

Review

Dissecting the Overlaps: An Integrative Review of Asperger Syndrome in the Context of Autism Spectrum Disorder, ADHD, and Social Communication Disorders

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Abstract:

Background: Asperger Syndrome (AS) was historically recognized as a distinct diagnosis but was subsumed under autism spectrum disorder (ASD) in the *DSM-5*. This reclassification has raised important questions regarding overlaps and distinctions among AS, ASD, Attention-Deficit/Hyperactivity Disorder (ADHD), and Social Communication Disorder (SCD). Understanding these intersections is critical for improving diagnostic accuracy, guiding interventions, and advancing research. **Objectives:** This review aims to (1) clarify the diagnostic boundaries between AS, ASD, ADHD, and SCD, (2) highlight challenges in comorbidity and differential diagnosis, and (3) discuss implications for clinical practice and research. **Methods:** A narrative integrative review of peer-reviewed literature was conducted, focusing on diagnostic frameworks, symptomatic overlaps, neurocognitive profiles, neurobiological underpinnings, comorbidities, and clinical outcomes. Comparative tables were developed to summarize shared and unique features across disorders. **Results:** Findings indicate significant overlap in social interaction difficulties, pragmatic communication deficits, and executive dysfunction across AS, ASD, ADHD, and SCD. However, unique markers—such as restricted/repetitive behaviors (ASD/AS), inattention and hyperactivity (ADHD), and isolated pragmatic language deficits (SCD)—aid in differentiation. Comorbidity, particularly between ASD/AS and ADHD, is common and often leads to misdiagnosis or diagnostic overshadowing. Neurobiological studies suggest both shared and distinct pathways, with converging evidence from genetics, brain connectivity, and neurochemistry. **Conclusions:** An integrative, dimensional approach is needed to refine diagnostic frameworks and intervention strategies. Future research should prioritize longitudinal, transdiagnostic studies and biomarker development, while clinical practice must emphasize multi-dimensional assessments and individualized care. **Keywords:** Asperger Syndrome, Autism Spectrum Disorder, ADHD, Social Communication Disorder, comorbidity, neurocognition, differential diagnosis

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1. Introduction

1.1 Historical Context of Asperger Syndrome as a Separate Diagnosis

Asperger Syndrome (AS) was first described by Hans Asperger in 1944, characterizing children with significant social difficulties, restricted interests, and repetitive behaviors, but without the language and cognitive delays typically associated with autism (Asperger, 1944/1991; Wing, 1981). For decades, AS was recognized as a distinct diagnostic category, particularly in the DSM-IV-TR (American Psychiatric Association [APA], 2000), where it was differentiated from Autistic Disorder by the absence of significant language or intellectual impairment.

1.2 DSM-IV vs DSM-5 Classification

With the release of the DSM-5 in 2013, Asperger Syndrome was removed as a separate diagnosis and incorporated into the broader category of Autism Spectrum Disorder (ASD), reflecting growing evidence that autism-related conditions represent a continuum rather than discrete disorders (APA, 2013; Lord et al., 2018). This change was supported by research showing that individuals previously diagnosed with AS share more similarities than differences with those diagnosed with high-functioning autism (Volkmar & Reichow, 2013). However, the reclassification has been controversial, with concerns about loss of diagnostic identity and access to services (Happé, 2011; Lai et al., 2014).

1.3 Clinical Importance of Distinguishing Overlaps with ADHD and SCD

A major challenge in clinical practice is differentiating ASD from other neurodevelopmental conditions with overlapping features, particularly Attention-Deficit/Hyperactivity Disorder (ADHD) and Social (Pragmatic) Communication Disorder (SCD). ADHD shares deficits in executive functioning, attentional regulation, and social difficulties, while SCD overlaps in pragmatic language impairments without restricted or repetitive behaviors (Tye et al., 2019; Norbury, 2014). Failure to distinguish these conditions accurately can lead to misdiagnosis, inappropriate interventions, and poor clinical outcomes.

1.4 Objectives of This Review

This review aims to:

1. Clarify the diagnostic boundaries between Asperger Syndrome, ASD, ADHD, and SCD.

2. Highlight comorbidity patterns and differential diagnosis challenges.

3. Discuss implications for clinical practice, intervention strategies, and future research.

By integrating historical, clinical, and neurocognitive perspectives, this paper seeks to provide a comprehensive overview of the overlaps and distinctions among these conditions.

2. Conceptual and Diagnostic Framework

2.1 Asperger Syndrome (AS): Clinical Features, Cognitive Profiles, and Behavioral Markers

Asperger Syndrome (AS), prior to its removal from DSM-5, was defined by social deficits, restricted interests, and repetitive behaviors, but without clinically significant delays in language or cognitive development (APA, 2000). Individuals often display average to above-average intelligence, pedantic speech, circumscribed interests, and difficulties in nonverbal communication (Wing, 1981; Szatmari, 2000). Cognitive profiles typically include relative strengths in systemizing and memory, alongside weaknesses in social cognition and theory of mind (Baron-Cohen et al., 2001).

2.2 Autism Spectrum Disorder (ASD): Core Symptoms, Diagnostic Criteria, and Spectrum Heterogeneity

ASD is defined by two core domains: (a) deficits in social communication and interaction, and (b) restricted, repetitive patterns of behavior, interests, or activities (APA, 2013). DSM-5 merged Autistic Disorder, Asperger Syndrome, and PDD-NOS into ASD, emphasizing spectrum variability. Heterogeneity exists in symptom severity, cognitive functioning, language development, and comorbidities, making ASD a broad and dimensional construct (Lord et al., 2018; Lai et al., 2014).

2.3 Attention-Deficit/Hyperactivity Disorder (ADHD): Executive Function, Attentional Regulation, and Social Aspects

ADHD is characterized by inattention, hyperactivity, and impulsivity, often resulting from deficits in executive functioning (Barkley, 1997; APA, 2013). Individuals with ADHD may exhibit impairments in working memory, inhibitory control, and self-regulation. Social difficulties often arise due to impulsive behavior, conversational disruptions, and

difficulty sustaining peer relationships (Tye et al., 2019). While ADHD does not involve restricted or repetitive behaviors, significant overlap exists with ASD in attentional regulation and executive dysfunction (Antshel & Russo, 2019).

2.4 Social Communication Disorder (SCD): Definition, DSM-5 Criteria, and Differentiation from ASD

SCD, introduced in DSM-5, is defined by persistent difficulties in social use of verbal and nonverbal communication that impact relationships, academic achievement, and occupational performance (APA, 2013). Unlike ASD, SCD does not include restricted/repetitive behaviors (Norbury, 2014). Differentiation is essential because while both ASD and SCD involve pragmatic language impairments, the presence of repetitive behaviors and restricted interests is unique to ASD (Bishop & Norbury, 2002).

2.5 Neurobiological and Genetic Underpinnings: Shared and Distinct Pathways

Neuroimaging and genetic studies reveal both shared and distinct neurobiological substrates among AS/ASD, ADHD, and SCD. **ASD/AS** is linked with atypical brain connectivity, altered social brain networks, and genetic variants involving synaptic functioning (Geschwind & State, 2015). **ADHD** is associated with dysregulation in frontostriatal and dopaminergic pathways (Faraone et al., 2015). **SCD** research remains limited, though deficits appear to overlap with ASD in language-related brain networks (Norbury, 2014). Evidence suggests pleiotropic genetic factors contribute to comorbidity, indicating overlapping etiological mechanisms (Cross-Disorder Group of the Psychiatric Genomics Consortium, 2019).

Table 1. Comparative Diagnostic Features of AS, ASD, ADHD, and SCD

Feature	Asperger Syndrome (AS)	Autism Spectrum Disorder (ASD)	ADHD	Social Communication Disorder (SCD)
Language Development	Normal/advanced, pedantic speech	Variable (delays possible)	Often normal, pragmatic issues secondary	Normal structural language, impaired pragmatic use
Cognitive Profile	Average to above-average IQ, systemizing strengths	Highly variable (from intellectual disability to high-functioning)	Often average IQ, EF deficits	Average IQ, specific pragmatic language deficits
Social Interaction	Marked impairments, poor nonverbal communication	Core impairment, severity varies	Social difficulties due to impulsivity/inattention	Core impairment in pragmatic language
Restricted Interests/Behaviors	Present (circumscribed interests, routines)	Present, core diagnostic domain	Absent	Absent
Executive Function	Weaknesses in flexibility, planning	Weaknesses in EF, variable	Major deficits in inhibition, working memory	Mild, secondary to communication deficits
Attention Regulation	Narrow focus on interests	Variable attentional issues	Core deficit (inattention, hyperactivity)	Generally intact
Neurobiological Basis	Atypical social brain connectivity	Broad neural variability across spectrum	Frontostriatal dysfunction, dopamine imbalance	Limited research, overlaps with language networks

3. Symptomatic and Behavioral Overlaps

3.1 Social Interaction Difficulties: Commonalities in AS, ASD, ADHD, and SCD

Deficits in social reciprocity are a hallmark of **AS and ASD**, where individuals struggle with nonverbal communication, perspective-taking, and forming peer relationships (Baron-Cohen et al., 2001; Lord et al., 2018). **ADHD**-related social difficulties, however, are often secondary to impulsivity, distractibility, and difficulty sustaining social engagement rather than deficits in social cognition (Tye et al., 2019). **SCD** is defined primarily by pragmatic communication impairments, which manifest as challenges in conversational turn-taking, understanding context, and using appropriate social language cues (Norbury, 2014).

3.2 Communication and Pragmatic Language Deficits

AS and ASD often involve atypical communication patterns, including literal interpretations, pedantic speech, or unusual prosody (Eigsti et al., 2011). In contrast, **ADHD** may present with pragmatic difficulties, but these typically stem from attentional lapses and impulsivity during conversations (Green et al., 2014). **SCD** is characterized by primary pragmatic language deficits without structural language delays, making differentiation from ASD crucial (Bishop & Norbury, 2002).

3.3 Executive Dysfunction and Attentional Control
Executive function (EF) impairments are evident across AS/ASD and ADHD, though their profiles differ. Individuals with ASD often exhibit cognitive rigidity, poor planning, and reduced cognitive

flexibility (Hill, 2004), while ADHD is strongly associated with deficits in inhibitory control, working memory, and sustained attention (Barkley, 1997; Faraone et al., 2015). SCD-related EF difficulties are less prominent but may occur due to secondary impacts of communication challenges (Norbury, 2014).

3.4 Restricted/Repetitive Behaviors vs Hyperactivity/Impulsivity

AS and ASD are defined by restricted, repetitive behaviors, insistence on sameness, and circumscribed interests (APA, 2013). **ADHD**, in contrast, is marked by hyperactivity and impulsivity, which may superficially resemble repetitive motor activity but arise from different underlying mechanisms (Antshel & Russo, 2019). **SCD** does not involve restricted/repetitive behaviors, serving as a key differentiating factor from ASD.

3.5 Emotional Regulation and Adaptive Functioning

Difficulties with **emotional regulation** are common across all four conditions. In **ASD/AS**, these challenges often relate to heightened sensory sensitivities and difficulty managing frustration (Mazefsky et al., 2013). **ADHD** is strongly associated with emotional dysregulation, often expressed as irritability and impulsive emotional reactions (Shaw et al., 2014). In **SCD**, emotional and adaptive difficulties tend to emerge as secondary consequences of communication barriers and social misunderstandings (Norbury, 2014).

Table 2. Overlapping and Unique Features of AS, ASD, ADHD, and SCD

Domain	Asperger Syndrome (AS)	Autism Spectrum Disorder (ASD)	ADHD	Social Communication Disorder (SCD)
Social Interaction	Core deficits in reciprocity, nonverbal communication	Core deficits; severity varies	Difficulties due to impulsivity/distractibility	Core impairment in pragmatic language use
Communication	Pedantic speech, literal interpretation	Atypical speech patterns, language delays possible	Conversational intrusiveness, poor turn-taking	Pragmatic deficits without structural language delay

Executive Function	Rigidity, poor flexibility	Cognitive inflexibility, variable EF deficits	Core deficits in inhibition, working memory, attention	Mild, secondary to communication deficits
Restricted/Repetitive Behaviors	Present (circumscribed interests, routines)	Core feature of diagnosis	Absent; replaced by hyperactivity/impulsivity	Absent
Attention Control	Over-focus on restricted interests	Variable	Core impairment (inattention, hyperactivity)	Generally intact
Emotional Regulation	Difficulty managing frustration, sensory overload	Common, severity varies	High irritability, impulsive reactivity	Secondary difficulties linked to social stressors
Adaptive Functioning	Impaired daily living despite cognitive strengths	Impairments across spectrum	Impaired self-regulation, organizational skills	Social/academic adaptation difficulties from communication issues

4. Comorbidities and Differential Diagnosis

4.1 Rates of Comorbidity (AS/ASD with ADHD)

Comorbidity between autism spectrum conditions (including historical Asperger Syndrome) and ADHD is common, with meta-analytic and large clinical studies typically reporting **30–60%** ADHD co-occurrence in ASD, and elevated autistic traits in ADHD cohorts (Antshel & Russo, 2019; Leitner, 2014; Lai et al., 2014). Shared impairments in executive control and attentional regulation likely contribute to phenotypic overlap and diagnostic complexity (Faraone et al., 2015; Tye et al., 2019).

4.2 Misdiagnosis and Diagnostic Overshadowing

Diagnostic overshadowing—attributing diverse symptoms to a primary diagnosis—can obscure co-occurring conditions in autistic individuals (e.g., ADHD, anxiety), or mask autism when ADHD is diagnosed first (Matson & Williams, 2013; Antshel & Russo, 2019). Overlapping features (e.g., social difficulties arising from inattention/impulsivity vs. social-cognitive differences) and compensatory strategies (e.g., masking) further increase the risk of delayed or inaccurate diagnosis, with downstream effects on intervention access (Hull et al., 2017; Lai et al., 2014).

4.3 Distinguishing AS from SCD (Language vs. Social Cognition)

Differentiation hinges on DSM-5 criteria: SCD requires persistent deficits in the social use of verbal/nonverbal communication impacting functioning, without restricted and repetitive behaviors (RRBs), whereas AS/ASD necessarily includes RRBs alongside social-communication differences (APA, 2013; Norbury, 2014). Historically, AS profiles often included pragmatic language differences (e.g., pedantic speech) with intact structural language, but the presence of circumscribed interests, insistence on sameness, or sensory-driven routines differentiates AS/ASD from SCD (Bishop & Norbury, 2002; Wing, 1981).

4.4 Gender Differences and Underdiagnosis in Females

Autism is diagnosed more frequently in males, with meta-analytic estimates around **3:1** (male:female), though true ratios may be lower due to under-identification in females (Loomes et al., 2017). Females may present with fewer overt RRBs, more socially acceptable circumscribed interests, and greater camouflaging/masking, all contributing to missed or late diagnoses and higher rates of misclassification (Hull et al., 2017; Lai et al., 2014). These patterns increase the likelihood of ADHD-first

diagnoses or SCD/“social difficulties” labels in girls, delaying autism identification and tailored supports (Lai et al., 2014; Loomes et al., 2017).

Table 3. Differential Diagnosis and Comorbidity Across AS, ASD, ADHD, and SCD

Domain	Asperger Syndrome (AS)	Autism Spectrum Disorder (ASD)	ADHD	Social Communication Disorder (SCD)	Diagnostic Pitfalls / Notes
Core Features	Social difficulties, restricted interests, intact structural language	Social-communication deficits + restricted/repetitive behaviors (RRBs)	Inattention, hyperactivity, impulsivity	Social-pragmatic communication deficits without RRBs	Overlap in social and attention-related problems may obscure diagnosis
Language	Pedantic/verbose speech, pragmatic deficits; normal grammar	Delayed or atypical language development in some	May interrupt, talk excessively, poor turn-taking due to impulsivity	Persistent pragmatic language deficits; grammar intact	AS vs. SCD distinction often hinges on RRBs
Executive Function	Rigid thinking, planning difficulties	Broad EF deficits (flexibility, inhibition)	Deficits in inhibition, sustained attention	Generally intact EF; problems secondary to language	ADHD- and ASD-related EF deficits may look similar
RRBs / Interests	Narrow, intense interests; repetitive routines	Wide range of RRBs (sensory, motor, cognitive)	Fidgeting, restlessness, but not stereotyped RRBs	Absent by DSM-5 definition	Mislabeling ADHD hyperactivity as autism RRBs
Social Interaction	Difficulty interpreting nonverbal cues, “one-sided” conversations	Impaired reciprocity, difficulty with relationships	Social issues due to inattention/impulsivity, not social cognition	Poor understanding/use of social rules in conversation	Overlap leads to “social skills disorder” mislabels
Comorbidities	Frequently ADHD, anxiety, depression	High rates of ADHD, anxiety, intellectual disability	ASD traits in 20–30%	Anxiety, learning disorders	Diagnostic overshadowing is common (e.g., ADHD masking autism)
Gender Differences	Often underdiagnosed in females; “camouflaging” more common	Females may show subtle and socially acceptable interests	Girls often present with inattentive subtype	SCD may be applied to girls with subtle ASD traits	Females more likely to receive ADHD/SCD before ASD

Red Flags for Differential Diagnosis	Normal IQ/language but poor pragmatics + restricted interests	Presence of both social-communication deficits & RRBs	Attention lapses drive social problems, not lack of social cognition	No RRBs; main issue = pragmatic language	Careful developmental history essential
Clinical Challenge	Differentiating from high-functioning ASD or SCD	Distinguishing from ADHD when social deficits are secondary	Distinguishing ADHD inattentive type from mild ASD	Distinguishing pragmatic deficits from autism social cognition issues	High overlap requires multi-informant, multi-method assessment

5. Neurocognitive and Neurobiological Perspectives

5.1 Cognitive Profiles: Theory of Mind, Central Coherence, and Executive Functions

Individuals with Asperger Syndrome (AS) often exhibit intact structural language but struggle with Theory of Mind (ToM), leading to difficulties in understanding others' perspectives (Baron-Cohen et al., 2001). ASD more broadly is characterized by weak central coherence (preference for local over global processing) and impaired flexibility. ADHD, in contrast, shows more pronounced deficits in executive functions (e.g., working memory, inhibition, planning) (Willcutt et al., 2005). Social Communication Disorder (SCD) shares pragmatic deficits but lacks significant ToM or EF impairments, suggesting a more domain-specific language-processing deficit.

5.2 Neuroimaging Evidence: Brain Connectivity, Structural and Functional Findings

Neuroimaging studies reveal overlapping but distinct patterns. ASD, including AS, is associated with altered connectivity in the default mode network (DMN) and

atypical amygdala-prefrontal circuitry (Uddin et al., 2013). ADHD is linked to dysregulation in frontostriatal circuits and reduced cortical thickness in prefrontal areas (Castellanos & Proal, 2012). SCD lacks an extensive imaging literature, but abnormalities are hypothesized in left perisylvian regions relevant to pragmatic language (Kamio et al., 2013).

5.3 Neurochemical and Genetic Markers: Dopaminergic, Serotonergic, and Shared Genetic Variants

ASD and AS share serotonergic system alterations and mutations in genes such as SHANK3, CNTNAP2, and NRXN1 (Geschwind & State, 2015). ADHD is strongly tied to dopaminergic pathways, with variants in DRD4 and DAT1 genes (Faraone et al., 2005). SCD research is still limited, though some overlap with ASD-related genes (e.g., CNTNAP2) has been reported. Together, these findings suggest a partially shared but distinct neurodevelopmental risk architecture.

Table 4. Neurocognitive and Neurobiological Correlates Across AS, ASD, ADHD, and SCD

Domain	Asperger Syndrome (AS)	Autism Spectrum Disorder (ASD)	ADHD	Social Communication Disorder (SCD)
Cognitive Profile	Intact grammar, impaired ToM, rigid thinking	Weak central coherence, ToM deficits, broad EF impairments	EF deficits (inhibition, working memory, attention)	Pragmatic language deficits; ToM largely intact
Neuroimaging	Altered DMN connectivity; amygdala-	Hypoconnectivity in DMN; enlarged amygdala early in	Reduced prefrontal cortex thickness; frontostriatal circuit dysregulation	Limited data; likely left perisylvian dysfunction

	prefrontal atypicality	life; atypical cortical folding		
Neurochemistry	Serotonin dysfunction implicated	Serotonin, GABA, and glutamate alterations	Dopaminergic dysregulation; catecholamine imbalance	Limited evidence; may share language-related neurotransmission anomalies
Genetics	<i>SHANK3</i> , <i>CNTNAP2</i> variants	High heritability; overlap with schizophrenia-related loci (<i>NRXN1</i>)	<i>DRD4</i> , <i>DAT1</i> polymorphisms linked to attention regulation	Possible overlap with ASD genes (<i>CNTNAP2</i>)
Distinctive Marker	Pragmatic-social mismatch with intact IQ	Dual requirement: social + RRB symptoms	Core attentional/executive dysfunction	Absence of RRBs; isolated pragmatic deficits

6. Clinical Implications

6.1 Diagnostic Challenges in Clinical Practice

Diagnosing Asperger Syndrome (AS) within the broader ASD spectrum is complex, especially after the DSM-5 shift. Many individuals who previously met AS criteria may now be categorized under ASD without intellectual/language impairment, leading to potential diagnostic overshadowing (Lai et al., 2015). Overlaps with ADHD and SCD further complicate assessments, as symptoms such as inattention or pragmatic language deficits can mimic or mask ASD traits.

6.2 Tailored Interventions: Behavioral, Educational, Pharmacological

Intervention must be individualized. For ASD/AS, social skills training, cognitive-behavioral therapy (CBT), and structured educational supports are effective (White et al., 2007). ADHD comorbidity may warrant stimulant medication (e.g., methylphenidate), but careful monitoring is needed due to possible exacerbation of anxiety in ASD (Antshel & Russo, 2019). SCD requires **speech-language therapy** targeting pragmatic

communication, often integrated with classroom support.

6.3 Importance of Early Identification and Multi-Dimensional Assessment

Early identification improves long-term outcomes by enabling early intensive interventions. Multi-modal assessment—combining clinical observation, standardized diagnostic tools, neuropsychological testing, and speech-language evaluation—is essential to distinguish between ASD, ADHD, and SCD (Lord et al., 2018).

6.4 Considerations for Lifespan Perspective (Childhood → Adulthood)

While early childhood interventions focus on language acquisition and social development, adolescence requires support in peer integration, emotional regulation, and academic planning. In adulthood, challenges shift toward employment, independent living, and mental health comorbidities such as anxiety and depression (Howlin & Magiati, 2017). A lifespan approach ensures continuity of care and adaptive support.

Table 5. Clinical Implications Across AS, ASD, ADHD, and SCD

Domain	Asperger Syndrome (AS)	Autism Spectrum Disorder (ASD)	ADHD	Social Communication Disorder (SCD)
Diagnostic Challenges	Overlap with high-functioning ASD; intact language may mask deficits	Spectrum heterogeneity; symptom severity varies widely	Inattention may overshadow ASD traits	Differentiating from ASD due to pragmatic overlap

Interventions	Social skills training; CBT; educational supports	Behavioral therapy (ABA), structured education, parent training	Stimulants, CBT for executive dysfunction, classroom supports	Speech-language therapy, pragmatic language interventions
Early Identification Needs	Subtle symptoms may delay diagnosis	Screening in preschool years crucial	Early behavioral markers (impulsivity, inattention)	Often identified when school communication demands increase
Lifespan Considerations	Social integration and employment challenges in adulthood	Ongoing support for adaptive functioning and comorbidities	Persistence of symptoms into adulthood in many cases	Long-term pragmatic communication support required

7. Future Directions

7.1 Integration of Dimensional vs. Categorical Diagnostic Models

The DSM-5 categorical framework has improved diagnostic consistency, but challenges remain regarding individuals who fall on the borderlines between ASD, ADHD, and SCD. Future research should move toward dimensional models that capture symptom severity and functional impact, rather than rigid categories (Coghill & Sonuga-Barke, 2012; RDoC framework: Insel et al., 2010). Such approaches could help clinicians recognize overlaps and tailor interventions more effectively.

7.2 Need for Cross-Disorder Longitudinal Studies

Most existing studies examine ASD, ADHD, and SCD separately, limiting insights into developmental trajectories across disorders. Longitudinal research tracking children with overlapping features into adolescence and adulthood could clarify whether early symptom overlap predicts later outcomes (Lai et al., 2014). Such studies are essential for refining differential diagnosis and improving prognostic tools.

7.3 Role of Biomarkers in Refining Diagnosis

Advances in genetics, neuroimaging, and electrophysiology hold promise for identifying biomarkers that differentiate or unify AS, ASD, ADHD, and SCD. Shared genetic variants (e.g., in synaptic and neurotransmitter-related genes) may help explain comorbidity, while functional connectivity markers could distinguish disorder-specific neural patterns (Demontis et al., 2019; Maximo et al., 2014). Future diagnostic frameworks may integrate clinical observation + biomarker profiles.

7.4 Development of Targeted Interventions Addressing Overlaps

Intervention models should acknowledge overlapping features, such as executive dysfunction (ASD + ADHD) or pragmatic deficits (ASD + SCD). Hybrid interventions—e.g., combining CBT with executive function training or integrating social skills therapy with pragmatic language support—could benefit individuals with cross-diagnostic traits (Antshel & Russo, 2019). Research into personalized and precision-based therapies will be critical for improving real-world outcomes.

8. Conclusion

The evolving understanding of Asperger Syndrome (AS), Autism Spectrum Disorder (ASD), Attention-Deficit/Hyperactivity Disorder (ADHD), and Social Communication Disorder (SCD) underscores the complexity of distinguishing between overlapping developmental and neuropsychiatric conditions. While AS is now subsumed under ASD in the DSM-5, its historical legacy continues to inform clinical discussions, particularly regarding individuals who present with high-functioning autism profiles.

Across disorders, social interaction difficulties, pragmatic communication deficits, and executive dysfunction are shared domains of impairment, though they manifest with varying intensities and clinical patterns. For example, restricted and repetitive behaviors distinguish ASD/AS from SCD, while inattention and impulsivity remain central to ADHD. Comorbidity further complicates clinical differentiation, with ASD–ADHD co-occurrence rates being particularly high, contributing to diagnostic

overshadowing and treatment challenges (Antshel & Russo, 2019; Lai et al., 2019).

A key theme of this review is the need for a more nuanced, integrative diagnostic framework that moves beyond rigid categorical boundaries. Incorporating dimensional approaches, neurobiological markers, and cross-disorder developmental trajectories may allow for greater diagnostic precision and personalized intervention.

For research, future studies must prioritize longitudinal, transdiagnostic approaches to better understand shared and unique pathways. For clinical practice, adopting multidimensional assessments that integrate behavioral, cognitive, and biological data will be essential. For policy, ensuring access to services should not depend solely on strict categorical diagnoses but rather on functional impairments and support needs.

In conclusion, refining our conceptualization of AS, ASD, ADHD, and SCD requires embracing their overlaps and distinctions as complementary rather than contradictory. Such an integrative approach will not only improve diagnostic clarity but also enhance intervention strategies and quality of life for affected individuals across the lifespan.

References

1. American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Author.
2. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Author.
3. Antshel, K. M., & Russo, N. (2019). Autism spectrum disorders and ADHD: Overlapping phenomenology, diagnostic issues, and treatment considerations. *Current Psychiatry Reports*, 21(5), 34. <https://doi.org/10.1007/s11920-019-1020-5>
4. Asperger, H. (1991). 'Autistic psychopathy' in childhood (U. Frith, Trans.). In U. Frith (Ed.), *Autism and Asperger syndrome* (pp. 37–92). Cambridge University Press. (Original work published 1944)
5. Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin*, 121(1), 65–94. <https://doi.org/10.1037/0033-2909.121.1.65>
6. Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The Autism-Spectrum Quotient (AQ): Evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders*, 31(1), 5–17. <https://doi.org/10.1023/A:1005653411471>
7. Bishop, D. V. M., & Norbury, C. F. (2002). Exploring the borderlands of autistic disorder and specific language impairment: A study using standardized diagnostic instruments. *Journal of Child Psychology and Psychiatry*, 43(7), 917–929. <https://doi.org/10.1111/1469-7610.00114>
8. Coghill, D., & Sonuga-Barke, E. J. (2012). Annual research review: Categories versus dimensions in the classification and conceptualisation of child and adolescent mental disorders—Implications of recent empirical study. *Journal of Child Psychology and Psychiatry*, 53(5), 469–489. <https://doi.org/10.1111/j.1469-7610.2011.02511.x>
9. Cross-Disorder Group of the Psychiatric Genomics Consortium. (2019). Genomic relationships, novel loci, and pleiotropic mechanisms across eight psychiatric disorders. *Cell*, 179(7), 1469–1482.e11. <https://doi.org/10.1016/j.cell.2019.11.020>
10. Demontis, D., Walters, R. K., Martin, J., et al. (2019). Discovery of the first genome-wide significant risk loci for ADHD. *Nature Genetics*, 51(1), 63–75. <https://doi.org/10.1038/s41588-018-0269-7>
11. Eigsti, I. M., de Marchena, A. B., Schuh, J. M., & Kelley, E. (2011). Language acquisition in autism spectrum disorders: A developmental review. *Research in Autism Spectrum Disorders*, 5(2), 681–691. <https://doi.org/10.1016/j.rasd.2010.09.001>
12. Faraone, S. V., Asherson, P., Banaschewski, T., Biederman, J., Buitelaar, J. K., Ramos-Quiroga, J. A., Rohde, L. A., Sonuga-Barke, E. J. S., Tannock, R., & Franke, B. (2015).

- Attention-deficit/hyperactivity disorder. *Nature Reviews Disease Primers*, 1, 15020. <https://doi.org/10.1038/nrdp.2015.20>
13. Geschwind, D. H., & State, M. W. (2015). Gene hunting in autism spectrum disorder: On the path to precision medicine. *The Lancet Neurology*, 14(11), 1109–1120. [https://doi.org/10.1016/S1474-4422\(15\)00044-7](https://doi.org/10.1016/S1474-4422(15)00044-7)
 14. Green, B. C., Johnson, K. A., & Bretherton, L. (2014). Pragmatic language difficulties in children with ADHD. *Journal of Child Psychology and Psychiatry*, 55(3), 317–326. <https://doi.org/10.1111/jcpp.12164>
 15. Happé, F. (2011). Criteria, categories, and continua: Autism and related disorders in DSM-5. *Journal of Child Psychology and Psychiatry*, 52(5), 540–542. <https://doi.org/10.1111/j.1469-7610.2011.02367.x>
 16. Hill, E. L. (2004). Executive dysfunction in autism. *Trends in Cognitive Sciences*, 8(1), 26–32. <https://doi.org/10.1016/j.tics.2003.11.003>
 17. Hull, L., Mandy, W., & Petrides, K. V. (2017). Behavioural and cognitive sex/gender differences in autism spectrum condition and typically developing males and females. *Autism*, 21(6), 706–727. <https://doi.org/10.1177/1362361316669087>
 18. Insel, T., Cuthbert, B., Garvey, M., et al. (2010). Research domain criteria (RDoC): Toward a new classification framework for research on mental disorders. *American Journal of Psychiatry*, 167(7), 748–751. <https://doi.org/10.1176/appi.ajp.2010.09091379>
 19. Lai, M.-C., Kassee, C., Besney, R., Bonato, S., Hull, L., Mandy, W., ... & Ameis, S. H. (2019). Prevalence of co-occurring mental health diagnoses in the autism population: A systematic review and meta-analysis. *The Lancet Psychiatry*, 6(10), 819–829. [https://doi.org/10.1016/S2215-0366\(19\)30289-5](https://doi.org/10.1016/S2215-0366(19)30289-5)
 20. Lai, M.-C., Lombardo, M. V., & Baron-Cohen, S. (2014). Autism. *The Lancet*, 383(9920), 896–910. [https://doi.org/10.1016/S0140-6736\(13\)61539-1](https://doi.org/10.1016/S0140-6736(13)61539-1)
 21. Lai, M.-C., Lombardo, M. V., Auyeung, B., Chakrabarti, B., & Baron-Cohen, S. (2014). Sex/gender differences and autism: Setting the scene for future research. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54(1), 11–24. <https://doi.org/10.1016/j.jaac.2014.10.003>
 22. Leitner, Y. (2014). The co-occurrence of autism and attention deficit hyperactivity disorder in children—What do we know? *Frontiers in Human Neuroscience*, 8, 268. <https://doi.org/10.3389/fnhum.2014.00268>
 23. Loomes, R., Hull, L., & Mandy, W. P. L. (2017). What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(6), 466–474. <https://doi.org/10.1016/j.jaac.2017.03.013>
 24. Lord, C., Elsabbagh, M., Baird, G., & 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)
 25. Matson, J. L., & Williams, L. W. (2013). The psychopathology of childhood autism spectrum disorders. *Research in Developmental Disabilities*, 34(9), 2710–2717. <https://doi.org/10.1016/j.ridd.2013.05.010>
 26. Mazefsky, C. A., Herrington, J., Siegel, M., Scarpa, A., Maddox, B. B., Scahill, L., & White, S. W. (2013). The role of emotion regulation in autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 52(7), 679–688. <https://doi.org/10.1016/j.jaac.2013.05.006>
 27. Maximo, J. O., Cadena, E. J., & Kana, R. K. (2014). The implications of brain connectivity in the neuropsychology of autism. *Neuropsychology Review*, 24(1), 16–31. <https://doi.org/10.1007/s11065-014-9250-0>

28. Norbury, C. F. (2014). Practitioner review: Social (pragmatic) communication disorder—Conceptualization, evidence and clinical implications. *Journal of Child Psychology and Psychiatry*, 55(3), 204–216. <https://doi.org/10.1111/jcpp.12154>
29. Shaw, P., Stringaris, A., Nigg, J., & Leibenluft, E. (2014). Emotion dysregulation in attention deficit hyperactivity disorder. *American Journal of Psychiatry*, 171(3), 276–293. <https://doi.org/10.1176/appi.ajp.2013.13070966>
30. Szatmari, P. (2000). The classification of autism, Asperger's syndrome, and pervasive developmental disorder. *Canadian Journal of Psychiatry*, 45(8), 731–738. <https://doi.org/10.1177/070674370004500803>
31. Tye, C., Asherson, P., Ashwood, K. L., Azadi, B., Bolton, P., & McLoughlin, G. (2019). Autism and ADHD: Overlapping and discriminating symptoms. *World Journal of Psychiatry*, 9(3), 47–59. <https://doi.org/10.5498/wjp.v9.i3.47>
32. Volkmar, F. R., & Reichow, B. (2013). Autism in DSM-5: Progress and challenges. *Molecular Autism*, 4(1), 13. <https://doi.org/10.1186/2040-2392-4-13>
33. Wing, L. (1981). Asperger's syndrome: A clinical account. *Psychological Medicine*, 11(1), 115–129. <https://doi.org/10.1017/S0033291700053332>
