Future research should explore the development of more sophisticated analytical approaches that can examine the complex, multidimensional relationships between developmental functioning, social competence, and autism symptom severity. Advanced statistical techniques such as structural equation modeling and machine learning approaches could reveal patterns and relationships not detectable through traditional correlation analyses.

Studies incorporating ecological momentary assessment and naturalistic observation methods could provide more comprehensive understanding of how these relationships manifest in real-world contexts, complementing the standardized assessment approaches used in this research.

Research should also investigate the development of more sensitive and specific measures that can better capture the nuanced relationships between these constructs, potentially revealing associations that current instruments may not detect.

Limitations

Several limitations should be considered when interpreting these findings. The cross-sectional design prevents determination of causal relationships between variables, limiting conclusions about whether developmental improvements lead to enhanced social competence or whether these represent correlated but independent developmental processes. Longitudinal research designs are necessary to establish temporal relationships and examine how these associations change over time.

The sample size of 60 participants, while adequate for correlation analysis, limits the power to detect smaller effect sizes and prevents examination of potential moderating variables such as age, gender, or intervention history. Larger samples would enable more sophisticated statistical analyses, including multiple regression approaches that could examine the relative contributions of multiple predictors to social competence outcomes.

Reliance on standardised assessment instruments, while providing psychometric rigor, may not fully capture the complexity of social competence and autism symptom expression in naturalistic environments. Future research incorporating observational measures, parent and teacher reports, and ecological assessments could provide more comprehensive understanding of these relationships in real-world contexts.

The study population consisted entirely of children receiving services at a specialised rehabilitation facility, potentially limiting generalis abilitylity of the findings to community samples or children with milder autism presentations. Research examining these relationships across different service settings and autism severity levels would strengthen the external validity of findings.

Conclusion

This study provides compelling evidence for the complex developmental relationships that characterise Autism Spectrum Disorder, revealing that developmental functioning and social competence are strongly interconnected while remaining largely independent of autism symptom severity. The robust correlation between Developmental Quotient and Total Social Quotient ($\rho = 0.834$, $p < 0.001$) demonstrates that developmental capacity serves as a fundamental predictor of adaptive social functioning in children with ASD, with particularly strong associations observed in self-help skills, occupational abilities, communication, and locomotion domains. However, the complete absence of significant correlations between developmental functioning and

autism symptom severity across all ISAA domains challenges conventional assumptions regarding the relationship between therapeutic progress and functional outcomes.

These findings support a multidimensional conceptualization of ASD that recognizes developmental capacity, social competence, and autism-specific symptoms as distinct but interrelated constructs that require separate assessment and intervention consideration. The clinical and educational implications are profound, suggesting that comprehensive assessment protocols must evaluate both developmental functioning and autism symptom profiles to provide complete understanding of each child's unique presentation and intervention needs. The independence of autism symptoms from developmental level indicates that children with higher cognitive abilities may still require significant autism-specific supports, while those with lower developmental functioning may exhibit relatively mild symptom presentations.

This study contributes to the growing evidence base supporting individualised, multidimensional approaches to autism intervention that target both developmental enhancement and autism-specific symptom management as complementary rather than competing therapeutic objectives. This study emphasises the critical importance of avoiding assumptions about intervention needs based solely on cognitive or developmental assessments, ensuring that comprehensive support services address the full spectrum of challenges and strengths present in each individual with ASD.

The findings have significant implications for clinical practice guidelines, educational policies, and resource allocation strategies, necessitating fundamental restructuring of service delivery models to provide parallel streams of support calibrated to both developmental capacity and autism symptom profiles. Future longitudinal research examining how these relationships evolve over time and in response to various intervention approaches will be essential for refining our understanding of autism spectrum disorders and optimizing outcomes for individuals with ASD and their families. Continued investigation of these complex relationships through neurobiological, cross-cultural, and intervention studies will advance both theoretical understanding and practical applications in the field of autism spectrum disorder research and practice.

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