

Autism's Paradoxical Nature: Understanding Contradictory Characteristics

Doç. Dr. Sinan KALKAN*

Onsekiz Mart University, Faculty of Education, Department of Special Education, Çanakkale / Türkiye,
Sinan.kalkan@comu.edu.tr, ORCID: 0000-0001-6890-6421

Prof. Dr. Fatma ERDOĞAN

Fırat University, Faculty of Education, Department of Mathematics Educationi, Elazığ / Türkiye,
f.erdogan@firat.edu.tr, ORCID: 0000-0002-4498-8634

Abstract

Autism-specific traits and the behaviours associated with them often give rise to dilemmas that can be conceptualized as paradoxes. These paradoxical patterns are characterized by the coexistence of marked cognitive or social challenges alongside unusual or exceptional abilities within the same individual. Such dualities highlight the complexity and heterogeneity of autism and underscore the need for integrative conceptual frameworks. Positioned as a conceptual theoretical discussion, this article draws on literature from neuroscience, developmental psychology, education, and philosophy to reconceptualize autism through the organizing lens of paradox. Drawing on theoretical perspectives such as Kapur's "Paradoxical Brain" framework, the review illustrates how functional neurodevelopmental imbalances may simultaneously contribute to both strengths and limitations across developmental domains. Rather than providing a purely descriptive overview, this review integrates existing literature to identify recurring paradoxical patterns in autism and examines their

* Sorumlu Yazar. Tel: +90 553 450 54 88 | Derleme Makalesi.

Makale Tarih Bilgisi. Gönderim: 10.04.2026, Kabul: 03.08.2026, Erken Görünüm: Ağustos, 2026, Basım: Haziran, 2027.

© 2027. Kalem Eğitim ve Sağlık Hizmetleri Vakfı. Bütün Hakları Saklıdır. ISSN: 2146-5606, e-ISSN: 2687-6574

implications for daily life, diagnostic practices, and individualized intervention strategies. Understanding the paradoxical dimensions of autism is essential for moving beyond deficit-oriented models, optimizing individual strengths, and developing more inclusive and responsive support systems. By highlighting both individual and societal implications, this theoretical discussion aims to contribute to a more nuanced understanding of autistic experiences and capacities and to inform future research and practice.

Keywords: Autistic individuals; Paradox; Individualized intervention; Development.

Otizmin Paradoksal Doğası:

Çelişkili Özellikleri Anlamak

Öz

Otizme özgü özellikler ve bunlarla ilişkili davranışlar, genellikle paradokslar olarak kavramsallaştırılabilecek ikilemlere yol açar. Bu paradoksal örüntüler, aynı bireyde belirgin bilişsel veya sosyal zorlukların sıra dışı ya da olağanüstü yeteneklerle bir arada var olmasıyla karakterize edilir. Bu tür ikilikler, otizmin karmaşıklığını ve heterojenliğini ortaya koyar ve bütünleştirici kavramsal çerçevelere duyulan ihtiyacı vurgular. Kavramsal bir bütünleştirici inceleme olarak konumlandırılan bu makale, nörobilim, gelişim psikolojisi, eğitim ve felsefeden elde edilen bulguları sentezleyerek, otizmi paradoksun düzenleyici mercerğinden yeniden kavramsallaştırmaktadır. Kapur'un Paradoksal Beyin çerçevesi gibi teorik perspektiflerden yararlanarak, bu inceleme işlevsel nörogelişimsel dengesizliklerin gelişim alanları genelinde hem güçlü yönleri hem de sınırlılıklara nasıl eşzamanlı olarak katkıda bulunabileceğini göstermektedir. Bu inceleme, salt betimleyici bir genel bakış sunmak yerine, mevcut literatürü bir araya getirerek otizmde tekrarlayan paradoksal kalıpları belirlemekte ve bunların günlük yaşam, tanı uygulamaları ve bireyselleştirilmiş müdahale stratejileri üzerindeki etkilerini incelemektedir. Otizmin paradoksal boyutlarını anlamak; eksiklik odaklı modellerin ötesine geçmek, bireysel güçlü yanları optimize etmek ve daha kapsayıcı ve duyarlı destek sistemleri geliştirmek için gereklidir. Hem bireysel hem de toplumsal etkileri vurgulayan bu bütünleştirici inceleme, otistik deneyimlerin ve yeteneklerin daha incelikli bir şekilde anlaşılmasına katkıda bulunmayı ve gelecekteki araştırma ve uygulamalara bilgi sağlamayı amaçlamaktadır.

Anahtar Kelimeler: Otistik birey; Paradoks; Bireyselleştirilmiş müdahale; Gelişim.

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition with varied symptoms and behaviors unique to each individual (American Psychiatric Association [APA], 2022). The complexity of autism makes its definition and understanding challenging across disciplines (Lord et al., 2022). While heterogeneity in autism refers to the wide variability of traits across individuals, paradoxical patterns capture situations where contradictory strengths and challenges coexist within the same individual or phenomenon, and this paper focuses on the latter.

Since the publication of DSM-5 (APA, 2022) and DSM-5-TR, diagnostic conceptualizations of autism have shifted significantly. Earlier typologies such as Asperger syndrome or Rett syndrome are no longer included under the spectrum, while cognitive and language disorders are now treated as comorbid conditions rather than defining criteria (Lord et al., 2018). Therefore, when drawing on studies prior to 2013, it is essential to interpret findings cautiously, as earlier samples may represent diagnostic categories that no longer align with the current conceptualization of Autism Spectrum Disorder. In this context, autism can be understood as a developmental difference shaped by the interaction of genetic, neurological, and environmental factors, resulting in highly individualized profiles with distinct strengths and limitations (Happé and Frith, 2020; Lord et al., 2022).

Autism's complexity necessitates individualized intervention approaches supported by accurate diagnostic processes that address diverse developmental trajectories (Happé and Frith, 2020). Building on these perspectives, this review focuses on paradoxical patterns observed in autism, highlighting their dual impacts on individuals and society. In this paper, the term paradox is used in a broader philosophical sense to describe situations in which seemingly incompatible traits or behaviors coexist in ways that defy intuitive expectations (Clark, 2012; Quine, 1976; Sainsbury, 2009). From this perspective, paradoxical patterns refer to the coexistence of strengths and challenges that characterize autistic profiles, such as advanced abilities in specific domains alongside social or cognitive difficulties (Baron-Cohen et al., 2011). Framing autism through the neurodiversity paradigm—which conceptualizes autism as a natural variation in cognitive functioning—provides an inclusive framework for interpreting these paradoxes (Bagatell, 2010; Baron-Cohen, 2017). Within this framework, Kapur's (2011)

“Paradoxical Brain” theory offers a crucial theoretical foundation by suggesting that functional imbalances in specific brain regions may simultaneously give rise to exceptional abilities in some domains and significant challenges in others. This perspective supports the view that paradoxical features in autism should not be interpreted solely as deficits, but as integral components of diverse neurodevelopmental profiles shaped by underlying neurological organization (Loth, 2023).

These paradoxes are not merely descriptive labels but reflect structured tensions across neurological, cognitive, and social levels. As noted by Quine (1976), certain paradoxes are not illogical, but rather reveal hidden complexities in our reasoning systems. Similarly, Clark (2012) frames paradoxes as intellectual tools for reconciling contradiction. Within this framework, the contradictory features observed in autism—such as coexisting social withdrawal and social interest, or sensory hypersensitivity alongside sensory seeking—can be reconceptualized not as inconsistencies, but as structured paradoxes. This allows us to frame autism not through a deficit-based lens, but through a more dynamic, integrative paradigm.

While autism is commonly characterized by difficulties in verbal and non-verbal communication, repetitive behaviors, and restricted interests, the manifestation of these features varies widely across individuals (McDonald et al., 2019). Alongside these challenges, some autistic individuals demonstrate pronounced strengths in areas such as mathematics, music, art, or memory, illustrating the uneven and paradoxical distribution of abilities within the spectrum (Baron-Cohen et al., 2011). This variability underscores the spectrum nature of autism and highlights the importance of considering individual developmental profiles rather than uniform symptom presentations (Lord et al., 2018).

Interpreting such paradoxical patterns requires careful attention to contemporary diagnostic frameworks. Prior to DSM-5, subtypes such as Asperger syndrome or Rett syndrome were included within the autism category, often conflating categorical distinctions with paradoxical features. With the introduction of DSM-5 and DSM-5-TR, Rett syndrome was reclassified separately, and cognitive and language impairments were reconceptualized as comorbidities rather than defining characteristics (APA, 2022). This shift underscores the need to ground paradox-based interpretations in current diagnostic criteria to avoid anachronistic conclusions.

From a neurodevelopmental perspective, autism is associated with differences in specific brain systems that may contribute to both strengths and challenges. For example, Janušonis (2006) employed a theoretical model to explore how alterations in the serotonergic system might relate to features observed in autism, offering a speculative account of how neurobiological variation could give rise to divergent developmental outcomes. Although not intended as a definitive neurobiological explanation, such perspectives help contextualize the coexistence of atypical functioning and enhanced abilities within a single developmental framework.

Integrating these neurobiological considerations within the neurodiversity paradigm reinforces the view that such differences should not be interpreted solely as deficits, but as natural variations shaping diverse cognitive profiles (Bagatell, 2010; Baron-Cohen, 2017). This integrative perspective provides a foundation for understanding how neurological and cognitive mechanisms may underlie the paradoxical coexistence of limitations and strengths in autism. Consistent with this view, research on Theory of Mind and savant abilities further illustrates how specific cognitive challenges can coexist with exceptional skills, reflecting structured rather than contradictory developmental patterns (Baron-Cohen, 2009; Kapur, 2011; Tager-Flusberg, 2000).

A paradox represents a situation that appears logically or intuitively contradictory, but when examined in depth, often has a more complex and logical explanation (Clark, 2012). Paradoxes often lead to deeper understanding or a new intellectual perspective, often revealing deep and unexpected logical structures (Sainsbury, 2009). Paradoxes are especially common in fields such as philosophy, mathematics and logic (Kapur, 2011). Quine (1976) classifies paradoxes into three categories: Veridical (seemingly contradictory situations that are proven to be true), Falsidical (seemingly true situations that turn out to be false due to a logical error or misleading attempts) and Antinomies (situations that contain inconsistencies within themselves and are difficult to solve). In this context, some cognitive and behavioral features reflected in the behaviors of the individual with autism can be considered as paradoxes. These paradoxical features often challenge traditional perspectives on autism, urging a shift toward more nuanced and individualized approaches. It can be said that characteristic features associated with the paradoxical nature of autism, such as limitations in communication, interaction and imi-

tation skills, overlap with Quine's classification of "Antinomies". Both Quine (1976) and Clark (2012) have proposed that paradoxes often emerge from a tension between superficial contradiction and deeper logical coherence. This distinction supports the current study's framing of autism's seemingly incompatible traits as structurally meaningful. Drawing from philosophical typologies of paradox (Clark, 2012; Quine, 1976), this framework distinguishes between mere contradiction and functional coexistence.

When the literature is examined in terms of the paradoxical nature of autism, Mullin et al. (2024), who conducted one of the studies focusing on the neurological basis of autism, considered the contrasting and unexpected features of neurodevelopmental and behavioral characteristics observed in autistic individuals as a paradoxical pattern. Mullin et al., pointed out that early intervention strategies should be developed for autistic individuals who show different neurodevelopmental and behavioral development. Building on these insights, this theoretical discussion seeks to integrate findings from various disciplines to better understand and address these paradoxical patterns. Similarly, Kapur (2011) focused on the seemingly contradictory nature of certain cognitive and behavioral characteristics observed in autistic individuals. Kapur emphasized that the paradoxical nature of autism is that while showing functional differences and imbalances in some areas of the brain, these differences can also lead to extraordinary skills and abilities. Janušonis (2006) examined the serotonergic paradoxes associated with the neurological mechanisms of autism using a simple mathematical model. In his study, Janušonis emphasized that the neurodevelopmental effects of this biological alteration are not clearly understood and a direct link to autism is generally not found.

Molinari (2020) examined the paradox with autism through the concepts of emotional intimacy and empathy, highlighting that this paradoxical pattern makes the therapy process difficult for therapists working with autistic individuals. Molinari argued that autistic individuals struggle in relationships and that therapists should adopt an autistic attitude to align with the patient. Focusing on social interactions, Baron-Cohen et al. (2011) explored the superior attention and systematic analysis skills of autistic individuals, despite their deficiencies in social areas. Regarding sensory sensitivities, Bogdanova et al. (2022) investigated the paradox of pain perception and reactions to pain in autistic individuals, attributing it to the reorganization of pain processing pathways and varying individual characteristics. Similarly, Motttron et al.

(2006) addressed the paradoxical nature of autism through the “Enhanced Perceptual Functioning (EPF)” model, finding that autistic individuals show significant superiority and independence in perceptual processing compared to typically developing individuals. Pellicano (2010) examined the relationships between cognitive functions with autism, particularly the complexities and paradoxes in the interconnections of Theory of Mind (ToM), Executive Function (EF), and Central Coherence (CC), and emphasized that these functions can affect each other, leading to unexpected developmental outcomes. Finally, Grzadzinski et al. (2021) critically reviewed the literature, emphasizing the limited information on strategies to support the participation of autistic individuals in daily life and improve their quality of life. By examining these daily life challenges, this theoretical discussion aims to propose practical strategies that bridge the gap between theoretical understanding and real-world application.

The limited number of studies in the literature often examine the paradoxical patterns with autism from a single disciplinary perspective, which fails to fully capture the complexity of autism. For example, while Kapur (2011) and Janušonis (2006) explore the neurological mechanisms of autism and their paradoxical nature, they do not fully address the social and individual impacts of these paradoxes. In contrast, the current study takes a multidimensional approach, incorporating data from various disciplines to provide a more comprehensive understanding of autism’s paradoxical patterns. This theoretical discussion’s unique contribution lies in examining both the individual and social effects of these paradoxes as they manifest in the daily lives of autistic individuals. Moreover, it goes beyond cognitive and behavioral contexts to explore issues like social acceptance, identity, and neurodiversity, offering strategies to support the social integration of autistic individuals. In doing so, it not only advances scientific knowledge but also provides insights into improving the quality of life for autistic individuals. This dual focus on social inclusion and individual potential highlights the transformative impact of embracing neurodiversity in both research and practice. In line with neurodiversity principles and the preferences of many autistic self-advocates, this paper adopts identity-first language throughout. Recent large-scale genetic research has further emphasized that phenotypic heterogeneity in autism reflects underlying genetic programs that unfold across developmental trajectories, underscoring the need for conceptual frameworks that move beyond single-discipline explanations (Litman et al., 2025). Unlike prior approaches

that describe autism's heterogeneity, we structure this heterogeneity using philosophical definitions of paradox, which distinguish between contradictory appearance and functional coexistence.

This conceptual clarity provides the groundwork for a more integrative approach, as explored below. Building on this conceptual distinction, the present study does not aim to introduce new empirical findings, but rather to reconceptualize existing autistic patterns through the philosophical lens of paradox. This approach seeks to integrate diverse findings across cognitive, behavioral, and systemic levels in a more coherent way, thereby promoting interdisciplinary synthesis and generating new implications for applied practice.

Based on the foregoing, this theoretical discussion aims to explore paradoxical patterns in autism and their effects on daily life, with a focus on individualized intervention strategies. This theoretical discussion offers new perspectives by expanding the understanding of autism's paradoxical nature. Kapur's (2011) "Paradoxical Brain" theory highlights how neurological imbalances contribute to both exceptional abilities and significant challenges, while Baron-Cohen's (2009) exploration of savant skills reinforces this duality. This complexity underscores the relevance of the neurodiversity paradigm, which provides a framework for understanding autism as a natural variation rather than a deficit. In this context, the importance of the current study stems from the fact that it aims to better understand the experiences and potentials of autistic individuals by addressing the paradoxical nature of autism from a broad perspective.

In line with the neurodiversity paradigm and the preferences expressed by many self-advocates, this manuscript uses identity-first language, such as "autistic individuals," rather than person-first constructions, such as "individuals with autism," except when formal diagnostic terminology such as ASD is required. This linguistic choice reflects the view that autism may be understood as an integral aspect of identity rather than as a detachable condition (Kenny et al., 2015).

Conceptual Approach and Literature Selection

This article is a conceptual theoretical discussion rather than a systematic review. Accordingly, the aim was not to identify, screen, and quantify all available studies on autism, but to develop a conceptual framework for

interpreting paradoxical patterns observed across autistic development, daily functioning, diagnosis, intervention, and identity-related debates.

The literature was selected purposively to support the conceptual argument of the paper. Priority was given to peer-reviewed empirical studies, theoretical papers, systematic reviews, and meta-analyses that addressed autism in relation to neurodiversity, paradoxical brain functioning, coexisting strengths and challenges, sensory processing, social interaction, Theory of Mind, repetitive behaviors, motor development, intervention response, diagnostic complexity, and social acceptance. The selected literature was used not as an exhaustive evidence base, but as a conceptual foundation for identifying recurring tensions and dualities in autism.

The thematic structure of the paper was developed through iterative reading of the selected literature. Recurring conceptual patterns were grouped under developmental, behavioral-coping, and systemic domains. These domains informed the organization of the discussion into themes such as social interaction, Theory of Mind, motor skills, stereotypic behaviors, sensory sensitivities, social-emotional development, intervention response, diagnosis, and identity. The purpose of this organization was to clarify how seemingly contradictory features may coexist within autistic profiles and how these paradoxical patterns can inform individualized support and inclusive practice.

The thematic structure of the article was developed through a concept-driven reading of the selected literature. Particular attention was given to recurring situations in which autistic functioning was described through coexisting strengths and challenges, apparently contradictory developmental patterns, or tensions between individual needs and social expectations. These recurring patterns were then organized under developmental, behavioral-coping, and systemic domains. This organization informed the discussion of social interaction, Theory of Mind, sensory processing, repetitive behaviors, motor skills, social-emotional development, intervention response, diagnostic processes, and identity-related debates. Each theme was interpreted through the conceptual lens of paradox, with attention to whether the pattern reflected a simple contrast, a functional coexistence of strengths and challenges, or a broader systemic tension.

The Neurodiversity Paradigm and Paradoxical Patterns with Autism

In Autism, paradoxical patterns often involve extraordinary abilities alongside significant cognitive or social challenges. Framing these contradictory features within the neurodiversity paradigm shifts the focus from perceiving autism as a pathology to recognizing it as a natural variation of human neurological diversity. While neurodiversity emphasizes the natural variation of neurological differences, it does not discount the significance of developmental trajectories or domain-specific effects. Instead, it provides a lens through which these paradoxical features are understood as part of a broader spectrum of human diversity, reframing strengths and challenges as interrelated rather than isolated phenomena. The neurodiversity paradigm sees autism's neurological differences as natural variations, enriching human cognitive diversity (Baron-Cohen, 2017). This lens provides a nuanced understanding of neurodevelopmental differences shaping their abilities and challenges. In this context, the paradoxical patterns with autism can be better understood in terms of neurological diversity, which emphasizes the need for individualized support to maximize each individual's potential. The neurodiversity paradigm reframes autism not as a disorder but as a natural variation in cognitive functioning. It is important to note that the neurodiversity paradigm is not positioned as an alternative explanatory mechanism for autism's paradoxical traits. Rather, it serves as a conceptual framework that contextualizes these traits within the broader human spectrum, complementing developmental and neurobiological perspectives. It emphasizes that autism's neurological differences are not deficits but valuable variations, highlighting the coexistence of strengths and challenges to promote inclusion. This perspective shifts the focus towards understanding autism as part of human cognitive diversity, highlighting both the strengths and challenges it encompasses. This perspective is supported by Bagatell (2010), who argues that neurodiversity fosters societal inclusion by valuing unique cognitive contributions. Bagatell, emphasized that preserving autistic identity within societal frameworks is essential, while Baron-Cohen (2017) argues that neurodiversity enriches human cognitive diversity. Baron-Cohen, argues that viewing autism through a neurodiversity lens fosters a more inclusive understanding, which appreciates the strengths and contributions of autistic individuals. This perspective fosters a more inclusive understanding of autism, highlighting the strengths and potential contributions of individuals on the spectrum. This paper is, to our knowledge, the first to systematically conceptualize the mul-

tidimensional and sometimes contradictory features of autism under the framework of paradoxical patterns.

The neurodiversity paradigm posits that the paradoxical features observed with autism-such as “extraordinary abilities” coexisting with “cognitive challenges” arise from differences in how the brain functions. The neurodiversity approach views autism not as a disorder to be cured but as a natural variation explaining strengths and weaknesses. For instance, the paradox of social skill deficits alongside exceptional abilities in certain domains can be understood as a manifestation of these neurodevelopmental differences. These paradoxical patterns are manifestations of the diversity within autism, offering both challenges and unique strengths, as explored in the following sections. Neurodiversity-oriented research increasingly highlights that the co-occurrence of contrasting features in autism -such as heightened perceptual capacity and sensory aversion- constitutes structured paradoxes that shape the lived experience of autistic individuals (Bogdashina, 2016; Mottron et al., 2006).

Beyond a scientific model, the neurodiversity paradigm reinforces identity-centered perspectives. Bagatell (2010) and Robertson (2010) argue that interventions should preserve the unique identities of autistic individuals, rather than aiming for normalization. This approach enhances societal inclusion without compromising individuality. Autistic individuals. Society often views autism as a condition that requires treatment, whereas the neurological differences inherent to autism are fundamental to an individual's identity. This creates a conflict between preserving the autistic individual's identity and the societal expectation of conformity to neurotypical norms (Bagatell, 2010; Benson, 2023). The neurodiversity perspective emphasizes the importance of recognizing and accepting these neurological differences, advocating for the integration of autistic individuals into society without compromising their unique identities. This approach promotes a more inclusive perspective that acknowledges both the individuality of autistic persons and their right to participate fully in social life.

The Importance of Understanding the Paradoxical Nature of Autism

Autism's paradoxical nature highlights its inherent complexity and unique characteristics (Pellicano et al., 2014a). Understanding the paradoxical nature of autism is important for several reasons. First, it is necessary to move beyond a disability-focused view of autism to a needs-focused view that

recognizes the diverse abilities and potential of autistic individuals (Baron-Cohen et al., 2009). This perspective not only informs tailored intervention strategies but also promotes societal inclusion and awareness. This shift is crucial for developing strengths-based approaches that leverage each individual's unique abilities and interests and support their quality of life and participation in daily life.

More recent scholarship highlights the importance of moving beyond deficit-oriented models of autism toward frameworks that integrate both strengths and challenges. For instance, Lombardo and Mandelli (2022) emphasize that recognizing heterogeneity and paradoxical co-occurrences is crucial for both research and practice. Similarly, Dinishak (2022) argues that deficit views of autism obscure the complexity of autistic cognition and identity. These perspectives reinforce the need to conceptualize paradoxical features not as inconsistencies, but as meaningful manifestations of neurodevelopmental diversity.

Second, knowledge of the paradoxical features of autism can inform more effective and individualized interventions. By understanding the complex interplay of autism's strengths and challenges, practitioners can design interventions that not only address disabilities but also build on strengths (Sandbank et al., 2020; Schreibman et al., 2015). For example, an intervention that supports the interests of a child with autism may lead to better outcomes by increasing motivation and engagement in content of interest. By recognizing both the difficulties and exceptional abilities associated with autism, we can move towards a more comprehensive and empathetic understanding (Baron-Cohen et al., 2009). This perspective is vital for developing individualized interventions that support the unique developmental trajectories of autistic individuals (Sandbank et al., 2020; Schreibman et al., 2015), increase their participation in daily life, ultimately improving their and their families' quality of life and promoting a more inclusive social structure.

Patterns in the Paradoxical Nature of Autism

Autism often presents a paradoxical developmental profile: while many individuals show delays or impairments in social and daily living skills, others exhibit remarkable talents in areas like memory, mathematics, or music (Baron-Cohen et al., 2009; Treffert, 2009). These uneven abilities exemplify the paradox of simultaneous strengths and challenges, underscoring the complexity of autism's neurodevelopmental trajectory (Flores et al., 2024;

Howlin et al., 2009). Autistic individuals in this context, the patterns within the paradoxical nature of autism are explored under topics such as “social interaction, Theory of Mind, stereotypical behaviors, sensory sensitivities, social-emotional development and problem behaviors, motor skills, limited effect of interventions, cyclical nature, diagnostic processes, and the view of autism as both a condition to be treated and a matter of social acceptance”.

Developmental Paradoxes: Cognitive, Social, and Motor

Paradoxical Patterns in Social Interaction: Challenges and Opportunities

Autism significantly impacts social interaction, communication, and behavior, often limiting participation in daily life (American Psychiatric Association [APA], 2022). Autistic individuals frequently experience difficulties in interpreting social cues and mental states, which can hinder effective social engagement. At the same time, some individuals demonstrate context-specific strengths, such as heightened emotional sensitivity or empathy in certain situations, reflecting the heterogeneity of social functioning within the autism spectrum (Baron-Cohen et al., 2009; Happé and Frith, 2020). This coexistence of social challenges and social motivation illustrates a central paradox in autism: limitations in social skills alongside a desire to engage in social interaction.

From a neurodiversity perspective, these patterns are not viewed solely as deficits, but as expressions of natural variation in social cognition and communication (Kapp et al., 2013). Although social communication differences may interfere with initiating and maintaining interpersonal contact (Dubois-Sage et al., 2024), many autistic individuals report a strong desire for social connection and friendship (Jaswal and Akhtar, 2019; Klin et al., 2003). Differences in sensory processing and interpretations of social norms can further shape these interactions, sometimes constraining engagement despite underlying social interest (Baron-Cohen et al., 2009; Jaswal and Akhtar, 2019; Klin et al., 2002). Qualitative accounts of lived experience highlight this tension between motivation for connection and difficulties in navigating social contexts (Murray et al., 2023).

Feelings of loneliness are common among autistic individuals and are often linked to challenges in forming and sustaining social relationships. Paradoxically, experiences of loneliness do not always lead to increased social pursuit; instead, they may result in withdrawal, reinforcing the gap between

the desire for connection and the difficulty of interaction (Bauminger et al., 2003). Uncertainty and variability in social situations can further intensify this pattern, making social adaptation more demanding and increasing the likelihood of withdrawal (Farkas et al., 2024; Maddox and White, 2015). This dynamic aligns with the Interpersonal Distance Theory of Autism, which suggests that the paradox of social interest and withdrawal arises from mismatches between expected and perceived interpersonal proximity during interactions (Farkas et al., 2024).

A further dimension of this paradox is observed in communication modalities. Limitations in verbal and non-verbal communication may constrain face-to-face interaction, whereas some autistic individuals demonstrate relative strengths in written communication or technology-mediated contexts. Success in these alternative communication forms, contrasted with challenges in spoken interaction, further illustrates the paradoxical nature of social functioning in autism (Murray et al., 2023). Understanding these interconnected patterns is essential for contextualizing the multifaceted impacts of social paradoxes in autism and provides a foundation for the discussion of other developmental domains in the sections that follow.

Paradoxical Patterns in Tom: Understanding Cognitive Contradictions

Theory of Mind (ToM) refers to the ability to understand others' thoughts, feelings, and intentions, a domain that is often described as challenging for autistic individuals (Baron-Cohen et al., 2013). Limitations in ToM may hinder the interpretation of social cues such as facial expressions, tone of voice, and others' intentions, thereby affecting communication and social interaction (Baron-Cohen et al., 1985; Thaler et al., 2022). These challenges can contribute to social exclusion and difficulties in peer relationships, which play a critical role in social-emotional development, including shared activities such as play (Jaswal and Akhtar, 2019; Klin et al., 2003).

At the same time, the manifestation of ToM-related difficulties in autism is neither uniform nor absolute, reflecting considerable variability across individuals and contexts. Such perceptual and interpretive differences highlight a paradox within social cognition: while limitations in understanding others' mental states may constrain interaction in some situations, autistic individuals may demonstrate context-dependent awareness or alternative strategies for social understanding in others. This variability underscores

the complexity of ToM in autism and supports the need to conceptualize social-cognitive functioning through a nuanced, paradox-oriented lens rather than a strictly deficit-based framework.

Motor Skills with Autism: Strengths and Limitations in A Paradoxical Pattern

Motor functioning in autism often reflects a paradoxical developmental profile. While some autistic individuals experience difficulties in gross or fine motor coordination, others demonstrate pronounced strengths in specific physical activities or highly structured routines (Green et al., 2009; MacDonald et al., 2014). This uneven motor profile is thought to arise from neurodevelopmental differences in motor planning and execution processes (Bhat, 2021; Dziuk et al., 2007). For example, an individual may struggle to plan a motor action, such as catching a ball, yet achieve successful performance following repeated practice, illustrating a dissociation between motor cognition and motor execution.

Although such dissociations may be explained by the involvement of distinct neural systems—such as frontal networks associated with planning and cerebellar systems supporting motor execution—they often appear paradoxical within everyday functional contexts. Many autistic individuals develop compensatory strategies, including repetitive practice or routine-based movement sequences, that enable successful task completion despite planning difficulties (Bhat et al., 2011). This paradox, in which limitations in motor planning coexist with proficient execution, highlights adaptive flexibility within motor development.

Motor delays are frequently reported in autism; however, these delays do not preclude the emergence of effective or even advanced motor performance through compensatory mechanisms (Bhat, 2021). The coexistence of neurodevelopmental constraints and adaptive motor strategies underscores the dynamic interplay between challenge and strength that characterizes motor functioning in autism.

Behavioral-Coping Paradoxes: Stereotypy and Sensory Processing

Paradoxical Patterns in Stereotypic Behaviors: Routine and Creativity

Repetitive behaviors (stereotypy) and restricted interests are core diagnostic features of autism and can exert both constraining and adaptive influences on development (Leekam et al., 2011). While these behaviors often

create a sense of predictability and comfort, they may also limit access to a broader range of experiences and learning opportunities. For example, intense focus on a specific object, activity, or theme may provide emotional regulation, yet simultaneously reduce engagement in other developmentally relevant activities, contributing to uneven skill profiles across domains.

Repetitive behaviors frequently serve a dual function. On one hand, they operate as self-regulatory strategies that help manage sensory overload and emotional distress, particularly in demanding or unpredictable environments (Jaswal and Akhtar, 2019). On the other hand, these same behaviors may be perceived as socially atypical, thereby restricting peer interaction and participation in shared social contexts (Boyd et al., 2012). This paradox illustrates how behaviors that offer immediate relief and stability can concurrently act as barriers to social integration and broader developmental growth. Importantly, stereotyped actions should not be viewed solely as symptoms of rigidity, but also as adaptive coping mechanisms within constrained contexts.

Repetitive behaviors are often accompanied by strong preferences for routines and resistance to change (Lung et al., 2024). Paradoxically, this orientation toward repetition may also foster creative expression or the development of highly specialized skills. For instance, repetitive engagement with patterns or structures can be transformed into artistic production or domain-specific expertise, highlighting a tension between rigidity and creativity (Farkas et al., 2024; Maddox and White, 2015).

Similarly, intense and focused interests can lead to exceptional knowledge or performance in specific domains, while simultaneously narrowing opportunities for growth in other areas such as social interaction, emotional regulation, or academic flexibility (Lung et al., 2024). Heightened attention to detail may enhance task-specific success but constrain adaptability and integration across contexts (Farkas et al., 2024; Maddox and White, 2015). The coexistence of extraordinary abilities in circumscribed areas alongside limitations in broader functioning exemplifies a core paradox of autism. Interpreting stereotypy and restricted interests through this lens encourages a shift from suppressing these behaviors toward understanding their communicative, self-regulatory, and creative functions within neurodivergent developmental trajectories.

Paradoxical Patterns in Sensory Sensitivities: Stressors and Comfort Zones

Autistic individuals may often be hypersensitive to certain sensory stimuli, such as the smell of perfume, loud announcements in shopping malls, or the sound of shoes, but may be more open to certain sensory experiences, such as soft textured fabrics, water, certain tastes, and types of music (Ben-Sasson et al., 2009). Sensory sensitivities can be both a source of stress and a means of relaxation for autistic individuals. Ben-Sasson et al.'s (2009) meta-analysis comprehensively examined sensory modulation disorders in autistic individuals and found that responses to sensory stimuli vary significantly among individuals. This theoretical discussion demonstrates that sensory sensitivities observed with autism can be both a factor that complicates daily life and, in certain situations, a source of relief. Thus, while autistic individuals may tend to avoid certain sensory stimuli (e.g., avoid loud announcements), they may also actively seek out certain stimuli (e.g., enjoy listening to a certain type of music repeatedly) (Tomchek and Dunn, 2007). This reveals the paradoxical pattern between sensory sensitivity and sensory seeking.

Hypersensitivity in autistic individuals leads to problems such as problem behaviors, limiting the individual's participation in daily activities and learning experiences (Marco et al., 2011) and negatively affecting their interaction with their environment (Ben-Sasson et al., 2009; Tomchek and Dunn, 2007). In contrast, some autistic individuals are able to regulate themselves and calm down when exposed to certain sensory stimuli. For example, autistic individuals who are hypersensitive to certain textures can relax by holding certain objects such as a soft blanket (Reynolds and Lane, 2009). This creates a paradoxical pattern that the sensory system can be used both as a source of stress and as a regulatory tool.

Autistic individuals may perceive their surroundings differently due to sensory sensitivities, which can foster unique abilities in creative fields like art. However, these sensory differences may also pose challenges, negatively impacting their participation in daily life activities (Tomchek and Dunn, 2007). These two different situations brought about by sensory sensitivities create a paradoxical pattern that can be seen as both a limiting factor and a creative potential. Moreover, the sensory sensitivities of autistic individuals may lead them to develop hyper-awareness of the stimuli in their environ-

ment. This increased level of awareness causes them to be distracted and have difficulty in perceiving social cues. For example, an individual with autism who is hypersensitive to the brightness of the lights in the room may have difficulty maintaining eye contact during social interaction (Ashburner et al., 2008). This aspect of sensory awareness (both information gathering and limiting social interaction) can be considered a paradox. These sensory responses not only illustrate behavioral variability but also embody a deeper paradox. Sensory hypersensitivity can simultaneously result in both dysfunction and creative adaptation-where one individual avoids stimuli while another transforms sensory intensity into artistic output. This dual function of sensory processing underscores autism's paradoxical nature in perceptual and experiential terms.

Social-Emotional Development and Problem Behaviors: A Paradoxical Interplay

Social-emotional development and problem behaviors in autism are linked through a bidirectional and self-reinforcing relationship. Inadequate or delayed responses to early problem behaviors may intensify difficulties in cognitive functioning, behavioral regulation, and emotional control, thereby amplifying developmental challenges over time. This reciprocal process reflects a paradoxical dynamic in which behavioral challenges and emotional difficulties simultaneously influence and exacerbate one another, complicating developmental trajectories.

Many autistic individuals rely on structured routines to achieve emotional stability and predictability; however, this reliance may also limit adaptability in novel or unpredictable situations. While flexibility can be observed in certain contexts or under specific conditions (Farkas et al., 2024; Maddox and White, 2015), sudden changes or disruptions to established routines often precipitate problem behaviors. This tension between the need for structure and the demand for flexibility represents a functional paradox within social-emotional development, whereby the same behavioral patterns that support emotional regulation may also undermine adaptive responding when contextual demands shift.

Together, these paradoxical patterns across social, cognitive, motor, sensory, and emotional domains illustrate that autism cannot be understood through linear or deficit-based models alone. While these paradoxes emerge at the individual developmental level, they are further shaped, amplified, or

constrained by diagnostic frameworks, intervention systems, and societal expectations. Understanding autism therefore requires extending the analysis beyond individual functioning to examine how systems of diagnosis, intervention, and social inclusion respond to—and sometimes intensify—these paradoxical dynamics.

Systemic Paradoxes: Diagnosis, Intervention, and Identity

The diversity and inconsistency of intervention models across behavioral, educational, and therapeutic systems reflect a fundamental structural paradox in autism: the widespread reliance on standardized practices for a condition defined by highly individualized and non-standard developmental profiles. This tension highlights the need for paradigmatic flexibility and greater systemic responsiveness in the planning and delivery of support services.

Intervention Strategies for Autism: Cycles and Limitations in A Paradoxical Context

Although early intervention programs have been shown to improve core developmental domains in some autistic individuals, their long-term effects remain highly variable due to the inherent heterogeneity of autism (Rogers and Vismara, 2008; Rogers and Dawson, 2020). Differences in intervention models, combined with variability in family involvement, community resources, and access to services, further contribute to these uneven outcomes (Smith and Iadarola, 2015; Zwaigenbaum et al., 2015). Consequently, an intervention that is effective for some individuals may be ineffective or insufficient for others (Warren et al., 2011). Framing this variability as paradoxical foregrounds the tension between the universalizing logic of standardized interventions and the individualized developmental trajectories of autistic individuals.

Empirical evidence suggests that tailored early intervention approaches, such as the Early Start Denver Model, can enhance social and communication skills; however, the sustainability of these gains varies across individuals and developmental periods (Dawson et al., 2010; Vivanti et al., 2021). Some autistic individuals and families report that long-term outcomes fail to meet evolving needs, particularly as developmental demands change across the lifespan (Fuller and Kaiser, 2020; Lord et al., 2022; Pellicano et al., 2014a; Sandbank et al., 2020). These findings underscore a systemic paradox in which early intervention is both essential and insufficient when implemented

without ongoing adaptation.

Interventions for autism often unfold within a cyclical process characterized by periods of progress and subsequent plateaus or setbacks. As individual needs and environmental contexts shift, strategies that were initially effective may require substantial modification (Howlin et al., 2009; Pellicano et al., 2014b). Moreover, interventions targeting specific behaviors may inadvertently generate new challenges, such as the re-emergence of repetitive behaviors in alternative forms following their suppression (Dawson et al., 2010). Together, these patterns highlight the paradoxical nature of intervention in autism, wherein efforts to promote stability and improvement must remain continuously flexible to avoid constraining long-term developmental trajectories. These intervention-related tensions are closely linked to paradoxes within diagnostic and assessment practices, where early identification is both essential and inherently complex.

Diagnosis and Evaluation with Autism: Navigating Paradoxical Challenges

One of the defining diagnostic features of autism is the early emergence of symptoms, typically before the age of three (American Psychiatric Association [APA], 2022). During this critical developmental period, children rapidly acquire foundational skills that support later learning and social interaction (Rutter, 2011). Autism alters this trajectory, often resulting in delayed or atypical development across language, motor, communication, cognitive, and social-emotional domains. These early differences underscore the importance of timely diagnosis and early intervention. However, the marked heterogeneity of autism—together with co-occurring conditions, assessment biases, and sociocultural variation—creates paradoxical challenges in diagnostic practice (Song et al., 2022; Wing, 1997).

The variability of autism across individuals and contexts complicates diagnostic accuracy and, by extension, the planning of effective interventions. Overlapping symptom profiles with other neurodevelopmental conditions, cultural differences in the interpretation of behavior, and the dynamic nature of autism symptoms across development all contribute to diagnostic uncertainty (Volkmar et al., 2005). For example, early manifestations of autism may be subtle or nonspecific, delaying diagnosis until differences become more pronounced over time (Charman and Baird, 2002; Mandell et al., 2005). In other cases, co-occurring neurodevelopmental or psychiatric conditions

may obscure autism-related features, leading to inconsistent or biased assessments (Simonoff et al., 2008; Lord et al., 2022).

Historically, categorical distinctions within the autism spectrum further complicated diagnostic clarity. Conditions once subsumed under autism, such as Asperger syndrome or Rett syndrome, illustrate how broad diagnostic labels can conflate distinct developmental profiles (Wing, 1997). Additionally, shared features such as atypical joint attention or imitation difficulties—also observed in other disability groups, including intellectual disability—can increase the risk of misdiagnosis (Gillberg et al., 2004). When universal diagnostic criteria are applied without sufficient contextual sensitivity, cultural variations in symptom expression may further amplify these paradoxes (Grinker, 2007). Collectively, these factors highlight a diagnostic paradox in which early identification is both essential and inherently challenging, underscoring the need for flexible, context-aware assessment approaches that can accommodate the diversity and developmental fluidity of autism. Beyond diagnostic uncertainty, these paradoxes extend into ethical and identity-related debates concerning how autism is defined, treated, and socially understood.

Social Acceptance and Autism: Balancing Identity and Treatment Paradoxes

Another central source of paradox in autism arises from the divergent ways the condition is conceptualized across disciplines. In some frameworks, autism is primarily defined as a condition requiring treatment, with interventions aiming to modify characteristics that may constitute integral aspects of autistic identity (Happé and Frith, 2020; Kapp et al., 2013). From this perspective, autistic individuals may experience interventions as efforts to “fix” or normalize them, generating tension between preserving individual identity and adapting to societal expectations (Bagatell, 2010). This contradiction reflects a core paradox in autism: the simultaneous pursuit of therapeutic change and the preservation of personal identity.

Interventions are undeniably necessary to mitigate challenges associated with autism and to enhance quality of life (Pellicano et al., 2014b). However, while intervention models increasingly emphasize individualization, broader social systems often expect autistic individuals to conform to normative behavioral standards. This discrepancy produces a paradoxical tension between individuality and social adaptation. As Bagatell (2010) ar-

gues, approaches grounded in neurodiversity seek to reconcile this tension by respecting autistic identities while supporting meaningful participation in social life. Nevertheless, societal processes of acceptance and inclusion frequently lag behind these theoretical advances, reinforcing the conflict between treatment-oriented models and identity affirmation.

Disciplinary perspectives that frame autism predominantly as a neurodevelopmental disorder often prioritize deficits and biomedical explanations, focusing on causation and remediation (Baron-Cohen, 2017). While such approaches have contributed valuable insights, they may underemphasize the social and environmental contexts in which autistic individuals develop and interact. Viewing autism solely through a deficit-based lens risks obscuring individual strengths, adaptive capacities, and the role of behavioral and contextual supports (Dawson et al., 2010; Robertson, 2010). This imbalance creates a structural paradox in which efforts to remediate perceived impairments may inadvertently marginalize the very abilities and identities they seek to support.

The definition of autism—as a disorder to be treated, a neurodevelopmental condition, or a developmental difference—is itself shaped by cultural, disciplinary, and ethical considerations (Grinker, 2007). Interventions designed to reduce impairment may conflict with autistic individuals' self-perception and identity, giving rise to tensions between clinical objectives and identity affirmation (Bagatell, 2010). These tensions constitute systemic paradoxes that challenge not only intervention practices but also the ethical foundations of autism research and policy.

Accordingly, autism should not be conceptualized solely as a neurodevelopmental disorder, but as a multidimensional developmental difference with heterogeneous and sometimes conflicting implications for cognitive, social, and emotional functioning (Happé and Frith, 2020). Contemporary ethical and theoretical debates increasingly advocate for recognizing autism within the framework of neurodiversity and identity (Jaarsma and Welin, 2012). Acknowledging autism as part of human neurodiversity is therefore essential for understanding autistic development in a way that integrates support, autonomy, and identity rather than positioning them in opposition (Robertson, 2010).

Strategies for Resolving Paradoxical Patterns with Autism

It should not be forgotten that autism is a complex condition that can manifest itself in a wide spectrum and in different ways in each individual (Volkmar et al., 2014). Autism presents a highly individualized spectrum of abilities and limitations, requiring flexible and multifaceted approaches (Happé and Frith, 2020; Volkmar et al., 2014). Autistic individuals Although the wide variation and individual differences among autistic individuals make it difficult to understand the paradoxical nature of this developmental difference, it also offers a rich field of study to discover and resolve these paradoxes (Happé and Frith, 2020). Accepting that autism has a wide spectrum and that each individual may have different abilities and limitations is the first step to understanding this paradoxical nature (Pellicano et al., 2014a). In addition, multifaceted and individualized interventions are required to help autistic individuals adapt to social life and support their social interactions. In addition, special strategies should be developed for issues such as sensory sensitivities, motor skill differences, and management of problem behaviors seen with autism. Below are suggestions for education, therapy and support programs designed to suit the needs of autistic individuals. These suggestions aim to guide a better understanding of autism and its paradoxical nature, and to ensure a healthier social integration of autistic individuals. In this context:

Regarding paradoxical patterns in social interaction: Various strategies can be developed to alleviate the social interaction difficulties faced by autistic individuals and to enhance their adaptation to the social world. Primarily, programs and therapies aimed at improving the social communication skills of autistic individuals should be implemented (Baron-Cohen et al., 2011). These programs should focus particularly on strengthening non-verbal communication skills and encouraging individuals to apply these skills in natural social contexts. Additionally, for those with difficulties in verbal communication, methods that support social interaction through written communication and technology should be expanded (Murray et al., 2005). To address paradoxical social interaction patterns, programs should focus on enhancing non-verbal communication and incorporating technology-based methods (Baron-Cohen et al., 2011; Murray et al., 2005). These strategies increase real-life social participation and bridge expressive gaps. Finally, educational and support programs for families and the community should be developed. These efforts also foster greater understanding of social dualities in autism and support their integration into social life (Farkas et al., 2024;

Maddox and White, 2015).

Regarding paradoxical patterns in ToM skills: Addressing paradoxical patterns commonly observed in theory of mind skills with autism can be achieved by increasing efforts to understand the perspectives of autistic individuals and by developing effective communication methods with them. To enhance ToM in autism, interventions should focus on social cognition skills such as recognizing facial expressions, interpreting tone of voice, and understanding social cues. Implementing these strategies early can significantly improve social development and reduce exclusion (Baron-Cohen et al., 2013; Jaswal and Akhtar, 2019). Additionally, it should be considered that some autistic individuals may have notable abilities in developing empathy and emotional understanding. These abilities should be supported and encouraged to contribute to the individual's success in social interactions (Bird and Cook, 2013).

Regarding paradoxical patterns in stereotypic behaviors: Directing stereotypic behaviors observed in autistic individuals in more functional and socially acceptable ways is of great importance. Evidence-based approaches such as Applied Behavior Analysis (ABA) can be effective in redirecting repetitive behaviors through alternative methods. Moreover, an Integrative Approach should be adopted in the education of autistic individuals. These approaches should include strategies that support the individual's ability to focus on details while also promoting flexibility and holistic thinking (Lee-kam et al., 2011). Additionally, while encouraging special interests in autistic individuals, other areas such as social skills and emotional regulation should also be supported (Lung et al., 2024). In this context, Interest-Based Learning Models can help address developmental deficiencies while supporting the strengths of autistic individuals (Boyd et al., 2012). Ultimately, allowing repetitive behaviors of autistic individuals to be channeled into creative processes or productive activities such as art can help them relax and gain social acceptance (Farkas et al., 2024; Maddox and White, 2015).

Regarding paradoxical patterns in sensory sensitivities: To manage the paradoxical patterns caused by contradictory conditions in sensory sensitivities with autism, it is crucial to comprehensively understand the sensory sensitivities and interests of autistic individuals and provide them with a suitable environment. In this regard, interventions such as sensory integration therapy and occupational therapy can help autistic individuals improve their

sensory processing skills (Schaaf and Miller, 2005). Additionally, Sensory Integration Therapy can support autistic individuals in regulating their responses to sensory stimuli, allowing their sensory systems to serve both as a source of stress relief and as a calming tool (Lang et al., 2012). Personalized approaches tailored to the specific needs of the individual should be adopted in these therapies.

The use of various sensory support tools to promote relaxation and stress management in daily life for autistic individuals is also important. For example, tools such as soft-textured blankets, stress balls, or special headphones can provide sensory relaxation (Reynolds and Lane, 2009). These sensory support tools can help individuals control their stress levels and participate more effectively in daily activities. It should also be considered that sensory sensitivities in autistic individuals may provide potential for creative thinking and artistic talents (Ashburner et al., 2008). To support this potential, participation in artistic and creative activities should be encouraged for autistic individuals. Such activities can allow autistic individuals to express themselves and use their sensory awareness constructively.

Regarding paradoxical patterns in social-emotional development and problem behaviors: Problem behaviors observed in autistic individuals can negatively impact social-emotional development, but early intervention strategies play a critical role in breaking this vicious cycle (Kazdin, 2019). In this context, the scope of early intervention programs should be expanded and supported with individualized behavioral interventions. Such programs can contribute to reducing problem behaviors and developing social-emotional skills (Lee et al., 2022). Additionally, it is important to increase social-emotional skills training for autistic individuals, with an emphasis on emotional regulation, empathy development, and social interaction skills. Social Skills Training is recommended as a method that can yield effective results in this area (Kazdin, 2019).

The paradoxical pattern related to the limitations in social-emotional skills and perceptual inconsistencies associated with autism is crucial for developing social skills interventions that foster and are based on the natural social motivations of autistic individuals. In managing the paradoxical patterns caused by this dilemma, attention should be paid to the presentation of routines and changes, and strategies should be developed to help autistic individuals adapt to these situations. Visual stimulus-based programs and

social stories designed for this purpose can facilitate autistic individuals to be more prepared for changes. Flexibility skills should also be developed to help individuals adapt to new situations with small and controlled changes (Gray, 1994).

Regarding paradoxical patterns in motor skills: Differences in motor skills among autistic individuals span a wide range. In this context, educational, rehabilitation, and family support factors play a significant role in supporting motor skills and understanding paradoxical patterns in motor skills of autistic individuals (Case-Smith and Arbesman, 2008). Particularly, individualized motor skills development programs need to be designed to enhance the motor skills of autistic individuals. In this regard, Individualized Education Programs (IEPs) can offer an effective pathway (MacDonald et al., 2014). Moreover, autistic individuals can benefit from compensatory strategies they naturally develop to overcome difficulties in motor skills (Bhat et al., 2011). Recognizing and supporting these strategies can boost individuals' confidence and accelerate their motor skill development. Additionally, supportive services such as physiotherapy and occupational therapy can provide guidance tailored to the needs of individuals.

Furthermore, autistic individuals may demonstrate exceptional abilities in specific sports or physical activities (Green et al., 2009). Focusing on the interests of autistic individuals can enable them to perform excellently in these areas (Jaswal and Akhtar, 2019; Klin et al., 2003; Koegel et al., 2001). Also, more research is needed on brain structures and neural connections to understand the differences and paradoxical patterns in motor skills of autistic individuals (Bhat, 2021; Dziuk et al., 2007). Such research can uncover the underlying causes of difficulties in motor skills and allow the development of new intervention methods. Ultimately, participation in relevant sports or activities can contribute to both the development of motor skills and the increase of social interaction opportunities for autistic individuals.

Regarding paradoxical patterns in the limited and cyclical nature of autism interventions: To overcome the limited and cyclical nature of autism interventions, certain measures need to be taken. Due to the inherent nature of autism, the fact that a single intervention method does not have the same effect on all individuals underscores the importance of individualized intervention strategies (Baron-Cohen et al., 2009). Designing intervention programs according to the unique needs, strengths, and developmental level

of the individual can yield more effective and long-term results. Effective interventions require individualized strategies that adapt to the diverse needs of autistic individuals. This ensures that intervention approaches remain flexible and capable of addressing unique challenges, enhancing the overall developmental trajectory. Interventions must consider autism's diversity, emphasizing personalized approaches to achieve long-term effects. Tailored strategies are crucial to address the paradoxical nature of autism in interventions. Such strategies not only enhance the effectiveness of interventions but also ensure that the interventions align with the individual's unique challenges and strengths, ultimately improving their quality of life. In this context, Personalized Intervention Plans are critically important (Smith and Iadarola, 2015).

The lack of consistency and integration in early intervention approaches across different disciplines can limit the long-term effects of autism interventions (Rogers and Vismara, 2008). Therefore, the integration of interdisciplinary approaches can be a critical strategy to support the social, communicative, and behavioral development of autistic individuals. Integrating behavioral, educational, and therapeutic interventions to complement each other can provide more consistent and effective results (Zwaigenbaum et al., 2015). Additionally, the limited long-term effects of early intervention programs highlight the need for continuous monitoring and evaluation of these programs (Dawson et al., 2010). It is crucial to continuously monitor the developmental processes of individuals and update intervention strategies when necessary to enhance the effectiveness of intervention programs. In this context, Developing Continuous Monitoring and Evaluation Mechanisms is essential (Howlin et al., 2009).

Regarding paradoxical patterns in diagnosis and evaluation processes: Various recommendations can be made for the accurate and effective diagnosis and evaluation of autism. Firstly, the broad spectrum of autism and the variability of its symptoms can complicate the diagnosis processes. Therefore, diagnostic processes need to be more standardized and adapted to different cultural contexts (Grinker, 2007; Simonoff et al., 2008). While standardization ensures consistency and reliability in the diagnostic process, it does not preclude flexibility to accommodate individual differences. The goal is to establish a standardized framework that allows for variability in symptom presentation and personal contexts, ensuring both precision and inclusivity.

For example, diagnostic tools such as Autism Diagnostic Observation Schedule (ADOS-2) and Autism Diagnostic Interview-Revised (ADI-R) offer structured evaluations while accounting for diverse manifestations of autism symptoms across individuals (Lord et al., 2022). Additionally, by increasing the flexibility and comprehensiveness of evaluation criteria, the various symptoms of autism can be better captured (Lord et al., 2022). One of the factors that can complicate the diagnosis of autism is the ambiguity of autism symptoms in early childhood.

Therefore, developing comprehensive screening programs is of great importance. These programs should conduct screenings in multiple domains such as language, motor skills, and social-emotional development to better detect signs of autism at early ages (Charman and Baird, 2002). While tools such as the ADOS-2 and the ADI-R are invaluable in diagnosing autism spectrum disorders, they primarily focus on diagnostic criteria and may not fully encompass the variability in developmental trajectories across multiple domains. Our proposed approach seeks to complement these tools by broadening the scope of assessment to include emerging signs of atypical development in language, motor skills, and social-emotional growth. This broader focus aims to identify children who may not meet diagnostic thresholds but could benefit from early interventions. Such screening programs can play a critical role in detecting early signs of autism, especially for children at risk. However, we acknowledge the challenges in implementing such an encompassing approach, including resource limitations, variability in training across clinics, and logistical difficulties in coordinating input from parents, teachers, and clinicians. Lessons can be drawn from models successfully implemented in certain regions, such as where interdisciplinary collaboration has enhanced early screening efforts. A significant practical challenge lies in ensuring that such screenings are feasible within the constraints of existing healthcare and educational systems. For example, while contacting teachers and parents for input is ideal, variability in access to comprehensive resources may hinder implementation. Addressing these challenges requires piloting adaptable screening frameworks tailored to the available infrastructure in different regions.

To further refine these efforts, future research should explore the practical integration of multi-domain screening approaches with existing tools like ADOS-2 and ADI-R. This could involve evaluating their combined effecti-

veness in early detection and intervention planning, ensuring that added components provide unique and measurable value without overburdening healthcare systems. Furthermore, educational programs should be implemented to raise awareness of autism among parents and caregivers. This will enable parents to notice early signs and take timely action for appropriate interventions (Mandell et al., 2005).

Moreover, adopting multidisciplinary approaches beyond a single discipline in the diagnosis of autism is essential. Collaborative work among experts from different fields, such as psychiatry, neurology, psychology, and education, can allow for a more holistic evaluation of autism (Wing, 1997). These approaches can contribute to a better understanding of the variable symptoms of autism over time and accurate diagnosis. Finally, given that the symptoms of autism can be confused with other neurodevelopmental disorders, there is a need for advanced assessment tools to prevent misdiagnoses (Gillberg et al., 2004). Advanced psychometric tests and observation techniques can provide more sensitive results in distinguishing autism from other disorders. The use of such tools can help obtain more objective and reliable results in the diagnosis process (Rutter, 2011).

Regarding paradoxical patterns in the perception of autism as a condition to be treated and social acceptance processes: Various strategies have been proposed to approach autism more balancedly and acceptingly in light of the paradoxical patterns related to viewing autism as a condition that needs to be treated and social acceptance processes. Firstly, it is necessary to expand education and awareness programs that support the acceptance of autism as a difference rather than a disease that needs to be treated (Happé and Frith, 2020). In this context, developing inclusive education programs that facilitate better understanding and acceptance of autistic individuals in society is important. The implementation of these programs for both educators and the general public can play a critical role in raising social awareness. Furthermore, it is clear that interventions for autistic individuals should support their adaptation to society while preserving their unique characteristics. At this point, it is crucial for individualized intervention plans to highlight the strengths of autistic individuals while also providing the necessary support for adapting to societal expectations (Pellicano et al., 2014a). This can help autistic individuals maintain their identities and integrate into society.

It is also emphasized that autism should be accepted not only as a di-

sorder to be treated but as part of an individual's identity and neurodiversity (Jaarsma and Welin, 2012). Viewing autism from a neurodiversity perspective brings to the forefront that each individual has different needs and strengths. This approach considers autism in a more balanced way, helping autistic individuals preserve their identities and adapt to society (Mullin et al., 2024). In this context, developing early intervention strategies in a way that is individualized and compatible with the neurodiversity perspective can significantly contribute to changing the existing paradoxical structure. Finally, to integrate autistic individuals into society, it is necessary to strengthen social and environmental support systems. However, a noteworthy reality is that professionals rarely address the challenges autistic individuals face related to social stigma and attitudinal barriers (Robertson, 2010). Therefore, it is clear that social support networks should focus on the strengths of autistic individuals, encouraging them to contribute to society. By implementing these approaches, it is possible to mitigate the challenges posed by paradoxical patterns and enhance the quality of life for individuals on the autism spectrum, as emphasized in the conclusion.

In response to the identified paradoxes, the following table offers structured intervention strategies. The Table 1 below provides a comprehensive overview of the key paradoxical patterns observed in autistic individuals. It outlines the specific challenges associated with these patterns, potential solution approaches, and the expected outcomes of these interventions, many of which are grounded in findings from recent meta-analyses and clinical trials (e.g., Rogers and Vismara, 2008; Sandbank et al., 2020). By presenting this information in a structured format, the table aims to enhance clarity and support a deeper understanding of how targeted strategies can address the complex needs of individuals on the autism spectrum.

To enhance the applicability of intervention strategies, future models should directly link each paradoxical pattern with tailored approaches. For example, motor planning paradoxes can be addressed through occupational therapy programs that combine repetitive practice with strength-based motor training (Mohd Nordin et al., 2021). Sensory paradoxes benefit from individualized sensory diets and structured sensory integration therapies (Schaaf et al., 2018). Diagnostic paradoxes require the adoption of culturally sensitive, multidisciplinary assessments to ensure accurate classification (Lord et al., 2018). Anchoring interventions in these specific paradoxes increases ecol-

gical validity and strengthens the translation of theoretical insights into clinical and educational practices.

Table 1. Conceptually Derived and Research-Informed Strategies Addressing Paradoxical Patterns Observed in Autism

Paradoxical Pattern	Paradoxical Feature (Coexisting Opposites)	Description	Solution Approaches	Expected Outcomes
Social Interaction	Desire for connection vs. social withdrawal	Many autistic individuals express a strong desire to form friendships but simultaneously engage in avoidant or withdrawn behaviors due to anxiety or difficulties in interpreting social cues.	Peer-mediated interventions, social stories, video modelling, and structured social skills training.	Improved social understanding, increased peer engagement, and reduced social anxiety.
Theory of Mind	Interest in social information vs. difficulties understanding others	Some individuals are highly interested in social interactions yet struggle to interpret others' mental states, leading to misunderstandings.	Explicit Theory of Mind training, perspective-taking exercises, and role-playing scenarios.	Enhanced empathy, improved communication, and reduced interpersonal conflicts.
Sensory Sensitivities	Hypersensitivity vs. sensory seeking	Autistic individuals may display heightened sensitivities to sensory stimuli but also seek certain sensory experiences for self-regulation.	Sensory integration therapy, environmental modifications, and use of sensory diets.	Decreased sensory overload, improved self-regulation, and enhanced participation in activities.
Restricted and Repetitive Behaviors	Need for sameness vs. capacity for creativity	While repetitive behaviors often reflect a need for predictability and sameness, many individuals also demonstrate exceptional creativity in specific domains (e.g., art, music).	Incorporation of interests into learning, flexible routines, and creative expression activities.	Increased flexibility, improved adaptive behavior, and fostered creative talents.
Motor Skills	Motor planning challenges vs. isolated motor strengths	Despite general difficulties with motor planning and coordination, some individuals display isolated motor skills (e.g., exceptional drawing ability or instrument playing).	Occupational therapy, task analysis, and strength-based skill development.	Improved motor planning, increased confidence, and further development of specific motor talents.
Intervention Response	Resistance to change vs. openness in preferred contexts	Many individuals resist unfamiliar interventions but may show openness when interventions align with their interests or strengths.	Use of interest-based and contextually meaningful interventions, gradual exposure, and motivational strategies.	Higher intervention engagement, better skill generalization, and reduced avoidance behaviors.
Social Acceptance	Desire for inclusion vs. fear of stigma	Individuals often desire social inclusion but fear judgment or rejection, which can result in self-isolation or masking behaviors.	Psychoeducation for peers, self-advocacy training, and community awareness programs.	Increased self-confidence, reduced masking, and greater social participation.

Table 1 presents research-informed intervention strategies designed to respond to the paradoxical developmental and behavioral patterns discussed in the previous sections. Rather than introducing a separate set of claims, the table summarizes the conceptual links already developed in the text

between paradoxical features, related challenges, possible support approaches, and expected outcomes. The strategies presented in the table are grounded in the studies cited in the corresponding thematic sections, and selected citations are retained within the table where clarification is needed.

By tracing paradoxical patterns from individual development to systemic practices, this review highlights that autism is shaped not only by neurodevelopmental differences, but also by how these differences are interpreted, supported, and negotiated within social systems.

Conclusion

As previously defined, autism's paradoxical nature reflects the coexistence of strengths and challenges. Adopting a neurodiversity lens situates developmental and cognitive explanations within a broader, inclusive narrative that views autism as variation rather than deficit and guides tailored supports. On an individual level, this theoretical discussion emphasizes the importance of personalized intervention strategies that address the unique challenges and strengths of autistic individuals. For example, educational programs that incorporate sensory-friendly approaches have shown to improve engagement and learning outcomes (Pellicano, 2010). Furthermore, understanding the paradoxical patterns in repetitive behaviors can help design therapies that balance emotional stability with developmental progress. The complex interplay between strengths and limitations supports a more comprehensive understanding of autism and guides the development of tailored perspectives. At the societal level, integrating neurodiversity perspectives into public policies and community programs remains essential. Awareness campaigns that highlight the coexistence of strengths and challenges in autism can reduce stigma and foster inclusion, while educational reforms that support neurodiverse learners enhance long-term outcomes (Robertson, 2010). In this context, increasing studies that address both individual and societal impacts of autism will contribute to a better understanding of the unique experiences and potentials of autistic individuals.

It is also important to acknowledge the historical shifts in diagnostic frameworks. Prior to DSM-5, subtypes such as Asperger syndrome or Rett syndrome were included within the autism category, often conflating paradoxical features with categorical distinctions. DSM-5 and DSM-5-TR now classify Rett syndrome separately and treat cognitive and language impairments as comorbidities (APA, 2022). This evolution underscores the necessity

of grounding paradox-based interpretations in current diagnostic criteria, thereby avoiding anachronistic conflations and ensuring conceptual precision.

To advance this field further, several avenues for future exploration and application are suggested. First, future research should explore the long-term impact of tailored intervention strategies on improving the quality of life for autistic individuals. Investigations into the role of neurodiversity-based educational models could also provide deeper insights into fostering inclusion and acceptance. From a practical standpoint, developing more inclusive public policies that reflect the neurodiversity perspective is critical for societal acceptance. Additionally, intervention programs should be designed to address specific paradoxical patterns, ensuring a balance between challenges and strengths. Lastly, raising awareness among educators, healthcare professionals, and the general public can significantly reduce stigma and promote a better understanding of autism's diverse characteristics. Moreover, framing autism through paradox not only advances theoretical clarity but also offers a more inclusive communicative framework for families and professionals, helping demystify complex behavioral profiles and promote broader social understanding. Rather than offering new data, this paper synthesizes existing knowledge under a coherent paradox-based framework, enabling more inclusive interpretations and individualized practices.

Ethical Approval

As this conceptual review did not involve human participants, intervention procedures, or the collection of personal data, ethical approval was not required. The study was conducted through the analysis and synthesis of previously published scholarly literature.

Kaynakça

- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). <https://doi.org/10.1176/appi.books.9780890425787>
- Ashburner, J., Ziviani, J., and Rodger, S. (2008). Sensory processing and classroom emotional, behavioral, and educational outcomes in children with autism spectrum disorder. *The American Journal of Occupational Therapy*, 62(5), 564-573. <https://doi.org/10.5014/ajot.62.5.564>
- Bagatell, N. (2010). From cure to community: Transforming notions of autism. *Ethos*, 38(1), 33-55. <https://doi.org/10.1111/j.1548-1352.2009.01080.x>
- Baron-Cohen, S. (2009). Autism: The empathizing-systemizing (E-S) theory. *Annals of the New York Academy of Sciences*, 1156(1), 68-80. <https://doi.org/10.1111/j.1749-6632.2009.04467.x>

- Baron-Cohen, S. (2017). Editorial perspective: Neurodiversity—a revolutionary concept for autism and psychiatry. *Journal of Child Psychology and Psychiatry*, 58(6), 744-747. <https://doi.org/10.1111/jcpp.12703>
- Baron-Cohen, S., Ashwin, E., Ashwin, C., Tavassoli, T., and Chakrabarti, B. (2011). The paradox of autism: Why does disability sometimes give rise to talent? In N. Kapur (Ed.), *The paradoxical brain* (pp. 274–288). Cambridge University Press. <https://doi.org/10.1017/CBO9780511978098.017>
- Baron-Cohen, S., Leslie, A. M., and Frith, U. (1985). Does the autistic child have a “theory of mind”? *Cognition*, 21(1), 37-46. [https://doi.org/10.1016/0010-0277\(85\)90022-8](https://doi.org/10.1016/0010-0277(85)90022-8)
- Baron-Cohen, S., Scott, F. J., Allison, C., Williams, J., Bolton, P., Matthews, F. E., and Brayne, C. (2009). Prevalence of autism-spectrum conditions: UK school-based population study. *The British Journal of Psychiatry*, 194(6), 500-509. <https://doi.org/10.1192/bjp.bp.108.059345>
- Baron-Cohen, S., Tager-Flusberg, H., and Lombardo, M. (2013). *Understanding other minds: Perspectives from developmental social neuroscience*. Oxford University Press.
- Bauminger, N., Shulman, C., and Agam, G. (2003) Peer interaction and loneliness in high-functioning children with autism. *Journal of Autism and Developmental Disorders*, 33, 489-507. <https://doi.org/10.1023/A:1025827427901>
- Ben-Sasson, A., Hen, L., Fluss, R., Cermak, S. A., Engel-Yeger, B., and Gal, E. (2009). A meta-analysis of sensory modulation symptoms in individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 39(1), 1-11. <https://doi.org/10.1007/s10803-008-0593-3>
- Benson, K. J. (2023). Perplexing presentations: Compulsory neuronormativity and cognitive marginalisation in social work practice with autistic mothers of autistic children. *The British Journal of Social Work*, 53(3), 1445-1464. <https://doi.org/10.1093/bjsw/bcac229>
- Bhat, A. N. (2021). Motor impairment increases in children with autism spectrum disorder as a function of social communication, cognitive and functional impairment, repetitive behavior severity, and comorbid diagnoses: A SPARK study report. *Autism Research*, 14(1), 202–219. <https://doi.org/10.1002/aur.2453>
- Bhat, A. N., Landa, R. J., and Galloway, J. C. (2011). Current perspectives on motor functioning in infants, children, and adults with autism spectrum disorders. *Physical Therapy*, 91(7), 1116-1129. <https://doi.org/10.2522/ptj.20100294>
- Bird, G., and Cook, R. (2013). Mixed emotions: The contribution of alexithymia to the emotional symptoms of autism. *Translational Psychiatry*, 3(7), Article e285. <https://doi.org/10.1038/tp.2013.61>
- Bogdanova, O. V., Bogdanov, V. B., Pizano, A., Bouvard, M., Cazalets, J. R., Mellen, N., and Amestoy, A. (2022). The current view on the paradox of pain in autism spectrum disorders. *Frontiers in Psychiatry*, 13, Article e910824. <https://doi.org/10.3389/fpsy.2022.910824>
- Bogdashina, O. (2016). *Sensory perceptual issues in autism and asperger syndrome: different sensory experiences-different perceptual worlds*. Jessica Kingsley Publishers.

- Boyd, B. A., McDonough, S. G., and Bodfish, J. W. (2012). Evidence-based behavioral interventions for repetitive behaviors in autism. *Journal of Autism and Developmental Disorders*, 42, 1236-1248. <https://doi.org/10.1007/s10803-011-1284-z>
- Case-Smith, J., and Arbesman, M. (2008). Evidence-based review of interventions for autism used in or of relevance to occupational therapy. *American Journal of Occupational Therapy*, 62(4), 416-429. <https://doi.org/10.5014/ajot.62.4.416>
- Charman, T., and Baird, G. (2002). Practitioner review: Diagnosis of autism spectrum disorder in 2-and 3-year-old children. *Journal of Child Psychology and Psychiatry*, 43(3), 289-305. <https://doi.org/10.1111/1469-7610.00022>
- Clark, M. (2012). *Paradoxes from A to Z*. Routledge.
- Dawson, G., Rogers, S., Munson, J., Smith, M., Winter, J., Greenson, J., and Varley, J. (2010). Randomized, controlled trial of an intervention for toddlers with autism: The early start Denver Model. *Pediatrics*, 125(1), e17-e23. <https://doi.org/10.1542/peds.2009-0958>
- Dinishak, J. (2022). The deficit view and its critics. *Disability Studies Quarterly*, 36(4). <https://doi.org/10.18061/dsq.v36i4.5236>
- Dubois-Sage, M., Jacquet, B., Jamet, F., and Baratgin, J. (2024). People with autism spectrum disorder could interact more easily with a robot than with a human: Reasons and limits. *Behavioral Sciences*, 14(2), Article e131. <https://doi.org/10.3390/bs14020131>
- Dziuk, M. A., Larson, J. G., Apostu, A., Mahone, E. M., Denckla, M. B., and Mostofsky, S. H. (2007). Dyspraxia in autism: Association with motor, social, and communicative deficits. *Developmental Medicine & Child Neurology*, 49(10), 734-739. <https://doi.org/10.1111/j.1469-8749.2007.00734.x>
- Farkas, K., Pesthy, O., Janacsek, K., and Németh, D. (2024). Interpersonal distance theory of autism and its implication for cognitive assessment, therapy, and daily life. *Perspectives on Psychological Science*, 19(1), 126-136. <https://doi.org/10.1177/17456916231180593>
- Flores, E. A., Fernández, M. R., and Chepe, J. M. C. (2024). Accompanying talent in students with autism spectrum disorders: Psychoeducational and therapeutic perspectives. *International Journal of Research*, 5(12), 841-844. <https://doi.org/10.61707/k9kpm151>
- Fuller, E. A., and Kaiser, A. P. (2020). The effects of early intervention on social communication outcomes for children with autism spectrum disorder: A meta-analysis. *Journal of Autism and Developmental Disorders*, 50(5), 1683-1700. <https://doi.org/10.1007/s10803-019-03927-z>
- Gillberg, C., Gillberg, I. C., Rasmussen, P., Kadesjö, B., Söderström, H., Råstam, M., and Niklasson, L. (2004). Co-existing disorders in ADHD—implications for diagnosis and intervention. *European Child & Adolescent Psychiatry*, 13, i80-i92. <https://doi.org/10.1007/s00787-004-1008-4>
- Gray, C. (1994). *Comic strip conversations: Illustrated interactions that teach conversation skills to students with autism and related disorders*. Future Horizons.
- Green, D., Baird, G., Barnett, A. L., Henderson, L., Huber, J., and Henderson, S. E. (2009). The severity and nature of motor impairment in Asperger's Syndrome: A comparison with specific developmental disorder of motor function. *Journal of Child Psychology and Psychiatry*, 50(5), 608-618.

- <https://doi.org/10.1111/1469-7610.00054>
- Grinker, R. R. (2007). *Unstrange minds: Remapping the world of autism*. Basic Books.
- Grzadzinski, R., Amso, D., Landa, R., Watson, L., Guralnick, M., Zwaigenbaum, L., Deák, G., Estes, A., Brian, J., Bath, K., Elison, J., Abbeduto, L., Wolff, J., and Piven, J. (2021). Pre-symptomatic intervention for Autism Spectrum Disorder (ASD): Defining a research agenda. *Journal of Neurodevelopmental Disorders*, 13, Article e49 <https://doi.org/10.1186/s11689-021-09393-y>
- Happé, F., and Frith, U. (2020). Annual research review: Looking back to look forward-Changes in the concept of autism and implications for diagnosis and care. *Journal of Child Psychology and Psychiatry*, 61(3), 236-254. <https://doi.org/10.1111/jcpp.13164>
- Howlin, P., Magiati, I., and Charman, T. (2009). Systematic review of early intensive behavioral interventions for children with autism. *American Journal on Intellectual and Developmental Disabilities*, 114(1), 23-41. <https://doi.org/10.1352/2009.114.23-41>
- Jaarsma, P., and Welin, S. (2012). Autism as a natural human variation: Reflections on the claims of the neurodiversity movement. *Health Care Analysis*, 20, 20-30. <https://doi.org/10.1007/s10728-011-0169-9>
- Janušonis, S. (2006). Erratum to “Serotonergic paradoxes of autism replicated in a simple mathematical model [Med Hypotheses 64 (2005) 742–750]”. *Medical Hypotheses*, 66(1), 214. <https://doi.org/10.1016/j.mehy.2005.08.024>
- Jaswal, V. K., and Akhtar, N. (2019). Being misunderstood: Social motivation in autism. *Behavioral and Brain Sciences*, 42, Article e82. <https://doi.org/10.1017/S0140525X18001826>
- Kapp, S. K., Gillespie-Lynch, K., Sherman, L. E., and Hutman, T. (2013). Deficit, difference, or both? Autism and neurodiversity. *Developmental Psychology*, 49(1), 59-71. <https://doi.org/10.1037/a0028353>
- Kapur, N. (2011). *The paradoxical brain*. Cambridge University Press.
- Kazdin, A. E. (2019). Annual research review: Expanding mental health services through novel models of intervention delivery. *Journal of Child Psychology and Psychiatry*, 60(4), 455-472. <https://doi.org/10.1111/jcpp.12937>
- Kenny, L., Hattersley, C., Molins, B., Buckley, C., Povey, C., and Pellicano, E. (2015). Which terms should be used to describe autism? Perspectives from the UK autism community. *Autism*, 20(4), 442-462. <https://doi.org/10.1177/1362361315588200>
- Klin, A., Jones, W., Schultz, R., and Volkmar, F. (2003). The enactive mind, or from actions to cognition: Lessons from autism. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 358(1430), 345-360. <https://doi.org/10.1098/rstb.2002.1202>
- Klin, A., Jones, W., Schultz, R., Volkmar, F., and Cohen, D. (2002). Defining and quantifying the social phenotype in autism. *American Journal of Psychiatry*, 159(6), 895-908. <https://doi.org/10.1176/appi.ajp.159.6.895>
- Koegel, L. K., Koegel, R. L., and McNeerney, E. K. (2001). Pivotal areas in intervention for autism. *Journal of Clinical Child Psychology*, 30(1), 19-32. https://doi.org/10.1207/S15374424JCCP3001_4
- Lang, R., O'Reilly, M., Healy, O., Rispoli, M., Lydon, H., Streusand, W., Davis, T.,

- Kang, S., Sigafos, J., Lancioni, G., Didden, R., and Giesbers, S. (2012). Sensory integration therapy for autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, 6(3), 1004-1018. <https://doi.org/10.1016/j.rasd.2012.01.006>
- Lee, J., Lee, T. S., Lee, S., Jang, J., Yoo, S., Choi, Y., and Park, Y. R. (2022). Development and application of a metaverse-based social skills training program for children with autism spectrum disorder to improve social interaction: protocol for a randomized controlled trial. *JMIR Research Protocols*, 11(6), Article e35960. <https://doi.org/10.2196/35960>
- Leekam, S. R., Prior, M. R., and Uljarević, M. (2011). Restricted and repetitive behaviors in autism spectrum disorders: A review of research in the last decade. *Psychological Bulletin*, 137(4), 562-593. <https://doi.org/10.1037/a0023341>
- Litman, A., Sauerwald, N., Green Snyder, L., Foss-Feig, J., Park, C. Y., Hao, Y., Dinstein, I., Theesfeld, C. L., and Troyanskaya, O. G. (2025). Decomposition of phenotypic heterogeneity in autism reveals underlying genetic programs. *Nature Genetics*, 57(7), 1611-1619. <https://doi.org/10.1038/s41588-025-02224-z>
- Lombardo, M. V., and Mandelli, V. (2022). Rethinking our concepts and assumptions about autism. *Frontiers in Psychiatry*, 13 Article e903489. <https://doi.org/10.3389/fpsy.2022.903489>
- Lord, C., Elsabbagh, M., Baird, G., and Veenstra-Vanderweele, J. (2018). Autism spectrum disorder. *The Lancet*, 392(10146), 508-520. [https://doi.org/10.1016/S0140-6736\(18\)31129-2](https://doi.org/10.1016/S0140-6736(18)31129-2)
- Lord, C., Charman, T., Havdahl, A., Carbone, P., Anagnostou, E., Boyd, B., Carr, T., De Vries, P. J., Dissanayake, C., Divan, G., Freitag, C. M., Gotelli, M. M., Kasari, C., Knapp, M., Mundy, P., Plank, A., Scahill, L., Servili, C., Shattuck, P., ... McCauley, J. B. (2022). The Lancet Commission on the future of care and clinical research in autism. *The Lancet*, 399(10321), 271-334. [https://doi.org/10.1016/S0140-6736\(21\)01541-5](https://doi.org/10.1016/S0140-6736(21)01541-5)
- Loth, E. (2023). Does the current state of biomarker discovery in autism reflect the limits of reductionism in precision medicine? Suggestions for an integrative approach that considers dynamic mechanisms between brain, body, and the social environment. *Frontiers in Psychiatry*, 14, Article e1085445. <https://doi.org/10.3389/fpsy.2023.1085445>
- Lung, S. L. M., Picard, È., Soulières, I., and Bertone, A. (2024). Identifying the functions of restricted and repetitive behaviours and interests in autism: A scoping review. *Research in Autism Spectrum Disorders*, 117, Article 102458. <https://doi.org/10.1016/j.rasd.2024.102458>
- MacDonald, M., Lord, C., and Ulrich, D. A. (2014). Motor skills and calibrated autism severity in young children with autism spectrum disorder. *Adapted Physical Activity Quarterly*, 31(2), 95-105. <https://doi.org/10.1123/apaq.2013-0068>
- Maddox, B. B., and White, S. W. (2015). Comorbid social anxiety disorder in adults with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, 45, 3949-3960. <https://doi.org/10.1007/s10803-015-2531-5>
- Mandell, D. S., Novak, M. M., and Zubritsky, C. D. (2005). Factors associated with

- age of diagnosis among children with autism spectrum disorders. *Pediatrics*, 116(6), 1480-1486. <https://doi.org/10.1542/peds.2005-0185>
- Marco, E. J., Hinkley, L. B. N., Hill, S. S., and Nagarajan, S. S. (2011). Sensory processing in autism: A review of neurophysiologic findings. *Pediatric Research*, 69(8), 48-54. <https://doi.org/10.1203/PDR.0b013e3182130c54>
- McDonald, C. A., Donnelly, J. P., Feldman-Alguire, A. L., Rodgers, J. D., Lopata, C., and Thomeer, M. L. (2019). Special education service use by children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 49, 2437-2446. <https://doi.org/10.1007/s10803-019-03997-z>
- Mohd Nordin, A., Ismail, J., and Kamal Nor, N. (2021). Motor development in children with autism spectrum disorder. *Frontiers in Pediatrics*, 9, Article e598276. <https://doi.org/10.3389/fped.2021.598276>
- Molinari, E. (2020). Intimacy and autism: An apparent paradox. *The Psychoanalytic Quarterly*, 89(3), 483-502. <https://doi.org/10.1080/00332828.2020.1769990>
- Mottron, L., Dawson, M., Soulières, I., Hubert, B., and Burack, J. (2006). Enhanced perceptual functioning in autism: An update, and eight principles of autistic perception. *Journal of Autism and Developmental Disorders*, 36, 27-43. <https://doi.org/10.1007/s10803-005-0040-7>
- Mullin, L. J., Rutsohn, J., Gross, J. L., Caravella, K. E., Grzadzinski, R. L., Weisenfeld, L. A., Flake, L., Botteron, K. N., Dager, S. R., Estes, A. M., Pandey, J., Schultz, R. T., John, T. S., Wolff, J. J. Shen, M. D., Piven, J., Hazlett, H. C., and Girault, J. B. (2024). Differential cognitive and behavioral development from 6 to 24 months in autism and fragile X syndrome. *Journal of Neurodevelopmental Disorders*, 16, Article e12. <https://doi.org/10.1186/s11689-024-09519-y>
- Murray, D., Lesser, M., and Lawson, W. (2005). Attention, monotropism and the diagnostic criteria for autism. *Autism*, 9(2), 136-156. <https://doi.org/10.1177/1362361305051398>
- Murray, D., Milton, D., Green, J., and Bervoets, J. (2023). The human spectrum: A phenomenological enquiry within neurodiversity. *Psychopathology*, 56(3), 220-230. <https://doi.org/10.1159/000526213>
- Pellicano, E. (2010). Individual differences in executive function and central coherence predict developmental changes in theory of mind in autism. *Developmental Psychology*, 46(2), 530-544. <https://doi.org/10.1037/a0018287>
- Pellicano, E., Dinsmore, A., and Charman, T. (2014a). Views on researcher-community engagement in autism research in the United Kingdom: A mixed-methods study. *PLOS ONE*, 9(10), Article e109946. <https://doi.org/10.1371/journal.pone.0109946>
- Pellicano, E., Dinsmore, A., and Charman, T. (2014b). What should autism research focus upon? Community views and priorities from the United Kingdom. *Autism*, 18(7), 756-770. <https://doi.org/10.1177/13623613145296>
- Quine, W. V. (1976). *The ways of paradox, and other essays* (2nd ed.). Harvard University Press. <https://doi.org/10.2307/2105696>
- Reynolds, S., and Lane, S. J. (2009). Sensory over-responsivity and anxiety in children with ADHD. *American Journal of Occupational Therapy*, 63(4), 433-440. <https://doi.org/10.5014/ajot.63.4.433>
- Robertson, S. M. (2010). Neurodiversity, quality of life, and autistic adults: Shifting

- research and professional focuses onto real-life challenges. *Disability Studies Quarterly*, 30(1). <https://doi.org/10.18061/dsq.v30i1.1069>
- Rogers, S. J., and Dawson, G. (2020). *Early start Denver Model for young children with autism: Promoting language, learning, and engagement*. Guilford Publications.
- Rogers, S. J., and Vismara, L. A. (2008). Evidence-based comprehensive treatments for early autism. *Journal of Clinical Child & Adolescent Psychology*, 37(1), 8-38. <https://doi.org/10.1080/15374410701817808>
- Rutter, M. (2011). Progress in understanding autism: 2007–2010. *Journal of Autism and Developmental Disorders*, 41(4), 395-404. <https://doi.org/10.1007/s10803-011-1184-5>
- Sainsbury, R. M. (2009). *Paradoxes*. Cambridge University Press.
- Sandbank, M., Bottema-Beutel, K., Crowley, S., Cassidy, M., Dunham, K., Feldman, J. I., and Woynaroski, T.G. (2020). Project AIM: Autism intervention meta-analysis for studies of young children. *Psychological Bulletin*, 146(1), 1-29. <https://doi.org/10.1037/bul0000215>
- Schaaf, R. C., Dumont, R. L., Arbesman, M., and May-Benson, T. A. (2018). Efficacy of occupational therapy using Ayres Sensory Integration®: A systematic review. *The American Journal of Occupational Therapy*, 72(1), Article e7201190010p1-7201190010p10. <https://doi.org/10.5014/ajot.2018.028431>
- Schaaf, R. C., and Miller, L. J. (2005). Occupational therapy using a sensory integrative approach for children with developmental disabilities. *Mental Retardation and Developmental Disabilities Research Reviews*, 11(2), 143-148. <https://doi.org/10.1002/mrdd.20067>
- Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., Kasari, C., Ingersoll, B., Kaiser, A. P., Bruinsma, Y., McNerney, E., Wetherby, A., and Halladay, A. (2015). Naturalistic Developmental Behavioral Interventions: Empirically validated treatments for autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 45(8), 2411–2428. <https://doi.org/10.1007/s10803-015-2407-8>
- Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T., and Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: Prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the American Academy of Child & Adolescent Psychiatry*, 47(8), 921-929. <https://doi.org/10.1097/CHI.0b013e318179964f>
- Smith, T., and Iadarola, S., (2015). Evidence base update for autism spectrum disorder. *Journal of Clinical Child & Adolescent Psychology*, 44(6), 897-922. <https://doi.org/10.1080/15374416.2014.930687>
- Song, A. Y., Bakulski, K., Feinberg, J. I., Newschaffer, C., Croen, L. A., Hertz-Picciotto, I., Schmidt, R. J., Farzadegan, H., Lyall, K., Fallin, M. D., Volk, H.E., and Ladd-Acosta, C. (2022). Associations between accelerated parental biologic age, autism spectrum disorder, social traits, and developmental and cognitive outcomes in their children. *Autism Research*, 15(12), 2359-2370. <https://doi.org/10.1002/aur.2822>
- Tager-Flusberg, H. (2000). Language and understanding minds: Connections in autism. In S. Baron-Cohen, H. Tager-Flusberg, and D. J. Cohen (Eds.), *Understanding other minds: Perspectives from developmental cognitive neuros-*

- science* (2nd. ed., pp. 124-149). Oxford University Press.
- Thaler, H., Albantakis, L., and Schilbach, L. (2022). Social cognitive and interactive abilities in autism. In K. C. Kadosh (Ed.), *Oxford handbook of developmental cognitive neuroscience* (pp. 925–954.). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780198827474.013.29>
- Tomchek, S. D., and Dunn, W. (2007). Sensory processing in children with and without autism: A comparative study using the Short Sensory Profile. *American Journal of Occupational Therapy*, 61(2), 190-200. <https://doi.org/10.5014/ajot.61.2.190>
- Treffert, D. A. (2009). The savant syndrome: An extraordinary condition. A synopsis: Past, present, future. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1522), 1351-1357. <https://doi.org/10.1098/rstb.2008.0326>
- Vivanti, G., Kasari, C., Green, J., Mandell, D., and Maye, M. (2021). Implementing and evaluating early intervention programs for autism spectrum disorder: Where are the gaps and what should we do? *Autism Research*, 14(2), 259-284. <https://doi.org/10.1002/aur.1900>
- Volkmar, F. R., Chawarska, K., and Klin, A. (2005). Autism in infancy and early childhood. *Annual Review of Psychology*, 56, 315–336. <https://doi.org/10.1146/annurev.psych.56.091103.070159>
- Volkmar, F., Siegel, M., Woodbury-Smith, M., King, B., McCracken, J., and State, M. (2014). Practice parameter for the assessment and treatment of children and adolescents with autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 53(2), 237-257. <https://doi.org/10.1016/j.jaac.2013.10.013>
- Warren, Z., McPheeters, M. L., Sathe, N., Foss-Feig, J. H., Glasser, A., and Veenstra-VanderWeele, J. (2011). A systematic review of early intensive intervention for autism spectrum disorders. *Pediatrics*, 127(5), e1303-e1311. <https://doi.org/10.1542/peds.2011-0426>
- Wing, L. (1997). The autistic spectrum. *The Lancet*, 350(9093), 1761-1766. [https://doi.org/10.1016/S0140-6736\(97\)09218-0](https://doi.org/10.1016/S0140-6736(97)09218-0)
- Zwaigenbaum, L., Bauman, M. L., Stone, W. L., Yirmiya, N., Estes, A., Hansen, R. L., McPartland, J. C., Natowicz, M. R., Choueiri, R., Fein, D., Kasari, C., Pierce, K., Buie, T., Carter, A., Davis, P. A., Granpeesheh, D., Mailloux, Z., Newschaffer, C., Robins, D., ... Wetherby, A. (2015). Early identification of autism spectrum disorder: Recommendations for practice and research. *Pediatrics*, 136(Suppl 1), S10–S40. <https://doi.org/10.1542/peds.2014-3667C>