

Differential diagnosis of autism spectrum disorder, intellectual disability and attention-deficit hyperactivity disorder (ADHD)

Michelle Heyman, Megan Ledoux Galligan, Giselle Berenice Salinas, Elizabeth Baker, Jan Blacher and Katherine Stavropoulos

Abstract

Purpose – Professionals working with community populations are often presented with complicated cases where it is difficult to determine which diagnosis or diagnoses are appropriate. Differentiating among neurodevelopmental disorders such as autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder and intellectual disability can be a complex process, especially, as these disorders have some overlapping symptoms and often co-occur in young children. This series of case studies aims to present commonly overlapping symptoms in children who present to clinics with developmental concerns.

Design/methodology/approach – This paper presents three case studies that were completed at a free community ASD screening clinic in Southern California.

Findings – The case studies have common presenting behaviors and symptoms (e.g. social communication difficulties) that often co-occur across diagnoses; explanations for the final diagnoses are given in each case.

Research limitations/implications – Conclusions from these three cases cannot generalize to all children being seen in clinics for neurodevelopmental concerns.

Practical implications – This series of case studies highlights commonly overlapping symptoms in children who present for differential diagnosis with social and/or behavioral concerns. Implications for educational placement and intervention are discussed.

Social implications – These cases highlight the challenges involved in the differential and dual diagnostic process for young children with developmental concerns. Diagnostic considerations can affect later educational placement and opportunities for socialization.

Originality/value – This series of case studies provide practical information for clinicians about how to effectively differentiate between commonly occurring neurodevelopmental disorders, particularly given recent changes to the Diagnostic and Statistical Manual, 5th edition (DSM-5).

Keywords Intellectual disability, Comorbidity, Autism spectrum disorder, Differential diagnosis, Attention-deficit/hyperactivity disorder

Paper type Case study

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Introduction

Autism spectrum disorder (ASD) has increased in prevalence over the past three decades, with current prevalence estimates of 1 in 54 (Maenner *et al.*, 2020). ASD is a neurodevelopmental disorder with two core symptoms:

1. social communication deficits and
2. restricted, repetitive behaviors and/or interests ([American Psychiatric Association \[APA\], 2013](#)).

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However, the diagnosis of ASD is made more complicated by the heterogeneity of symptom presentation and the presence of co-occurring behavioral challenges (e.g. overactivity, aggression, language delays; [Baker and Blacher, 2019](#); [Eisenhower et al., 2007](#); [Totsika et al., 2011](#)). For example, many children with ASD also display symptoms similar to those observed in children with other neurodevelopmental disorders (e.g. attention-deficit hyperactivity disorder [ADHD] and intellectual disability [ID]).

The differential diagnosis of ASD has historically been difficult, with clinicians and researchers struggling to understand characteristics that are unique to ASD compared to other neurodevelopmental disorders. The *diagnostic statistical manual of mental disorders, fifth edition* (DSM-5; [APA, 2013](#)) provides clinicians with a framework to better understand the symptomatology of ASD and how to differentiate between various neurodevelopmental disorders. The most recent edition of the DSM (i.e. DSM-5) provided the umbrella term “autism spectrum disorder” (ASD), whereas DSM-IV and DSM-IV-TR had multiple diagnoses under this umbrella ([American Psychiatric Association, 2000](#)). Specifically, DSM-IV included diagnoses of autistic disorder, Asperger’s disorder and pervasive developmental disorder not otherwise specified (PDD-NOS). The 2013 conceptualization of ASD as a single umbrella diagnosis with varying levels of severity and the corresponding terminology helps to ensure that all individuals on the autism spectrum have an appropriate diagnosis and consequently receive adequate services ([APA, 2013](#); [Mahjouri and Lord, 2012](#)).

Additionally, the symptomatology of ASD often overlaps with other neurodevelopmental disorders, leading to diagnostic difficulties (e.g. differential diagnosis, co-occurring diagnoses). Diagnostic screeners are not well equipped to distinguish between neurodevelopmental disorders. For example, screeners report heightened levels of inattention and hyperactivity/impulsivity behaviors for those diagnosed with ASD, ID and/or ADHD ([McClain et al., 2017](#); [Rommelse et al., 2018](#)). This finding emphasizes the need for trained professionals to conduct a comprehensive assessment(s), thus providing an accurate diagnosis. The differential diagnosis of ASD and other developmental disorders is made complex by two diagnostic phenomena: diagnostic overshadowing and diagnostic substitution. Diagnostic overshadowing refers to the inaccurate attribution of behavior problems (i.e. symptoms) to one diagnosis (e.g. ADHD and ID), rather than evaluating the individual for a separate co-occurring psychiatric or mental health disorder (e.g. ASD; [Reiss and Szyszko, 1983](#)). This can lead to ASD being overlooked in individuals with other developmental disabilities or disorders. The opposite problem, diagnostic substitution, refers to providing the diagnosis of ASD rather than another developmental disability that bears appropriate symptoms (e.g. ADHD and ID; [King and Bearman, 2009](#); [Shattuck, 2006](#); [Weintraub, 2011](#)).

Autism spectrum disorder and attention-deficit/hyperactivity disorder

Previous versions of the DSM did not allow for the dual diagnosis of ASD and ADHD and noted that individuals with ASD commonly presented with symptoms of overactivity and inattention. However, the DSM-5 removed this restriction, thus allowing clinicians to recognize the overlapping and discrete symptom presentations of ASD and ADHD ([APA, 2013](#); [Grzadzinski et al., 2016](#)). The ability to correctly diagnose both ASD and ADHD is important, as previous studies have demonstrated that approximately 30–75% of children with ASD present with symptoms of ADHD and approximately 20–60% of children with ADHD have social difficulties that resemble ASD ([Antshel and Russo, 2019](#); [Grzadzinski et al., 2016](#); [Stevens et al., 2016](#)). Additionally, there is considerable diagnostic overlap between these disorders, with a substantial portion of children with ASD being diagnosed with ADHD (22–83%; [Matson et al., 2013](#); [Sokolova et al., 2017](#)) and 30–65% of children with ADHD meeting criteria for a diagnosis of ASD ([Ronald et al., 2008](#); [Sokolova et al., 2017](#)).

Many children with ADHD have difficulty with maintaining social interactions, making and keeping friends and using appropriate behavior in social situations. These social challenges often lead to a referral for an ASD assessment. However, it is important to understand the clinical differences between these disorders. Notably, children with ASD often lack *understanding* of social cues and may not know *how* to engage in socially appropriate behaviors, whereas individuals with ADHD may have trouble *using* appropriate social behavior – despite knowing how to act appropriately – due to lack of self-control or impulsivity issues (e.g. interrupting others). Individuals diagnosed with ADHD often display negative behaviors (e.g. interrupting) that hinder their social abilities (Clark and Belanger, 2018); whereas those diagnosed with ASD often lack positive behaviors such as limited eye contact, which impairs their social skills (Antshel and Russo, 2019; APA, 2013). Other overlapping symptoms are harder to differentiate such as responses to sensory stimuli, though still an emerging area of research. Previous literature suggested children with ADHD have more sensory problems compared to their neurotypical peers (Ghanizadeh, 2011). In such cases, it is crucial to train clinicians how to conceptualize the overall diagnostic presentation of each disorder to make an accurate diagnosis (e.g. ASD, ADHD and ASD + ADHD) so that children receive appropriate treatment.

Autism spectrum disorder and intellectual disability

In addition to ADHD, ASD often co-occurs with ID or if the child is younger than age five, global developmental delay (GDD). Research has explored this diagnostic overlap, the finding indicates that, conservatively, approximately 12 to 33% of individuals with ASD also have ID (Maenner *et al.*, 2020; Stevens *et al.*, 2016) and approximately 25% of individuals with ID also have ASD (Sappok *et al.*, 2013). The symptomatology of ASD and ID have similarities, contributing to the confusion in the diagnostic process. For example, both ID and ASD can be characterized by difficulties in social interaction and communication, in addition to stereotyped and repetitive behaviors and impaired motor movements (APA, 2013; Noterdaeme and Euders, 2009; Thurm *et al.*, 2019). Children with ID, as well as children with ASD often have difficulty interpreting and understanding social cues, leading to social, as well as communication difficulties (e.g. challenges with receptive and/or expressive communication). However, these challenges present differently in the two conditions. If an individual's social communication skills correspond to current cognitive and/or adaptive abilities but are delayed compared to chronological age, a diagnosis of ID is more likely than ASD. In contrast, an individual with ASD typically demonstrates social communication abilities that are below the level expected based on cognitive functioning (APA, 2013).

Overall, if a child is demonstrating delayed social communication, but social-communicative skills are commensurate with cognitive abilities, we can infer that ID is more likely than ASD. If, however, a child's cognitive and adaptive skills are significantly delayed (e.g. cognitive scores of 70 or below along with adaptive skills deficits) *and* social communication is a notable weakness when compared to approximate mental age, a dual diagnosis of ASD and ID may be appropriate. Due to the high rate of co-occurrence between ASD and ID, it is important to ensure that cognitive development is assessed to determine an appropriate diagnosis (e.g. ASD, ID and ASD + ID) and subsequent appropriate educational services (Baker and Blacher, 2021). However, this may be difficult for those with profound ID, as the majority of ASD diagnostic measures were not designed or normed for those with such impaired cognitive functioning. In addition, the DSM-5 does not define low cognitive functioning as an exclusionary for ASD. This sometimes makes it difficult to differentiate the two diagnoses (i.e. ID and ASD) and when it is appropriate to provide a dual-diagnosis (APA, 2013; Thurm *et al.*, 2019).

The diagnostic assessment of ASD has historically been complicated by the heterogeneity of symptom presentation, as well as the presence of co-occurring behavior problems and/

or mental disorders. The convergence of symptoms across disorders has resulted in ASD often being confused with ADHD and ID. While the presentations of these disorders are similar, the treatment for each is different. Accurate diagnosis of neurodevelopmental disorders is crucial, as it allows individuals to seek appropriate services, most crucially, early intervention (Boyd *et al.*, 2010) and subsequent educational placement. The current paper presents three case studies in which the diagnostic evaluation of ASD was made more complicated by co-occurring diagnoses and/or behavior problems (e.g. ADHD, language delays). We present these cases to demonstrate the similarities (i.e. overlapping symptoms), as well as important distinctive characteristics among ASD, ADHD and ID. The current literature supports the distinctive features of these diagnoses but often presenting information within real-life cases is missing. Our goal is to support community clinicians in better understanding the symptomatology of ASD and other neurodevelopmental disorders that present similarly to ASD, thus providing an appropriate diagnosis and subsequent recommendation for optimal treatment and/or intervention.

Methods

The following procedures were approved by the university's Institutional Review Board; caregivers provided informed consent and cases have been de-identified. The children were referred to a free university-based autism screening clinic due to caregiver and/or professionals' concerns about behaviors potentially related to ASD.

Cases

The three cases as the subject of this paper were chosen due to their complexities in differentiating between ASD and other neurodevelopmental disorders. When assessing which cases were to be selected, the clinical team met to discuss those in which there were challenges in determining the diagnostic status of the child. Joseph's case illustrates deficits in the social communication of a child his age which were not explained by his low cognitive abilities, therefore granting a dual diagnosis of ASD and GDD. Both Shawn and Ben's cases demonstrate the differentiation between ASD and other neurodevelopmental disorders (i.e. ID and ADHD).

Measures

Social communication questionnaire

The social communication questionnaire assesses a person's social communication abilities and social skills specific to ASD-related behaviors. If the child is younger than six years old, the Current form is administered to assess their current behaviors and abilities. Children older than six years old are administered the Lifetime form to understand current and past behaviors (specifically when they were 4 to 5 years old). A total of 40 questions are provided to caregivers. The publishers of the SCQ recommend a cut-off score of 15, however, our clinic has set its own cut-off score of 10 to be considered as demonstrating sufficient behaviors related to ASD and are recommended for further assessment (Rutter *et al.*, 2003).

Autism diagnostic observation schedule, second edition

The autism diagnostic observation schedule, second edition (ADOS-2) is a semi-structured diagnostic assessment for ASD that was administered by a research reliable assessor and was overseen by the directors of the clinic. The ADOS-2 consists of five modules that are based on the child's language abilities and chronological age. Based on the observed behaviors, the child is scored on social communication and repetitive and restricted behaviors. The algorithm changes for each module, based on the current language abilities

and age of the child. The total score from the algorithm determines if the child meets the criteria for autism, ASD or non-spectrum (Lord *et al.*, 2012).

Wechsler preschool and primary scale of intelligence – fourth edition

The Wechsler preschool and primary scale of intelligence - fourth edition (WPPSI-IV) is a cognitive assessment administered to children age from 2-years-6-months to 7-years-7-months. There are different subtests provided to children age 2-years-6-months to 3-years-11-months that includes seven subtests. The other version administered to 4-years to 7-years-7-month old children includes 17 subtests. The raw scores from specific subtests sum to create the full-scale IQ (FSIQ) score or the child's cognitive functioning (Wechsler, 2012).

Differential ability scales – second edition

The differential ability scale – second edition (DAS-II) is a cognitive assessment administered to children between the ages of 2-years-6-months and 17-years-11-months. There are two forms, the early years (for 2-years-6-months to 8-years-11-months) and the school-age (for 5-years to 17-years-11-months). The early years are divided into two levels, the lower level (2-years-6-months to 3-years-5-months) consists of 7 subtests, while the upper level (3-years-6-months to 8-years-11-months) consists of 16 subtests. The school-age form consists of 14 subtests. Each form provides a general conceptual ability and a special nonverbal composite score (Elliott, 2007).

Vineland adaptive behavior scale, third edition

The Vineland adaptive behavior scale, third edition (VABS-3) assesses a child's adaptive behavior through a parent interview. The parent interview assesses a child's adaptive abilities for children of any age. The scores provide a general adaptive score, as well as four other composite scores: communication, daily living skills, socialization and motor skills (for children up to 9 years old). The scores are compared to other peers of the same age as the child being assessed (Sparrow *et al.*, 2016). This was completed over the phone with the caregiver.

Procedures

Prior to their appointment, families completed a phone intake to document the child's current behaviors and developmental history. Based on the family's responses to the social communication questionnaire (SCQ; Rutter *et al.*, 2003) and the resulting score, the child was either assessed at our screening clinic or referred to another professional (e.g. school psychologist, physician, psychiatrist). Clinic visits included the administration of the autism diagnostic observation schedule, second edition (ADOS-2; Lord *et al.*, 2012) to determine if children met criteria for ASD, a cognitive assessment – either the Wechsler preschool and primary scale of intelligence – fourth edition (WPPSI-IV; Wechsler, 2012) or the differential ability scales, second edition (DAS-II; Elliott, 2007) and the vineland adaptive behavior scales, third edition (VABS-3; Sparrow *et al.*, 2016). Other parent-report measures were also collected (e.g. developmental history). The results of the assessments, along with overall diagnostic impressions and recommendations, were provided to the families in a Zoom call, with ample time to answer questions. The families were then sent a copy of the report, either was emailed or sent by US mail.

Findings: Case studies

Autism spectrum disorder and global developmental delay/intellectual disability case: Joseph

Joseph was a 4-year-old boy referred to the screening clinic due to concerns about language development. He was screened at the clinic in February of 2020. Joseph lived with his biological mother, father and sister. He was enrolled in a Head Start program at a local elementary school where Joseph was not receiving any services and did not have an Individualized Education Plan (IEP). At the time of the phone screening, Joseph's father reported specific speech concerns, including behaviors suggesting echolalia, routinized speech and limited spontaneous language. Joseph was previously evaluated for ASD at his local regional center where he was administered a cognitive assessment and ASD diagnostic assessments; his parents were also interviewed about Joseph's adaptive behaviors. The previous assessment concluded that his visual-spatial skills on the WPPSI-IV were in the borderline range and his adaptive skills fell in the extremely low range. The results from the autism diagnostic assessments, in conjunction with the other information collected, indicated that Joseph met the criteria for autism. However, parents were unclear about what the diagnosis meant and why their child appeared to have delays or difficulty learning. Joseph's family was also unsure of how his diagnosis might affect his educational placement.

Psychological testing

Joseph's cognitive functioning was assessed using the DAS-II. Joseph achieved a general cognitive ability standard score of 64, which is within the very low range (verbal comprehension score of 77 and nonverbal reasoning index of 64). Joseph was able to sit and attend to the administration of the cognitive assessment when provided with frequent praise and brief breaks between tasks.

In terms of adaptive behavior, Joseph's results on the VABS-3 indicated that his overall adaptive skills were in the moderately low range for his age, with a score of 74. Joseph sometimes responded to his parent's attempts to gain his attention (e.g. calling his name). He did not follow "if-then" instructions (e.g. "If you're hungry, then get a snack.") Joseph also did not respond to more advanced gestures (e.g. *come here*). Additionally, he did not use words to express his feelings or concerns for others. In terms of self-help skills, Joseph was not able to fasten small buttons or connect zippers.

During the administration of the ADOS-2 Module 1, Joseph was inconsistently engaged. When the activity included highly preferred items (e.g. bubbles), Joseph demonstrated more spontaneous engagement. For example, when he was engaged, Joseph often used single words and routinized phrases (e.g. "ready, set and go"). However, it was challenging to maintain his attention and engagement during non-preferred activities. Joseph frequently displayed echolalia. When playing with cars, Joseph echoed the examiner saying, "coming through." His eye contact was inconsistent throughout and he used few gestures.

Joseph demonstrated mannerisms and other repetitive behaviors during the assessment. Joseph was observed flapping his hands during multiple activities. He demonstrated one clear instance of sensory-seeking behavior by smelling the pretend candles during a birthday party activity, in addition to several possible sensory-seeking behaviors during a bubble play activity. Overall, Joseph's total score on the ADOS-2 was 15, which corresponds to a calibrated severity score of seven. Joseph displayed sufficient autism-related behaviors to meet the criteria for Autism on the ADOS-2.

Specifically, Joseph struggled to make appropriate requests for items beyond what would be expected for a young child with GDD (e.g. difficulty with verbal communication). Specifically, he often placed the examiner's hand on an item, using the examiner's hand as

a tool (e.g. he put the examiner's hand on the Jack-in-the-Box toy to wind it and make it pop up). Similarly, Joseph lacked integration between eye contact, vocalizations and gestures (e.g. Joseph would wave at inappropriate times and without eye contact or speech; [APA, 2013](#)).

Results

Taking both the results from the ADOS-2, DAS-II and VABS-3, Joseph met the criteria for both ASD and GDD. ID is defined by two main symptoms: IQ score below 70 and low adaptive skills. Joseph's cognitive score was 64 and his adaptive behavior score was 74, meeting both criteria for ID. However, due to Joseph's age (i.e. under the age of 5), it was concluded that Joseph met the criteria for GDD rather than ID ([APA, 2013](#)). Joseph met the criteria for ASD based on his ADOS-2 results, parent report about his developmental history and clinical judgment. This dual diagnosis was provided because Joseph's social communication abilities were more impaired than would be expected based on his current language and developmental abilities. Dual diagnosis also better explained Joseph's significant learning delays. For Joseph, we recommended that his family contact his local school district to request an individualized education plan (IEP) for ASD and ID. Additionally, we recommended that his parents seek additional services outside of the educational environment.

Intellectual disability without autism spectrum disorder and global case: Shawn

Shawn was a five-year-old male who was referred to the screening center due to social difficulties and familial history of ASD. Shawn was assessed in the screening clinic in November of 2019. He lived with his biological parents and eight siblings. Shawn was not receiving any services at the time of his appointment but did qualify for an IEP at school under Specific Learning Disability and Speech/Language Impairment. At the time of the appointment, Shawn's mother reported concerns related to Shawn's current educational placement (i.e. she believed a special educational placement would be more appropriate), language abilities and social skills difficulties. Shawn was previously assessed for ASD through his private insurance. Both the insurance provider and his school concluded that Shawn met the criteria for a speech delay and learning disability rather than ASD. However, due to the lack of standardized assessment measures and Shawn's mother's concerns about educational placement, the family was seen at our screening clinic.

Psychological testing

Shawn received an FSIQ of 63 (verbal comprehension score of 67 and performance index score of 70) on the WPPSI-III, which reflects some ID. During the cognitive assessment, Shawn had difficulty understanding directions, specifically those related to vocabulary and struggled to hold a pencil during activities requiring him to copy shapes and/or draw lines through shapes.

To obtain information about Shawn's adaptive skills, the VABS-3 was administered. Overall, Shawn's adaptive skills fell within the low range for his age (SS = 50). The subdomains of the VABS-3 revealed Shawn's communication (SS = 22) and socialization skills (SS = 50) fell within the low range and his daily living skills (SS = 73) were in the moderately low range for his age. For example, Shawn was toilet trained but still had toileting accidents at night, had difficulty expressing and understanding feelings (e.g. often screamed, laughed when others were sad) and preferred to play alone.

The ADOS-2 Module 2 was administered to determine if Shawn met the criteria for ASD. Shawn frequently used nonverbal initiations to engage with the assessor and his parent, by providing brief eye contact to check-in and to show objects. To request, Shawn either

stared at the assessor or pointed to the item without vocalization and to respond he either nodded or shrugged rather than use language. He often repeated questions that were asked to him before providing his response. He rarely initiated social interactions with the assessor during unstructured routines; however, during structured routines, when expectations were clear, he initiated more. During a birthday party play routine, Shawn initiated sequential steps of the routine by feeding a doll after singing, "Happy Birthday." Shawn displayed brief and inconsistent eye contact and was observed smiling for the majority of the assessment, but did not direct these expressions toward the assessor. When Shawn was observed using gestures, he primarily used instrumental gestures such as pointing, nodding and shrugging. Overall, Shawn's social communication skills were present and generally appropriate, but quite limited for his age. Shawn did not display any repetitive and restrictive interests. Altogether, Shawn scored an 11 on the ADOS-2, which corresponds with a calibrated severity score of 6 and falls into the "autism" classification.

Results

When reviewing all of the information collected, it was determined that Shawn did not meet ASD based on the criteria described in the DSM-5. To meet the DSM-5 criteria of ASD, one must demonstrate social communication deficits across different contexts. Shawn displayed social communication strengths with his family and sibling (e.g. frequent social initiations through showing, eye contact and initiating play) and he attempted to initiate with the assessor through brief interactions that were appropriate for his current language and cognitive abilities. When Shawn communicated with the assessor, he frequently used nonverbal means rather than language, which is consistent given his language difficulties. Additionally, Shawn had no history of repetitive and restricted behaviors, per the parent report and no repetitive and restricted behaviors were observed during the assessment. Although Shawn met the threshold for ASD on the ADOS-2, his immature social interactions were better explained by his below-average cognitive and language abilities. Poor social interactions and even repetitive and restricted behaviors can be displayed by children with both ASD and ID. However, in individuals with ID, social-communicative skills are commensurate with cognitive and adaptive skills (as was the case with Shawn) rather than being impaired compared to cognitive and adaptive skills. Taken together, Shawn did not meet the criteria for ASD but met the criteria for ID as his FSIQ was below 70 and his adaptive skills, as reported by his parents, were also low for his age (APA, 2013). We recommended that Shawn's parents consider scheduling a meeting with his school to request an individualized education plan (IEP) to reflect ID, to facilitate him receiving appropriate academic and non-academic services.

Attention-deficit/hyperactivity disorder without autism spectrum disorder and global case: Ben

At the time of the assessment, Ben was a 6-year-old boy who was referred to the screening clinic by another assessment center due to concerns about possible ASD characteristics. Ben was assessed in February of 2020. Ben lived with his biological mother and three sisters. His mother reported issues regarding his impulse control, non-compliant behaviors and limited social abilities. On the other hand, he demonstrated a strong interest in history and science. Prior to his evaluation, Ben's school assessed him due to attention-related concerns, primarily in the areas of cognitive abilities, attention and behaviors related to ASD. On the WISC-V administered by the school, Ben received an FSIQ of 112. The school report also included significant concerns regarding ASD. Based on the school's assessment, Ben received an IEP under the eligibility of a specific learning disability. Ben's mother also reported a previous diagnosis of ADHD.

Psychological testing

The WPPSI-IV was administered to re-measure Ben's cognitive abilities. His FSIQ was 103, which is in the average range (verbal comprehension standard score of 108, visual-spatial standard score of 112, fluid reasoning standard score of 91 and working memory standard score of 100). Ben was fidgety and walked out of the testing room multiple times. Ben's difficulties with remaining still and on-task eventually led to his mother having to remain with him throughout the rest of the assessment to assure that he would comply with tasks. Ben's FSIQ score during this assessment was nine points lower than the FSIQ reported on his IEP. However, this discrepancy did not warrant further examination, given that the cognitive assessments were done at different times, in different environments and used different standardized tests.

To learn more about Ben's adaptive skills, Ben's mother was interviewed using the VABS-3. The VABS-3 results revealed that Ben's overall adaptive skills fell within the low range for his age with a standard score of 77. Per the parent report, Ben had some daily living difficulties such as following multiple step directions, being safe around hot and/or sharp objects and following time limits. Ben was reported to have elevated internalizing and externalizing behaviors. For example, Ben was more active than his peers, was very argumentative and did not obey those in authority.

During the administration of the ADOS-2 Module 3, Ben was frequently moving around the room, making it difficult for him to use a broad range of nonverbal communication (e.g. he did not remain still long enough to direct facial expressions and/or maintain eye contact). Ben was very engaged and socially motivated; however, he frequently initiated inappropriate social interactions to get the assessor's attention. Some examples included laying on top of the table and sliding his body across the table to get close to the assessor's face and to say, "Hi," while the assessor was attempting to write notes on a piece of paper. Ben also attempted to lay on the assessor during multiple activities when the assessor tried to redirect him to the activities presented. For example, Ben often got out of his seat to walk around the room and when the assessor tried to redirect his attention to the activity, he would try to sit near the assessor by either laying on the assessor's lap or really close to her. It was unclear whether these behaviors were attention-seeking (e.g. an attempt to obtain the examiner's attention as the examiner often ignored Ben's "silly" behavior to avoid inadvertently reinforcing him for being off task) or whether they were an attempt to escape demands (e.g. acting out when the assessor reminded Ben to remain on task to avoid completing tasks).

Ben was easily distracted, making it difficult to move on to new activities or to another question. Additionally, he had trouble sitting still and would often climb on top of the table. These behaviors impeded his ability to display consistent and well-modulated eye contact, as well as his ability to integrate facial expressions and gestures with his speech. Notably, the session was paused mid-way to rearrange the assessment room to remove distracting items.

Despite his behavioral dysregulation and challenges remaining focused and on-task, Ben displayed a variety of social-communicative skills. Ben used a variety of facial expressions to communicate his effect and regularly used descriptive gestures to describe the height and shape of objects. In addition, Ben often offered information about his own feelings and the likes and dislikes of others. Finally, he frequently initiated social interactions, though this often included interrupting the assessor (e.g. he often asked questions regarding the assessment room such as, "Is the camera still recording?"). Though Ben was excited to talk about a variety of different topics, he had trouble maintaining attention on one topic for long before beginning to talk about something else. Ben was socially responsive, though he often needed a reminder or a prompt to answer the questions that were being asked of him rather than bringing up topics unrelated to the assessor's questions. Ben did not display

any restricted interests or repetitive behaviors. Overall, Ben received an ADOS-2 score of 19, which corresponds to a 10 for the calibrated severity score and falls into the category of “autism.” Ben additionally scored high on codes at the end of the ADOS-2 that are based on behaviors (e.g. anxiety, overactivity, aggression) likely to impede the administration of the assessment.

Results

Although Ben met the criteria for ASD on the ADOS-2, overall clinical impressions – along with results of other measures – were not consistent with a diagnosis of ASD. Symptoms of both ADHD and ASD often include social difficulties, behavioral problems and inattention. However, the function of these behaviors differs. Ben displayed several attempts to initiate social interactions with the assessor but struggled to make these attempts appropriately (i. e. laying on the table, sitting on the assessor); these behaviors appeared to either serve as attention-seeking or as a technique to avoid engaging in unwanted tasks. He responded to questions but quickly changed topics or needed reminders to answer the question due to inattention. These behaviors were better understood as an inability to control his impulses rather than an inability to understand and respond to social cues provided by the assessor. He often moved around the room, interrupted the assessor and became easily distracted, making it difficult to complete the assessment. We recommended that Ben’s family meet with his school to discuss behavioral accommodations to decrease off-task and impulsive behaviors and increase compliance and attention.

The behaviors displayed by Ben, Shawn and Joseph, displayed across diagnoses, are illustrated in [Figure 1](#).

Discussion

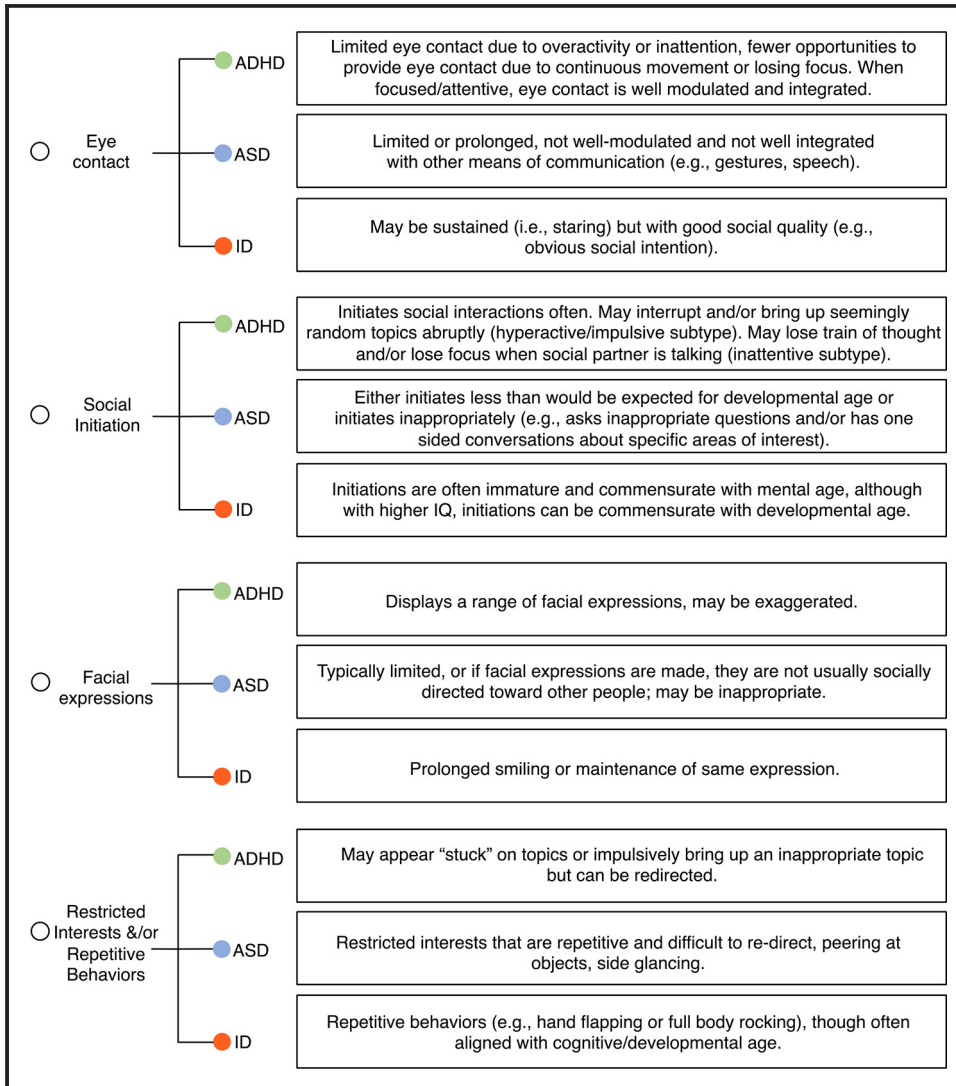
It is often challenging to differentiate between neurodevelopmental disorders in young children; however, accurate diagnosis or possible identification of dual diagnoses, is necessary to receive appropriate services and educational placement. The current set of case studies illustrates the importance of a systematic and careful approach to diagnostic assessment, including both standardized clinician-administered measures and parent reports.

Diagnostic difficulties

Joseph’s case emphasizes the importance of considering ID – called GDD in children under 5-years-old – and/or ASD in children who exhibit marked delays in language and social skills. Joseph’s scores on both the cognitive assessment and parent-reported adaptive skills measure indicated he met the criteria for GDD. However, Joseph also met the criteria for ASD due to inconsistent social engagement (e.g. he was socially engaged only during preferred activities), challenges with social communication (e.g. rare use of gestures, inconsistent eye contact, difficulties requesting objects) and the presence of restricted/repetitive behaviors (e.g. hand flapping, sensory interests). These social-communicative symptoms and symptoms of restricted interests/repetitive behaviors are more severe than what would be expected given his cognitive and adaptive abilities. Therefore, a dual diagnosis of GDD and ASD was appropriate.

Shawn’s case highlights why it is necessary to interpret social skills in the context of a child’s cognitive and adaptive behavior if there is reason to suspect ID. Shawn’s cognitive and adaptive skills were suggestive of ID – therefore, clinicians should not expect his social-communicative abilities to be age-appropriate. In cases where ID and/or ASD are being considered, clinicians should consider whether a child’s social-communicative skills are commensurate with his or her mental age or whether deficits in social communication are

Figure 1 Symptoms and behaviors observed across individuals with ADHD, ASD or ID



more severe than would be expected. Additionally, a diagnosis of ASD requires the presence of repetitive behaviors and/or restricted interests (RRBs). If a child has an ID and commensurately delayed social-communicative skills in the absence of RRBs, ASD should not be diagnosed. Shawn displayed delays in social communication, but these delays were commensurate with his cognitive and adaptive abilities and did not display RRBs. Therefore, a diagnosis of ID was most appropriate.

Ben's case is a prototypical example of social deficits often observed in ADHD and why it is important to carefully consider the *cause* of social deficits and/or *function* of a child's social behaviors. Individuals with ASD or ADHD may display inappropriate social behavior, but the function and cause differences between the two diagnoses. Those with ASD often have difficulties remaining on the topic during the conversation (e.g. describing extraneous topics of interest) and/or fail to follow social norms (e.g. standing too close, interrupting). However, interactions with individuals with ADHD often have an impulsive quality to them, where the child excitedly shares information, may forget to use appropriate social skills and struggle to wait for their turn to speak. In contrast, children with ASD can become "stuck"

(i.e. display inflexibility), by wanting to speak as if in a monologue or lecture format, about topics of interest (i.e. RRBs) without allowing the other individual to interject, converse or change the topic (see “social initiation” section of [Figure 1](#)).

In Ben’s case, his excitement about engaging with the assessor and his challenges with inhibitory control caused him to act in a socially inappropriate manner (e.g. laying on the table, periodically lying on the assessor to get her attention, interrupting the assessor). Ben’s hyperactive/impulsive behaviors were not unique to his interactions with the assessor; he often got up from his seat to walk around and look at various things in the room. Ben’s behavior appeared to stem from hyperactivity/impulsivity rather than a core deficit in social communication (which would indicate ASD). Additionally, Ben did not present with RRBs, which are required – either at the time of evaluation or by history – for a diagnosis of ASD.

Taken together, the three cases presented here underscore the importance of both not jumping to diagnostic conclusions prior to undertaking standardized assessments and recognizing that neurodevelopmental disorders present with multiple overlapping symptoms.

Implications for educational placement and intervention

Educational placement and services were important in all the cases presented above. For Joseph, procuring an individualized education plan (IEP) for ASD and ID and obtaining additional services outside of the educational environment were among our primary recommendations. To set Joseph up for success in an educational environment, it is important for him to receive services that target both his ID (e.g. working on adaptive skills, having a classroom aide, breaking up tasks into small steps/task analysis, using demonstrations in addition to verbal instructions) and his ASD (e.g. social skills support, speech/language therapy, working to increase functional communication skills). In addition, as Joseph was only 4 years old, he would benefit from in-home early intervention services to support his adaptive and social-communicative abilities, prior to transitioning to a pre-K or kindergarten classroom.

For Shawn, educational placement was one of his parents’ primary concerns. At the time of Shawn’s assessment, he had an IEP for speech/language impairment and specific learning disabilities. One of our primary recommendations was for Shawn’s parents to request an IEP meeting to consider changing his eligibility from “specific learning disability” to “intellectual disability,” as the latter is more accurate and would dictate different types of educational supports and learning aids. As mentioned above for Joseph, specific accommodations and supports for children with ID would be beneficial for Shawn along with speech/language intervention to help him communicate more effectively.

At the time of his evaluation, Ben had an IEP under “specific learning disability.” Given Ben’s marked difficulties completing tasks and remaining focused, we suggested that his family may wish to request an IEP update meeting to change his eligibility category to “other health impairment (OHI).” The categorization of “other health impairment” covers challenges with attention and focus; children in the US with ADHD are often served under this disability category. Changing Ben’s eligibility to “other health impairment” would also allow him to receive accommodations and services designed for children with ADHD and related conditions (e.g. IEP goals related to increasing attention and decreasing hyperactive/impulsive behaviors, extra time on tests and with homework, seating away from distractions, counseling to work on self-regulation).

Limitations

The current series of case studies were chosen to provide examples of overlapping symptoms in neurodevelopmental disorders and highlight the importance of accurate

diagnosis. However, there are limitations, which should be kept in mind. As this paper contains case studies, we cannot extrapolate our clinical findings for these children to the broader population of children with ASD, ID, ADHD or a combination of these three. We consider these cases to be examples of how different disorders have clinical overlap and to serve as a series of “lessons learned” for clinicians who might serve children with similar profiles. We recognize that there are other neurodevelopmental disorders not considered in this paper, including language disorder, specific learning disorder, neurodevelopmental motor disorders (e.g. tic disorders) and others. These additional neurodevelopmental disorders have some overlap with the diagnoses we have discussed and should also be considered during the differential diagnostic process.

Finally, though this paper does not focus specifically on school-based eligibility for special education, it is important to recognize how different diagnoses can affect educational placements and the services provided under the IEP process (IDEA, 2004). In all cases presented above, we had specific recommendations for how to tailor or amend school-based services to best serve each individual child’s needs.

Conclusions and future directions

Taken together, the above clinical cases highlight important diagnostic nuances and considerations for professionals as they complete evaluations. Clinical judgments are necessary, as previous research suggests commonly used screening tools for ASD are not always able to differentiate between other neurodevelopmental disabilities (e.g. ID and ADHD). It would be beneficial for future research to examine the contribution of both parents- and teachers-report questionnaires to clinical diagnoses. Finally, training of both clinicians and educators would benefit from familiarity with behavioral “profiles” associated with different neurodevelopmental disorders and improve subsequent recommendations for school placement, program and/or intervention.

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