

NEUROCOGNITIVE PREDICTORS OF SOCIAL ADAPTATION IN CHILDREN WITH SPECIAL EDUCATIONAL NEEDS IN INCLUSIVE ENVIRONMENTS: A LITERATURE REVIEW

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Abstract

This article presents a literature review examining the neurocognitive predictors of social adaptation in children with special educational needs (SEN) attending inclusive educational settings. Publications from 2000 to 2024 were systematically retrieved from PubMed, Scopus, PsycINFO, and Web of Science databases. The review analyses theoretical frameworks linking neurocognitive functioning to social adaptation outcomes, empirical evidence on the role of theory of mind, emotion recognition, executive functions, and working memory as predictors of social competence in children with SEN, and the moderating influence of diagnostic category, educational environment, and cultural context. The analysis reveals that theory of mind and emotion recognition emerge as the strongest and most consistent neurocognitive predictors of social adaptation across diagnostic groups including autism spectrum disorder, intellectual disability, and developmental delay. Working memory and inhibitory control contribute primarily through indirect pathways. Evidence on cross-cultural generalisability of these relationships is limited, underscoring the need for research in non-Western inclusive educational contexts such as Central Asia.

Keywords: Social adaptation, neurocognitive predictors, inclusive education, special educational needs, theory of mind, emotion recognition, literature review.

1. INTRODUCTION

The international policy shift towards inclusive education has placed increasing demands on understanding the conditions that facilitate or impede successful social participation of children with special educational needs (SEN) in mainstream settings. UNESCO's Salamanca Statement (1994) and subsequent global frameworks have positioned inclusion as a fundamental educational right, with growing evidence that well-implemented inclusive education can yield positive outcomes for children with SEN in terms of academic achievement, social competence, and quality of life (Guralnick, 2010; UNESCO, 2020).

Yet the achievement of meaningful social inclusion — as distinct from mere physical co-location of children with and without SEN — remains a formidable challenge. Research consistently documents lower rates of peer acceptance, higher rates of social rejection, and more limited participation in peer activities among children with SEN in inclusive settings compared with their neurotypically developing classmates (Pavri & Luftig, 2000; Chamberlain

et al., 2007). Understanding the neurocognitive foundations of these social difficulties is essential for designing targeted interventions to support social adaptation.

The neurocognitive capacities most consistently implicated in social functioning include theory of mind (ToM) — the ability to attribute mental states to oneself and others — emotion recognition, executive functions, and working memory (Tager-Flusberg & Sullivan, 2000; Laugeson et al., 2012). These capacities interact in complex ways to support or undermine the quality of social interactions, and their relative contributions may vary across diagnostic groups and developmental levels.

This review aims to synthesise the current state of evidence on neurocognitive predictors of social adaptation in children with SEN in inclusive settings, identify methodological strengths and limitations of existing research, and highlight the particular gap concerning Central Asian educational contexts.

2. THEORETICAL FRAMEWORKS

Several theoretical frameworks have been proposed to explain the relationship between neurocognitive functioning and social adaptation in children with SEN. The social information processing model (Crick & Dodge, 1994) describes social competence as a sequential cognitive process involving encoding social cues, interpreting their meaning, generating response options, evaluating their likely consequences, and enacting chosen responses. Deficits at any stage of this process — many of which are rooted in neurocognitive impairments — can lead to socially maladaptive behaviour.

ToM theories, originating with Baron-Cohen et al.'s (1985) seminal work on autism, propose that the capacity to represent others' beliefs, desires, and intentions is foundational to social interaction, and that its impairment underlies a broad range of social difficulties across neurodevelopmental conditions (Frith, 2001; Yirmiya et al., 1998). Executive function models emphasise the role of inhibitory control and cognitive flexibility in suppressing egocentric responses and adapting behaviour to social contexts (Hughes & Ensor, 2007). Affective neuroscience perspectives highlight the contribution of emotion recognition and empathic processing to prosocial behaviour (Decety & Jackson, 2004).

3. THEORY OF MIND AS A PREDICTOR OF SOCIAL ADAPTATION

Theory of mind has been established as one of the strongest neurocognitive predictors of social adaptation across multiple diagnostic groups relevant to inclusive education. In autism spectrum disorder (ASD), the association between ToM deficits and social impairment has been extensively documented (Baron-Cohen et al., 1985; Tager-Flusberg & Sullivan, 2000). A meta-analysis by Yirmiya et al. (1998), synthesising data from 60 studies, demonstrated significantly lower ToM performance in children with ASD compared with both typically developing peers and children with non-ASD developmental delays, with effect sizes in the moderate-to-large range.

For intellectual disability (ID), research by Thirion-Marissiaux & Nader-Grosbois (2008) showed that ToM performance predicted social adaptive behaviour independently of overall intellectual ability, suggesting that ToM training may represent a productive target for improving social outcomes. In DD, ToM development follows a delayed but broadly typical trajectory, with delays that correlate with the degree of cognitive impairment and the quality of language and social experience (Thirion-Marissiaux & Nader-Grosbois, 2008).

Longitudinal evidence further supports the predictive significance of ToM: Astington & Jenkins (1999) demonstrated that early ToM ability predicted later peer relationship quality in preschool children, while Capps et al. (1998) found ToM performance at school entry to be

a significant predictor of social competence three years later in children with ASD. These findings strengthen the case for ToM-targeted intervention as a strategy for supporting social inclusion.

4. EMOTION RECOGNITION AND SOCIAL ADAPTATION

Emotion recognition — the ability to identify and interpret emotional expressions in faces, voices, and body language — is a fundamental prerequisite for socially appropriate responses and empathic engagement with peers. Research consistently demonstrates impaired emotion recognition across diagnostic categories associated with SEN, including ASD (Harms et al., 2010), ID (Moore, 2001), and attention disorders (Cadesky et al., 2000), with deficits most severe in ASD.

A systematic review by Harms et al. (2010) of 47 studies on facial emotion recognition in ASD found reliable impairments relative to neurotypical controls, most pronounced for complex or subtle emotional expressions and for the recognition of negative emotions. These difficulties have been linked to atypical gaze patterns — reduced fixation on the eye region — which may be amenable to targeted intervention (Dalton et al., 2005). Training programmes targeting emotion recognition have demonstrated improvement in this specific capacity (Laugeson et al., 2012; Tanaka et al., 2010), though generalisation to real-world social interactions requires further investigation.

Bellini (2006) demonstrated a significant longitudinal relationship between emotion recognition ability at baseline and quality of peer interactions at follow-up in adolescents with ASD, supporting emotion recognition as a mediating variable in the pathway from neurocognitive functioning to social adaptation outcomes.

5. EXECUTIVE FUNCTIONS, WORKING MEMORY, AND SOCIAL ADAPTATION

Executive functions, particularly inhibitory control and cognitive flexibility, contribute to social adaptation through their role in regulating impulsive social responses, perspective-taking, and adaptive behaviour modification in dynamic social situations. Hughes & Ensor (2007) demonstrated significant cross-sectional and longitudinal associations between executive function performance and social competence in preschool children with developmental difficulties, with inhibitory control emerging as the most robust predictor.

Working memory supports social adaptation indirectly by enabling the maintenance and manipulation of social information during ongoing interactions — holding in mind the perspective of a conversation partner while formulating a response, for example. Baddeley's (2000) multi-component working memory model provides a useful framework for understanding how working memory capacity constraints in children with SEN may limit the computational resources available for sophisticated social processing.

The relationship between executive functions and social adaptation is likely mediated by ToM: several studies have demonstrated that the association between EF performance and social competence is attenuated when ToM is controlled for, suggesting that EF contributes to social adaptation partly through its enabling role in ToM processing (Carlson & Moses, 2001). This mediation hypothesis has important implications for intervention design, suggesting that combined ToM and executive function training may be more effective than either alone.

6. CULTURAL AND CONTEXTUAL MODERATORS

The extent to which findings from predominantly Western research samples generalise to culturally different educational contexts is an important but underexplored question. Cultural factors shape the socialisation of emotional expression and recognition, the norms governing social interaction, and the educational practices that scaffold or impede neurocognitive

development (Matsumoto & Hwang, 2012). Studies comparing emotion recognition across cultures suggest both universal and culture-specific components, with some evidence for lower recognition of certain emotional expressions (notably disgust and contempt) in East Asian and Central Asian samples relative to Western norms (Elfenbein & Ambady, 2002).

The inclusive education environment itself — its structural characteristics, teacher training, peer attitudes, and institutional culture — is a significant moderating variable. Research consistently shows that inclusion quality, not merely its formal implementation, determines social outcomes for children with SEN (Guralnick, 2010; UNESCO, 2020). In Uzbekistan, where inclusive education policy is relatively recent and implementation infrastructure is still developing (Ministry of Public Education of the Republic of Uzbekistan, 2022), the environmental conditions for supporting social adaptation of children with SEN may differ substantially from those in more developed inclusive systems.

7. CONCLUSION

The present review establishes theory of mind and emotion recognition as the strongest and most consistent neurocognitive predictors of social adaptation in children with SEN across diagnostic categories, with executive functions and working memory contributing primarily through indirect pathways. These findings have clear implications for intervention: programmes targeting ToM and emotion recognition are likely to produce the most direct benefits for social adaptation in inclusive settings. The review simultaneously identifies a significant gap in the evidence base concerning Central Asian and Uzbek educational contexts. Future research in Uzbekistan should focus on validating neurocognitive assessment tools for the local population, examining culture-specific predictors and moderators of social adaptation, and evaluating the effectiveness of ToM- and emotion recognition-focused interventions within the developing inclusive education system.

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