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Chapter 12

Multidimensional impairments

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Abstract

Children and adolescents with neurodevelopmental disorders often show complex developmental disorders, including multiple areas of dysfunction such as emotional regulation and behavior, school integration, and learning difficulties. These multidimensionally impaired children share some common features with children with autism spectrum disorders (ASDs). However, paradoxically, they could qualify as diagnostically homeless. Several proposals have been formulated to categorize subgroups of these children, whose diversity and overlap in clinical expression emphasize the importance of using a multidimensional assessment inscribed in a developmental perspective. Here, we review these different classification proposals and describe a multidimensional approach that, in addition to a categorical approach, could constitute a complementary point of view. We believe that this multidimensional perspective allows one to address the child holistically, taking into account his or her interactive experience with the environment, and achieve a functional diagnosis enabling the elaboration of a tailored therapeutic plan and better school inclusion.

INTRODUCTION

In this chapter, we focus on children and adolescents with complex developmental disorders (CDDs), including multiple areas of dysfunction such as emotional regulation and behavior, school integration, and learning difficulties. In addition to this constellation of symptoms, these multidimensionally impaired (MDI) children share some common features with children with autism spectrum disorders (ASDs), although not the core symptoms. However, paradoxically, they are often qualified as diagnostically homeless (Frazier and Carlson, 2005). Indeed, their difficulties are frequently given the "not otherwise specified" (NOS) designation because they do not fit into the nosologic categories. ASD is defined as a combination of impaired social communication and repetitive/restrictive behaviors or interests (DSM-5, American Psychiatric Association, 2013). This single categorical mental disorder involves wide heterogeneity at either descriptive or etiologic levels (for a review, see Masi et al., 2017; Tordjman et al., 2017). This variability also concerns ASD behaviors during the developmental trajectory of each patient in this population (Lord and Bishop, 2015). The categorical approach has succeeded in constraining neither the heterogeneity nor the extensiveness of autism (Xavier et al., 2015; see also Chapter 10 of Volume 174). This failure is revealed by several indices, including excessive comorbidity and diagnostic uncertainty in borderline cases. These ambiguous cases contributed to the frequent use of the pervasive developmental disorder (PDD)-NOS category in the DSM-IV (Weintraub, 2011) and represented the majority of autism cases in epidemiological studies using the DSM-IV classification (Fombonne, 2009). When the DSM-5 (American Psychiatric Association, 2013)

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was introduced, a percentage of PDD-NOS cases, 29% according to Kim et al. (2014), were excluded because they no longer fulfilled ASD criteria. To address this issue, "social (pragmatic) communication disorder" (SPCD) has been added as a new category, outside of ASD, constituting a diagnostic home for some of those cases. As well as PDD-NOS for DSM-IV, SPCD is also a diagnosis borderline to ASD in the DSM-5, which can be made concerning children with CDDs.

In addition to international classifications, several proposals have been formulated to categorize subgroups of these children whose diversity and overlap in clinical expression emphasize the importance of using a multidimensional assessment inscribed in a developmental perspective. First, we review these different classification proposals, which we address through several specific dimensions. Then, we describe a multidimensional approach that, in addition to the categorical approach, could constitute a complementary point of view. In this way, clinicians could address the child holistically and then achieve a functional diagnosis enabling the elaboration of a tailored therapeutic proposal (Xavier et al., 2015). Finally, to illustrate this approach, we report the case of a 7-year-old MDI child.

CHILDREN WITH COMPLEX DEVELOPMENTAL DISORDERS (CDDs) ARE MULTIDIMENSIONALLY IMPAIRED

As described for DSM-IV PDD-NOS (Matson and Boisjoli, 2007; Rondeau et al., 2011) the behavioral sameness observed in autism is replaced in CDD by a great symptomatic variability between different children or even in the same child at different developmental stages. The polymorphism and overlap in the clinical expression of the CDD emphasize the importance of using a multidimensional approach as a complementary point of view to the categorical approach that we describe in this chapter.

Multiple complex developmental disorder (MCDD)

Cohen et al. (1986) proposed the term "multiplex developmental disorder" (MDD) to identify, within the PDD-NOS category, a heterogeneous group of children with atypical development (Dahl et al., 1986), including early-onset emotional and behavioral problems. This population has been given different diagnostic labels, such as "borderline children" (Pine, 1974; Bemporad et al., 1982) or "schizotypal children" (Nagy and Szatmari, 1986). Their multiple and complex disturbances bordering on the autism category could be, according to the DSM-III (American Psychiatric Association, 1980), included in "childhood-onset pervasive developmental disorder" (see earlier). In contrast to children with autism, they tend to have more optimistic outcomes and a later age of onset of symptoms (from 3 or 4 years). These children show marked instability, as well as variability and unpredictability, in their social abilities; although at times they can exhibit normal social relations, at other times they can display inappropriate anxious responses, disruptive behavior, and overinvolvement with fantasy figures blurring their reality. A dysfunction in the dynamic process of self-construction underlies their impairments in social adjustment, school performance, and emotional lability (Paul et al., 1999). MDD has been operationally defined according to criteria in three domains (emotional, cognitive, and social) in which disturbances are observed (see Table 12.1). Towbin et al. (1993) changed the term MDD to multiple complex developmental disorder (MCDD) and validated this construct. Van Der Gaag et al. (1995) showed a clear differentiation between MCDD and autism captured by the criterion "fluctuations in the level of functioning." Later, they succeeded in validating a criteria-scoring algorithm for MCDD (Buitelaar and Gaag, 1998). Comparing the neuropsychologic profiles of three groups of children (MCDD, attention deficit/hyperactivity disorder (ADHD), and controls), Lincoln et al. (1998) found that the MCDD group displayed significant impairments in the areas of executive control and motor planning, which corresponds in part to the diagnosis of developmental coordination disorders (DCDs) in the DSM-5 (for more details, see Ad-Dab'bagh and Greenfield, 2001). Children with DCD are less involved and less engaged in play (Smyth and Anderson, 2000; Green et al., 2011) and more socially isolated than their normally developing peers (Cummins et al., 2005; Kennedy-Behr et al., 2013). They also face emotional difficulties (Green et al., 2006; Xavier et al., 2013) related to internalizing problems (Dewey et al., 2002), such as depression, unfounded fears and phobias, or excessive worries.

Multidimensional impairment (MDI)

Similar to MCDD, other PDD-like symptoms were described in a clinical and neurobiologic study led by the National Institute of Mental Health focusing on children with very early-onset schizophrenia (onset of psychotic symptoms before age 12). One-third of the children with psychotic disorders not otherwise specified (meaning not responding to the criteria of schizophrenia) were labeled MDI. MDI children exhibit some of the clinical features seen in ASD (Kumra et al., 1998). Under stress, they have intermittent episodes of hallucinations and delusions, affective instability, and complex developmental impairments. In addition, they appear eager for relationships but are socially deficient and experience severe emotional disturbances, affective instability, and

Table 12.1

Diagnostic criteria for MCDD

1. Regulation of affective state and anxiety is impaired beyond that seen in children of comparable age, as exemplified by at least two of the following
   1. Intense generalized anxiety or tension
   2. Fears and phobias (often unusual or peculiar)
   3. Recurrent panic episodes or "flooding" with anxiety
   4. Episodes of behavioral disorganization punctuated by markedly immature, primitive, or violent behaviors
   5. Significant and wide emotional variability with or without environmental precipitants
   6. Frequent idiosyncratic or bizarre anxiety reactions
2. Consistently impaired social behavior/sensitivity, as exemplified by at least two of the following:
   Social disinterest, detachment, or withdrawal despite evident competence
   1. Severely impaired peer relationships
   2. Markedly disturbed attachments; high degrees of ambivalence to adults (esp. parents/caretakers)
   3. Profound limitations in the capacity for empathy or understanding others' affects accurately
3. Impaired cognitive processing (thinking disorder) beyond that seen in children of comparable age, as exemplified by at least two of the following
   1. Irrationality, sudden intrusions on normal thought process, magical thinking, neologisms or repetition of nonsense words, desultory thinking, blatantly illogical, bizarre ideas
   2. Confusion between reality and inner fantasy life
   3. Perplexity and easy confusability (trouble understanding social processes or keeping thoughts "straight")
   4. Delusions, overvalued ideas, including fantasies of omnipotence, paranoid preoccupations, overengagement with fantasy figures, grandiose fantasies of special powers, and referential ideation
   5. The child is not suffering from autism
   6. Duration of symptoms for at least 6 months

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Table 12.2

Multidimensional impairment (McKenna et al., 1994)

1. Poor ability to distinguish fantasy from reality, as evidenced by ideas of reference and brief perceptual disturbances during stressful periods or while falling asleep
2. Nearly daily periods of emotional ability disproportionate to precipitants
3. Impaired interpersonal skills, despite desire to initiate social interactions with peers
4. Cognitive deficits associated with childhood-onset schizophrenia or attention deficit/hyperactivity disorder (ADHD)
5. Absence of thought disorder
6. ADHD or attention deficit/hyperactivity disorder

ADHD, attention deficit/hyperactivity disorder; *DCD*, developmental coordination disorder; *ODD*, oppositional defiant disorder.

impulsivity (see Table 12.2). This symptomatology suggests some DSM diagnosis, without meeting full criteria for PDD-NOS, Asperger syndrome, bipolar disorder not otherwise specified, intermittent explosive disorder, borderline personality disorder, or schizotypal personality disorder (although personality diagnosis is not recommended in children). Children with MDI have cognitive deficits such as receptive/expressive language disorders, memory impairments, and visual–spatial difficulties (McKenna et al., 1994). Kumra et al. (2000) conducted a comparative study examining children with MDI and children with childhood-onset schizophrenia according to their neuropsychologic evaluations, including (1) visual-motor processing/attention, (2) abstraction-flexibility, (3) verbal intelligence/language, (4) spatial organization, and (5) memory and learning (verbal and visual). The majority of patients in both groups were found to have a similar pattern (in type and severity) of cognitive deficits for all five of these domains of cognitive functioning with the exception of two subtests: for the coding and digit symbol subtest and the digit span subtest, the MDI group was more impaired; and for memory and verbal learning, the opposite result was found. McKenna et al. (1994) conducted an in-person screening of 71 subjects (children and adolescents) with an onset of psychosis at or before age 12. Among these patients, they found that the children in the MDI group had higher rates of ADHD comorbidity (85% vs 35%) and were referred more frequently and at an earlier age for behavioral and language problems.

From a deficit in attention, motor control, and perception to ESSENCE

The concept of deficits in attention, motor control, and perception (DAMP) was proposed by Gillberg (2003) and is defined by the combination of ADHD and DCD (see Table 12.3). This condition has several comorbidities within other diagnostic categories, such as major depression or oppositional defiant disorder. Furthermore, in severe cases of DAMP, autistic features are common, with some cases meeting the full operationalized criteria for Asperger syndrome. The high frequency of comorbidity also involves learning problems (e.g., in reading

Table 12.3

Diagnostic criteria for deficit in attention, motor control and perception (DAMP) (Gillberg, 2003)

- ADHD as defined in the DSM-IV
- DCD as defined in the DSM-IV; condition not better accounted for by cerebral palsy
- Not associated with severe learning disability, that is, IQ higher than about 50

Other diagnostic categories often apply (for example, autism spectrum disorder, ODD)

ADHD, attention deficit/hyperactivity disorder; *DCD*, developmental coordination disorder, *ODD*, oppositional defiant disorder.

Table 12.4

Syndromes encompassed under the ESSENCE umbrella (Gillberg, 2010)

- ASD/PDD
- ADHD
- ODD
- Specific learning disorders
- Syndrome of nonverbal learning disabilities[a]
- Tic disorders/Tourette syndrome
- Bipolar disorder
- Behavioral phenotype syndromes
- Rare epilepsy syndromes
- Reactive attachment disorder

[a]Rourke (1988).

ADHD, attention deficit/hyperactivity disorder; *ASD*, autism spectrum disorder; *ODD*, oppositional defiant disorder; *PDD*, pervasive developmental disorder.

or writing and in mathematics abilities) and speech and language disorders. Beyond the high rates of overlap between ADHD and DCD, the DAMP construct does not correspond to a simple addition of these two disorders but rather to their interaction during child development.

Gillberg (2010) proposed the term ESSENCE, or early symptomatic syndromes eliciting neurodevelopmental clinical examinations. This umbrella term refers to a group of neurodevelopmental/neuropsychiatric disorders (see Table 12.4) that, at the time of early diagnostic assessment (3–5 years old), is difficult to consider separately for several reasons: (1) symptoms of each disorder can overlap with those of another disorder within the group; (2) diagnostic criteria may be met for one or two of them at one age and for a third or fourth at another age; and (3) they share environmental risk factors, clinical symptoms, and genes. In addition, few authors supported the idea that ESSENCE problems are underlined by heritable disorders of connective tissue, such as Ehlers–Danlos syndrome hypermobility type (Baeza-Velasco et al., 2017). From this perspective the nature of the disorders according to a categorical approach should no longer be considered discrete but continuous in regard to the developmental trajectory of each child.

Developmental disharmony: A developmental and dimensional approach

The term "developmental disharmony" was originally proposed in 1965 by Anna Freud to describe the "uneven progression rate in drive and ego development," which can lead to serious pathological consequences. This notion is linked to that of "developmental lines" by which Anna Freud intended to describe the progressive evolution of cognitive and affective functions from their earliest origins to their mature, adult forms. Some years later, this concept was introduced in psychopathology. The notion of disharmony focuses on the idea of a "maturative heterochrony" (Zazzo, 1964) in child development considered to be an interconnection between different dimensions (language, motor, cognition, affectivity) (de Ajuriaguerra, 1974; Lang, 1978). This functional shift can appear between and/or within each dimension. This cluster of symptoms can be found within the limits of the categories defined in classification systems with multiple comorbidities (e.g., autistic disorders and ADHD). Depending on which dimension was highlighted most, two labels were proposed: "developmental psychotic disharmony" (Misès et al., 1988), with an emphasis on emotional regulation and construction of the self; and "cognitive disharmony" (Gibello, 1976), with an emphasis on the discrepancies found in different cognitive domains. In 1997 Tordjman et al. organized a working group of experts to compare French and American concepts of MDD and disharmony (Dis), identifying a set of operationalized diagnostic criteria for each of the two constructs highlighting the similarity and differences between the two concepts. Xavier et al. (2011) confirmed the reliability, diagnostic efficiency, and validity of the disharmony construct (Dis) and explored the concordance between Dis, MCDD, and ASD. They found a significant concordance between Dis and ASD, but no concordance between Dis and each ASD subtype (AD or PDD-NOS). Furthermore, disharmony was very similar to MCDD, with a significant diagnosis concordance between the two constructs. To explore some developmental lines, they conducted three studies in children with PDD-NOS, with each participant fulfilling the criteria for disharmony and MCDD. The first study

addressed the emotional dimension described in the two concepts. It revealed great heterogeneity within this sample with regard to their neutral, emotional, and multimodal skills; this finding questioned the internal validity of the diagnosis. Compared with typically developing children the Dis/MCDD group efficiently processed auditory, visual, and multimodal stimuli on neutral tasks but performed significantly worse on emotional tasks, particularly those with angry and neutral faces (Vannetzel et al., 2011). In a second study, they explored language profiles in four groups: children with autism, Dis/MCDD, specific language impairments (SLIs), and typically developing controls. They found that language skills in autism and SLI rely on different linguistic profiles, while children with Dis/MCDD show an intermediate profile sharing some characteristics of both the autistic and SLI groups. This study suggests that expressive syntax, pragmatic skills, and some intonation features could be considered language differential markers of pathology (Demouy et al., 2011). The third study evaluated prosody using an automatic system to assess children's narrative prosodic skills. Autistic and SLI children hardly expressed their emotions through prosody but Dis/MCDD children were able to do so and even seemed hyperemotional compared with typically developing children (Ringeval et al., 2011).

MULTIDIMENSIONALLY IMPAIRED CHILDREN IN A DEVELOPMENTAL PERSPECTIVE

The categorical approach has succeeded in constraining neither the heterogeneity nor the extensiveness of ASDs (Xavier et al., 2015). This failure is revealed by several indices, including (1) excessive comorbidity, especially when the five other neurodevelopmental disorders mentioned in the DSM-5 (intellectual disabilities, communication disorders, attention deficit/hyperactivity disorder, specific learning disorder, and motor disorders) are involved (Waterhouse et al., 1992) and (2) diagnostic uncertainty in borderline cases often diagnosed PDD-NOS in the DSM-IV. These two indices concern the categorical approach toward MDI children, i.e., children with multiple domains of dysfunction in terms of behaviors, school integration, and learning disorders. Multidimensionality refers to an approach inscribed in a developmental and integrative perspective, offering a complementary point of view, which should encompass the issues posed by the categorical approach. The term "integrative" refers to the notion that we have to consider child development as formed by the interactions between different dimensions and that we must put into perspective various complementary influences. Thus taking into account their innate individual makeup, the child is addressed holistically in their interactions with the environment (family, social, school in particular). The clinician should inquire about their way of life, the different dimensions of their development, the existence of any associated disorders (e.g., sensory, visual, or auditory), their academic trajectory, and their living environment. In this regard, it is important to understand the place of the disorder and its impact at the individual level as well as on family dynamics. In Fig. 12.1, we attempt to describe the CDDs by addressing each of them through several specific dimensions.

Therapeutically, the dimensional approach, based on a multidisciplinary assessment (see Table 12.5), leads to a functional diagnosis and a more adjusted medical/cognitive/behavioral/educational treatment. To some extent the DSM-5 has defined ASD with a new categorical approach that includes some dimensional assessments described as specifiers of ASD. The DSM-5 asks clinicians to rate some features and ASD severity (see Chapter 10 of Volume 174). Two of the features are of a given dimension (language, intelligence). However, the dimensional approach we propose is much larger. To illustrate this, we now address a case study of a MDI child.

CASE REPORT

A is a 7-year-old boy. He was born into a family in Mauritius after a double donation of gametes. His father is unknown; his mother was 46 years old when she gave birth to A, and she had a history of repeated miscarriages throughout pregnancies with in vitro fertilization.

Early development and clinical history

Delivery was performed by emergency cesarean section due to abnormal fetal cardiac rhythm and intrauterine vascular growth retardation. A was born preterm at 29 weeks and 3 days of pregnancy. He weighed 810 g and measured 34 cm with a head perimeter of 25 cm. His Apgar scores were 9 at 1 min, 8 at 3 min, and 10 at 10 min. He was hospitalized in a neonatal intensive care unit for 2 months for multiple problems: he had hyaline membrane disease, minimal bronchodysplasia, and a secondary staphylococcal coagulase-negative infection requiring intubation; persistent ductus arteriosus; an enteropathy of prematurity and gastroesophageal reflux. In his early life, A had repeated bronchitis and ear infections. He walked at 12 months, said his first words at 9 months, and combinations of two words at 21 months. A was toilet trained day and night before he turned 3. Dietary diversification has been difficult, and A is still a selective, small eater. Sleep was also difficult, and he had his first complete night at age 5. Previously, A woke up several times a night and had frequent night terrors. Regarding his educational trajectory, A suffered

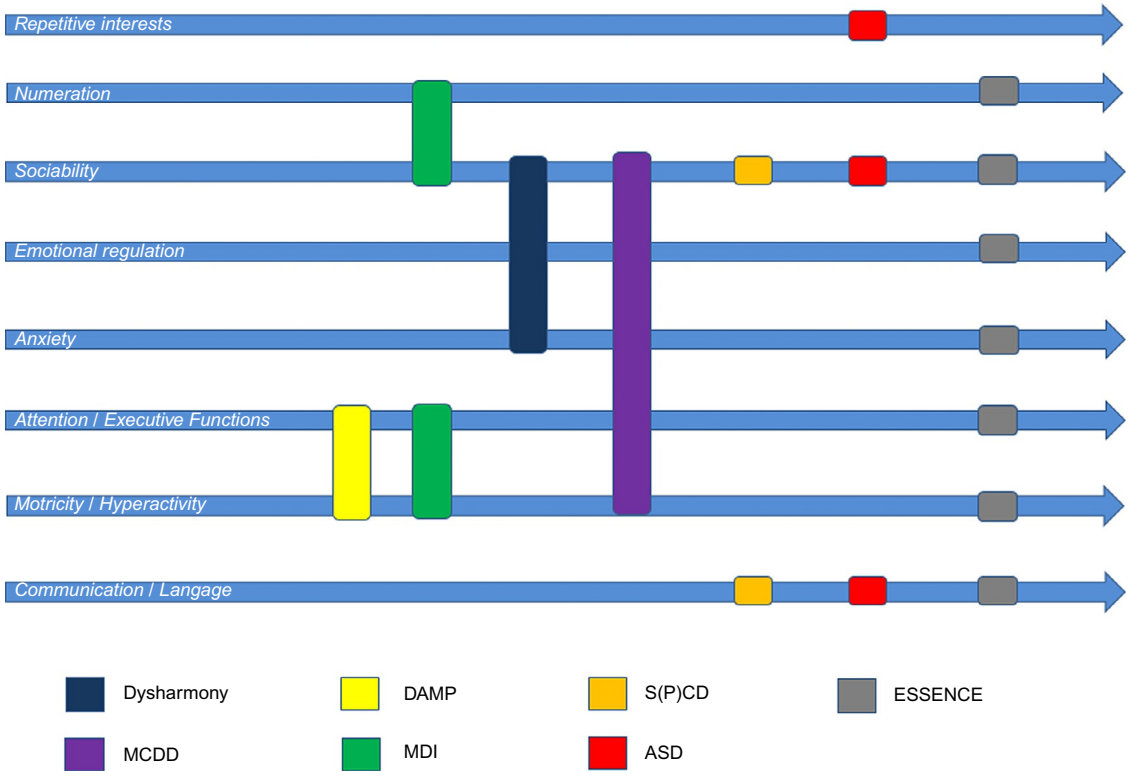

Fig. 12.1. Phenomenology and developmental lines in DSM-5 autism spectrum disorder and other complex developmental disorders. *ASD*, DSM-5 autism spectrum disorder; *ESSENCE*, early symptomatic syndromes eliciting neurodevelopmental clinical examinations; *DAMP*, deficit in attention, motor control, and perception; *MCDD*, multicomplex developmental disorder; *S(P)CD*, DSM-5 social (pragmatic) communication disorder.

from separation anxiety, impulsivity, and hyperkinesia at school from the age of 3. He was constantly searching for adults' attention and was socially isolated with severe relationship difficulties with peers. A exhibited reading and writing difficulties. In this context, he was attending the local child development center at the age of 3, where he began regular sessions with a psychotherapist. To organize a care plan addressing the complexity of his difficulties, a thorough and multidisciplinary assessment evaluation was necessary in an inpatient unit for children.

Multidimensional assessment

Somatic assessment

A has a slight dysmorphism with starry iris, small milk teeth, spaced and poorly implanted, a discreetly buttoned nose, and a wide mouth. Clinical genetic analysis (FISH probes and comparative genomic hybridization array) showed no abnormalities. A cardiac checkup (ECG, echocardiography) was performed and it showed no abnormalities. Neurologic examination was nonspecific. The EEG was well organized in the awake state as in sleep, with a source of left frontal spikes. Spikes were increased by sleep and associated with slow bifrontal waves during sleep. They appeared functional but atypical according to their bifrontal localization. The brain MRI showed a left Rolandic gyration anomaly.

Psychiatric and cognitive assessment

A was referred to an inpatient unit to investigate his psychiatric status, develop a personalized therapeutic program according to his developmental profile, and discuss his academic orientation. He had a merycism, facial tics, and repeated throat noises that he complained about. He showed anxiety at separation time, hyperkinesia (moving constantly, often with imbalance postures), and impulsivity. He cut off the words of his interlocutor and could not wait for his turn to speak. A spoke loudly, with a high voice, was logorrheic, although the content of his speech, which quickly appeared repetitive, included neologisms. His social contact could be disinhibited. He had little autonomy, with difficulties in dressing (tying his laces or doing his buttons) and needed individual support for basic hygiene and meals. He was not orientated in time, did not know the days of the week and the seasons of the year, was unable to read the time, and did not even know his birth date.

Table 12.5

Multidimensional assessment for a functional diagnosis

Dimension	Details	Example of instruments
Diagnostic criteria (DSM-5)	Deficit in social communication and social interaction, pragmatic disorder, learning disorders, ADHD, developmental coordination disorder	ADI-R, ADOS-2
General intelligence	Cognitive heterogeneity	WISC-5
Specific cognitive dimensions	Attention and executive functions, working memory, processing speed, visual–spatial abilities, reasoning, math skills, numeration	Specific neuropsychologic testing
Language	Orofacial praxis, phonology, lexicons, grammar and morphosyntax, semantics, pragmatics and conversational modes, reception/comprehension vs productions/expression	Specific psycholinguistic testing
Motricity	Motor coordination, fine motor skills, body schema and lateral dominance, temporospatial orientation, visual tracking, hand-eye coordination	Specific occupational therapist testing
Sensory integration	Sensorimotor processing	Dunn's sensory profile (Dunn, 2002)
Comorbid somatic conditions	Epilepsy, dysmorphia, genetic syndrome, brain size, prematurity	Specific referrals
Affectivity	Emotion (perception, recognition), temperament, theory of mind, affective empathy, emotional regulation, anxiety	CBCL-internalizing, specific assessments
Behavioral problems	Self-injurious behavior, hyperactivity, impulsivity	CBCL-externalizing, Aberrant Behavior Checklist (ABC) (Aman et al., 1985), Conners' scales (Conners, 1996)
Autonomy and social functioning	Communication, daily living skills socialization, motor skills, maladaptive behavior (optional)	Vineland-II

ADI-R, Autism Diagnostic Interview, Revised (Lord et al., 1994); *ADOS-2*, Autism Diagnostic Observation Schedule, Second Edition (Lord et al., 2012); *CBCL*, Child Behavior Checklist (Achenbach, 1991); *Vineland-II*, Vineland Adaptive Behavior Scales, Second Edition (Sparrow et al., 2005); *WISC-5*, W*echsler* Intelligence Scale for Children, Fifth Edition (Wechsler, 2014).

With his mother and caregivers in the unit, A showed oppositional conduct expressing a desire to be almighty. He had significant frustration intolerance and struggled to control his behavioral responses. He demonstrated a real relational appetite for his peers and preferred one-to-one relationships. However, being very directive, logorrheic, and having difficulty offering reciprocity to his partner, he was finally left apart from the group of children. According to A's point of view, his difficulties in peer relationships were due to "memory lapses" that impaired him from remembering the names of his peers. He also spontaneously associated his "memory lapses" with his learning difficulties.

Cognitive assessment included investigations of general and specific cognitive abilities, oral and written language, and fine/gross motor skills (see details in Table 12.6).

Despite an average intelligence quotient (IQ), A's IQ revealed a very heterogeneous profile. In contrast, with good scores in verbal comprehension and average scores in visual–spatial IQ, he obtained scores in the low average range for IQ processing speed and below average for working memory capacities. A exhibited normal auditory and visual attention abilities. However, he obtained low scores in complex auditory attention tasks, which could be explained by dysexecutive syndrome, including impulsivity and inhibitory control disabilities. The language skills examination revealed (1) scores approximating the average for expressive language associated with lowest scores in morphosyntax comprehension and (2) impairments in reading and spelling. Finally, he exhibited a DCD associated with visuospatial impairments.

In sum, A was MDI with (1) a frontal syndrome, including a dysexecutive syndrome, hyperkinesia, impulsivity, working memory deficits, emotional dysregulation, behavioral and linguistic perseverations, and disorientation in time; (2) an anxiety disorder; (3) a DCD associated with visuospatial impairments; and (4) language impairments, including deficits in morphosyntax comprehension in oral language, reading, and spelling. Furthermore, A's difficulties, inscribed in his developmental trajectories, must be conceptualized as the fruit of the interplay between (1) his history of prematurity, (2) the abnormalities

Table 12.6

Summary of interdisciplinary assessments in a multidimensionally impaired 7-year-old boy

Dimension (name of the test)	Scores	Comments
General cognition (WISC-5)		
Full-scale IQ	**Nonvalid**	Very heterogenous profile with lowest scores in processing speed and especially in working memory subtests
Verbal comprehension index		
Vocabulary	**VCI = 113**	
Similarities	11/19	
	14/19	
Visuospatial index	**VSI = 92**	Heterogenous results in visuospatial index with low scores in block design
Block design	7/19	
Visual puzzle	10/19	
Fluid reasoning index	**FRI = 100**	
Matrix reasoning	11/19	
Figure weights	9/19	
Working memory index	**WMI = 76**	
Digit span	5/19	
Picture span	7/19	
Processing speed index		
Coding	**PSI = 86**	
Symbol search	7/19	
Cancelation	8/19	
	8/19	
Attention and executive functions (EF)		
Auditory (A) attention NEPSY	12/19	Good scores in auditory modality and scores in the average range for visual attention according to the cancelation subtest
Inhibition and flexibility in A. modal NEPSY		
Comprehension in A. modal NEPSY	5/19	
Categorization NEPSY	6/19	
Word production NEPSY	7/19	
Opposite worlds TEA-Ch	8/19	
Verbal inhibition NEPSY	7/19	
Figure copying NEPSY	6/19	Low scores in complex auditory attention (comprehension task)
	4/19	
		Executive dysfunction with deficits in organization, anticipation, flexibility, and inhibition
Visuospatial abilities		
Visuospatial perception NEPSY	7	Visuospatial ability scores in the average range in perception but very low in construction using organization and planification abilities
Block construction NEPSY	4	
Rey-Osterrieth complex figure		
copy	4	
immediate recall	6	
Psychomotor assessment		
Manual dexterity M-ABC-2	2 (<5%)	Global motor retardation, including fine motor skills disabilities associated with visuospatial impairments
Oculomanual coordination M-ABC-2	9 (37%)	
Postural control M-ABC-2		
Total score M-ABC-2	6 (9%)	
Praxies EMG	5 (<5%)	
Hand imitation		
Fingers imitation	−0.74 SD	
Corporal schema (Goodenough drawing test)	−0.26 SD	
Laterality (Piaget-Head test)		
Visual perception subtest (Frostig test)	6 years	
Perceptual organization (Bender test)	<6 years	
	3/100	
	6 years	
Oral language assessment		
Understanding		
Lexicon N-EEL	79/89	Scores in the average range for expressive language
Morphosyntax N-EEL	11/16	
Production		
Phonology N-EEL	28/28	
Lexicon N-EEL	90/114	Scores in the average range for receptive language except for morphosyntax where A obtained low scores
Morphosyntax N-EEL	12/30	
		Absence of phonological impairments
Written language assessment		
Reading		
Character EDA	−6 SD	Overall low scores in written language
Word EDA	−2.11 SD	
Total reading EDA	−2.12 SD	
Phonological awareness N-EEL	10/20	

Table 12.6

Continued

Dimension (name of the test)	Scores	Comments
Dictation		
Dictation[EDA]	−1.88 SD	
Phonological awareness [BELO]	10%	

BELO, spelling and reading assessment battery (Pech-Georgel and George, 2006); *Bender visual-motor test*: Bender (1946); *EDA*, assessment of cognitive functions and learning (Billard and Touzin, 2012); *EMG*: evaluation of distal gnosopraxic motricity (Vaivre-Douret, 1997); *Frostig test*, developmental test of visual perception (Frostig, 1963); *Goodenough drawing test*, Goodenough and Harris (1963); *MABC-2*, Movement Assessment Battery for Children, Second Edition (Henderson et al., 2007); *N-EEL*, new tests for language assessment (Chevrie-Muller and Plaza, 2001); *NEPSY*, developmental neuropsychological assessment (Ahmad and Warriner, 2001); *Piaget-Head test*, right–left orientation test (Galifret-Granjon, 1960); *Rey-Osterrieth Complex Figure test*, Osterrieth (1944); *TEA-CH*, Test for Everyday Attention for Children (Manly et al., 1999); *WISC-5*, Wechsler (2014).

revealed in his neurologic examination, and (3) the circumstances of his conception and the family, cultural, and social contexts in which he grew up.

Outcome

A demonstrated progressively better adaptation to the care unit daily life with an improvement in his social interaction skills and a real gain in terms of autonomy. With regard to EEG abnormalities the neurologist introduced clobazam (7.5 mg/day). Concerning his learning difficulties, we recommended academic accommodations along with speech and occupational therapies in the context of the repetition of his first grade in primary school (of note, repetition is a practice that is frequent in France).

CONCLUSION

In view of a categorical approach, MDI children suffer from CDDs, and they could be clinically understood as the simple sum of several comorbid conditions that are sometimes identified as "other specified" or "unspecified" disorders. As illustrated by the case report, a multidimensional perspective inscribed in a developmental approach allows one to address the child holistically, taking into account his interactive experience with the environment. Promoting an empathetic relationship with the patient, this approach allows clinicians to achieve a functional diagnosis enabling the elaboration of a tailored therapeutic plan and better school inclusion.

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