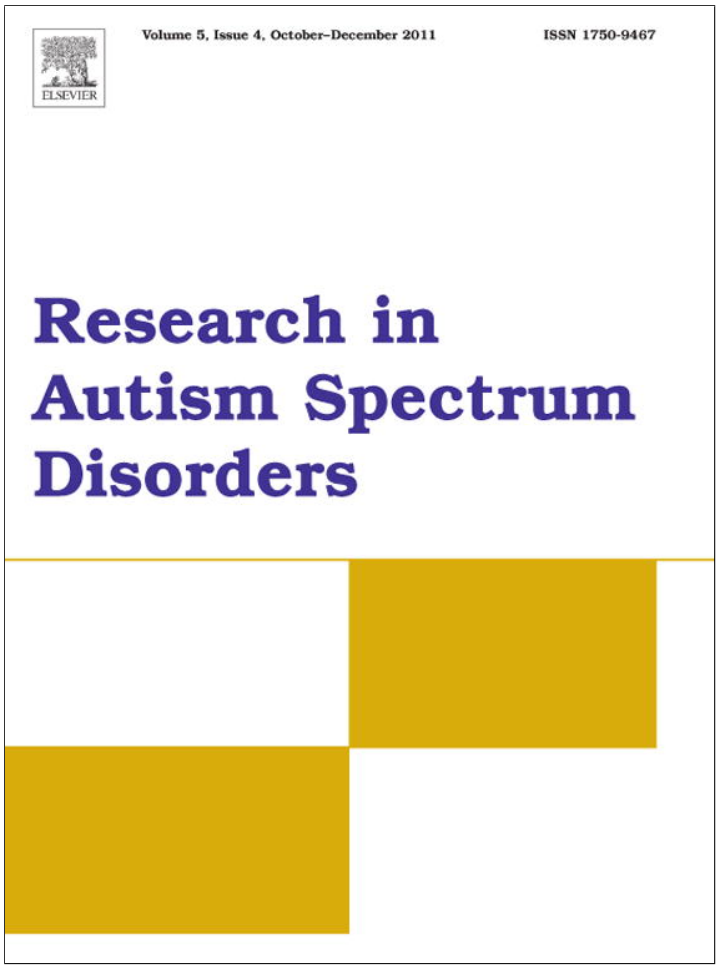

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Reliability and diagnostic efficiency of the Diagnostic Inventory for Disharmony (DID) in youths with Pervasive Developmental Disorder and Multiple Complex Developmental Disorder

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ABSTRACT

The Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) category is a psychopathological entity few have described and is poorly, and mainly negatively, defined by autism exclusion. In order to limit PDD-NOS heterogeneity, alternative clinical constructs have been developed. This study explored the reliability and the diagnostic efficiency of the Diagnostic Inventory for Disharmony (DID); its concurrent validity with the Vineland Adaptive Behavior Scales (VBAS); and its concordance with Multiplex Complex Developmental Disorder (MCDD) and PDD-NOS. Mean DID interrater reliabilities and internal consistency were good (.58 and .75, respectively). DID diagnostic efficiency yielded by the ROC analysis was very promising using a cut-off score of 12/36 (AUC = .97, sensitivity = .93, specificity = .91). Spearman correlations between the DID total score and the three subscales in the VABS socialization domain were significantly negative, thus confirming an association between Disharmony and impairments in socialization. However, no correlation was found between Disharmony and community daily living skills, likely reflecting a better autonomy in daily activities. Disharmony phenomenology overlapped with Autism Spectrum Disorders (DID and PDD concordance: kappa: .41; $p < .01$). Nevertheless, the Disharmony construct seemed to differ from PDD-NOS and be closer to MCDD. We conclude that Disharmony and MCDD constitute complementary views on the same group of severely impaired children.

1. Introduction

Both clinicians and researchers are facing a huge increase in the prevalence of Pervasive Developmental Disorders (PDD) resulting in part from the expansion of the diagnostic criteria (Matson & Kozlowski, 2011). According to the DSM-IV-TR, the PDD group includes a wide variety of diverse conditions pertaining to the autism spectrum: Autistic Disorder (AD), Asperger

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disorder (AS), Rett syndrome, disintegrative disorder of childhood, and PDD Not Otherwise Specified (PDD-NOS)(American Psychiatric Association, 2000; Rapin, 2002). Prevalence estimates are 13 per 10 000 for AD, 2.6 per 10 000 for AS and 20.8 per 10 000 for PDD-NOS (Fombonne, 2005). In France, the concept of what constitutes PDD has been expanded to include Disharmony, a notion introduced by the French Child Psychiatry school (Mises et al., 2002) and until recently conceived of as a distinct entity. Expansion in diagnostic criteria and recognition of PDD as a lifelong disorder has led to even higher figures as shown by recent reviews on prevalence studies (Matson & Kozlowski, 2011). Despite PDD-NOS tending to be more commonly diagnosed than AD, there are fewer studies on the predictive validity and stability of this diagnostic category (Mahoney et al., 1998; Matson & Boisjoli, 2007; Witwer & Lecavalier, 2008), and the developmental trajectories of PDD-NOS are marked with heterogeneity (Chawarska, Klin, Paul, & Volkmar, 2007; Charman et al., 2005; Cox et al., 1999). A recent meta-analysis (Rondeau et al., 2011) showed that PDD-NOS diagnostic stability was lower than AD (pooled Relative Risk was 1.95, $p < .001$). When diagnosed before 36 months PDD-NOS bore a 3-year stability rate of 35%. Examining the developmental trajectories showed that PDD-NOS corresponded to a group of heterogeneous pathological conditions including prodromic forms of later AD, remitted or less severe forms of AD (Leroy et al., 2010; Stone et al., 1999), and developmental delays in interaction and communication (Buitelaar & van der Gaag, 1998).

In the past, other proposals have been formulated to catch subgroups of children with less severe pervasive developmental trajectories than autism. In the US, the Yale Child Study Center team described the Multiplex Developmental Disorder (MDD) focusing on the clinical phenomenology of patients who presented a later age of onset and a better outcome (Cohen, Paul, & Volkmar, 1987). Symptoms were distributed into three separate domains: emotional, social and cognitive. In the Netherlands, Buitelaar and van der Gaag (1998) individualised a subtype of PDD-NOS, Multiple Complex Developmental Disorder (MCDD) that paralleled the Yale team construct and for which they validated a criteria scoring algorithm. In Sweden, Christopher Gillberg described a syndrome named Deficit in Attention, Motor control and Perception (DAMP) (Gillberg, 2003). The syndrome encompassed Attention-Deficit-Disorder-Not-Otherwise-Specified and motor coordination disorder with normal or borderline intelligence. The condition was compatible with comorbidities such as autism spectrum disorder, major depression or oppositional defiant disorder. Finally, in France, the concept of Disharmony was used to describe a developmental disorder characterized by the association of focal cognitive delay, emotional disturbances and learning difficulties. The phenomenology has been regrouped under two diagnostic labels, psychotic Disharmony (Mises et al., 2002) and cognitive Disharmony (Gibello, 2010) according to the hypotheses underlying the core psychopathological processes: impairments in self construction and discrepancies in cognitive development respectively.

There remains a need to better define PDD, especially PDD-NOS and improve both positive and differential diagnoses (Matson & Boisjoli, 2007; Rondeau et al., 2011). In order to achieve better diagnostic procedures research has to be done in developing proper assessment instruments (Matson, Nebel-Schwalm, & Matson, 2007). Among the previously mentioned proposals, only MCDD received proper empirical validation. In keeping with the proposal from the Yale Child Study Centre, the Netherlands Group evinced a set of symptom patterns in children with PDD-NOS which they labelled as a specific entity, "Multiple Complex Developmental Disorder" (MCDD). This entity was defined by (a) important social and communication difficulties, (b) emotional dysfunction, (c) cognitive disturbances, (d) a risk for schizophrenia in adolescence, and (e) a higher biological reactivity to stress. The group also validated the MCDD criteria in a sample of outpatients. Concurrent validity was assessed towards the Child Behavior Check List (Buitelaar and van der Gaag, 1998; De Bruin, De Nijs, Verheij, Hartman, & Ferdinand, 2007; Lahuis et al., 2008; Van der Gaag et al., 1995).

Tordjman et al. (1997) set up an Expert Work Group to study the French and US concepts. They identified a set of operationalised diagnostic criteria for each of the two constructs, MDD and Disharmony that the present study aimed to compare. They highlighted the similarities in the potential cases despite differences in the proposed criteria. The French Disharmony puts clinical and psychodynamic elements on the same level, while the US MDD concept proposed a more descriptive model and appears potentially more relevant for research (Tordjman et al., 1997).

The first aim of the present study was to explore the reliability and the diagnostic efficiency of the Diagnostic Inventory for Disharmony (DID) and its concurrent validity with the Vineland Adaptive Behavior Scales. In addition we aimed at studying the concordance between Disharmony, MCDD and PDD-NOS.

2. Methods

2.1. Sample

The study was conducted in accordance with the Hospital's Research Ethics Board regulations on two-day care units in a University teaching Hospital Child and Adolescent Psychiatry Department. The study concerned all consecutive admission for children at risk for Disharmony over a period of 18 months in 2009–2010. Inclusion required at least the presence of two diagnostic criteria for Disharmony. The resulting sample was composed of 41 six- to thirteen-year-old children (mean age: 10.02; SD: 2.10) with 39 boys and 2 girls. Participants' performance IQ ranged from 47 to 116 (mean 86.23; SD 16.62). Two children presented with Mental Retardation with performance quotient <70. All children were severely impaired. Total score on the Children's Global Assessment Scale (CGAS) ranged from 25 to 50 (mean score < 40). Following diagnostic assessment thirty children with Disharmony and eleven without Disharmony were included. Main characteristics of the sample are summarized in Table 1.

Table 1
Main characteristics of the participants ($N = 41$).

Age, mean (±SD)	10.05 (2.10)
Male/female	39/2
Socio-economic status: high/middle/low	12/19/10
Children's Global Assessment Scale: mean (±SD)	36.88 (7.08)
WISC performance IQ, mean (±SD)	86.23 (16.62)
WISC verbal IQ, mean (±SD)	92.61 (22.74)
VABS for children: (mean ± SD)	
Community daily living skills	30.63 (9.36)
Interpersonal relationships	40. (7.31)
Play and leisure time	24.93 (4.41)
Coping skills	16.85 (7.53)
DSM-IV-TR diagnosis	
Autism Disorder	$N = 14$
PDD-NOS: narrow definition/broad definition	$N = 3/N = 8$
Developmental Coordination Disorder	21
Attention-Deficit Hyperactivity Disorder	11
Mixed Receptive-Expressive Language Disorder	11
Reading Disorder	12
Reactive Attachment Disorder	12

VBAS, Vineland Adaptive Behavior Scales; WISC, Wechsler Intelligence Scale for Children; PDD-NOS, Pervasive Developmental Disorder Not Otherwise Specified.

2.2. Procedure

After being fully informed about the study, consents were obtained from parents or legal caregivers. During a one-week period of clinical assessments, each child was given a series of clinical and psychological assessments (see below). Interrater reliability was assessed in a subsample of 32 participants by two clinicians blind to the other rater's evaluation. For each child, a DSM-IV-TR diagnosis was obtained using team consensus best estimate (Klein, Ouimette, Kelly, Ferro, & Riso, 1994). Diagnoses were based on all available information (including direct interviews, family history data, treatment records, and psychomotor and learning assessment) and determined in consensus meeting gathering clinicians involved in children care, including psychiatrists experienced in using DSM-IV-TR (J.X., D.C., S.V., and J.M.).

2.3. Instruments

The Diagnostic Inventory for Disharmony (DID) is a 12-item care giver report available in French covering all symptoms of the Disharmony construct operationalised in a previous literature review (Tordjman et al., 1997). This tool allows a clinical rating of each criterion in terms of presence/absence and also assesses the index of severity of disorder on a Likert scale into four levels (0–3: absent, mild, moderate or severe). According to the literature, the 12 probes are regrouped in six sections: reality testing, thought content, raw expression of the impulses, anxiety, dual relationship and immaturity. Items are given the same weight and are summed up to yield criterion and section's scores. The Diagnostic inventory for Multiple Complex Developmental Disorder (MCDD) is an 8-item care giver-report available in French covering all symptoms of the MDD. This scoring rule is recommended by Buitelaar and van der Gaag (1998) and construct operationalised in a previous literature review on the basis of early works from Donald Cohen who first introduced this concept. We scored each item on a 4-point Likert scale, as absent, mild, moderate or severe. The eight probes are regrouped in three sections: impaired regulation of affective state and anxieties, impaired social behavior, and presence of thought disorder. Items are given the same weight and are summed up to yield criterion and sections scores. We conducted an interrater reliability study on each item, and for the total raw score (see Table 2). Apart from item 1 which displayed a negative low boundary of the confidence interval interrater agreements, all interrater agreement scores were significant with a mean score equal to .51. The scale internal consistency was good with the Cronbach's alpha coefficient equalling .85 and item-total correlations ranging between .14 (item 2) and .66 (item 3).

The Autism Diagnostic Interview-R (ADI-R) is a semi-structured interview for parents that investigate both current and past phenomenology (at age of 4/5 years) on four clinical domains in autism: early development, social interaction, communication, and stereotyped behaviors and limited interests (Lecavalier et al., 2006; Lord, Rutter, & Le Couteur, 1994). Results can be scored and interpreted for formal diagnosis using age-specific ADI-R algorithms including the four domains. The Current Behavior Algorithms yield a continuous score for present functioning in social interaction, communication, and stereotyped behaviors and limited interests' domains. To qualify for Autistic Disorder participants needed to meet the cut-offs in all four domains. As the ADI-R scoring manual (p. 34) is basically referring to clinical judgment for Pervasive Developmental Disorders-Not Otherwise Specified (PDD-NOS), we used two alternative algorithms. The first developed by Lecavalier et al. (2006) consisting of a score above the cut-off on the reciprocal social interaction domain and a score above the cut-off on *either* communication or repetitive behavior domains. The second, with respect to a broader definition of PDD-NOS, the Montreal algorithm stating that to be considered as PDD-NOS, children have to meet the reciprocal social

Table 2
Interrater reliability of the Multiplex Complex Developmental Disorder inventory ($N = 32$).

	ICC	95% CI	$p<$
1. Unusual or peculiar fears and phobias, or frequent idiosyncratic or bizarre anxiety reactions	.29	−.06–.58	NS
2. Recurrent panic episodes or "flooding" with anxiety	.75	.54–.87	.001
3. Episodes of behavioural disorganisation punctuated by markedly immature, primitive, or violent behaviors	.54	.23–.75	.001
4. Social disinterest, detachment, avoidance, or withdrawal despite evident competence	.40	.07–.66	.01
5. Severely impaired peer relationships	.36	.02–.63	.05
6. Markedly disturbed attachments; high degrees of ambivalence to adults (esp. parents/caretakers)	.40	.06–.66	.05
7. Irrationality, sudden intrusions on normal thought process, magical thinking, neologisms or repetition of nonsense words, desultory thinking, blatantly illogical, bizarre ideas	.67	.41–.82	.001
8. Perplexity and easy confusability (trouble understanding social processes or keeping thoughts 'straight')	.62	.34–.80	.001
9. Delusions, overvalued ideas including fantasies of omnipotence, paranoid preoccupations, overengagement with fantasy figures, grandiose fantasies of special powers, and referential ideation.	.54	.23–.75	.001
Total raw score	.67	.43–.83	.001

ICC, Intra-Class Correlation; CI, confidence interval.

interaction's cut-off (Fombonne, personal communication). In any case participants who scored below the cutoff were considered as not being part of the spectrum.

The Vineland Adaptive Behavior Scales (VABS) for children are standardized rating instruments that measure four adaptive skill domains: socialization, communication, daily living, and motor skills. Although motor skills are ordinarily assessed in children below the age of 6, all other domains can be measured in individuals from birth to adulthood (Sparrow, Cicchetti, & Balla, 2005). Raw scores are tabulated and transformed to obtain domain standard scores and a composite standard score with an average of 100 and an SD of 15. The VABS were completed through semi-structured interviews with primary caregivers. We were interested in the way patients with Disharmony behave in social domains. We selected in the VABS the four subdomain scales which evaluate social behaviors: community daily living skills, interpersonal relationships, play and leisure time and coping skills, the last three being regrouped in the socialization domain. In order to know to which extent psychopathology impede socialization we conducted Spearman correlations using continuous scores on the Disharmony inventory and ADI present functioning.

2.4. Statistical analyses

Interrater agreements were measured using Intra-Class Correlations (ICCs) and kappa coefficient with the scale's continuous scores and the categorical diagnostic classification respectively. Pearson coefficients and Cronbach's alpha coefficient were calculated to evaluate the scales' internal consistency. To investigate the concurrent validity and the diagnostic efficiency of the instruments with a categorical variable as criterion, we used Receiver Operating Characteristic (ROC) analyses. Finally, to explore the concordance between diagnostic entities we used both categorical and continuous scores with kappa and Spearman correlations. To explore correlations with VABS we used Spearman correlations on continuous scores.

3. Results

3.1. Disharmony inventory validity

Items and Sections Intra-Class Correlations (ICCs) for interrater reliability are presented in Table 3. Items have been regrouped in six sections as per recommended regrouping of items (Tordjman et al., 1997). All interrater agreement scores were significant with a mean score equal to .58. Apart from items 3 and 9 which displayed the lowest boundaries of the confidence interval, interrater agreements were good. The scale internal consistency was good with the Cronbach's alpha coefficient equalling .75 and item-total correlations ranging between .33 (item 9) and .75 (item 3).

A Receiver Operating Characteristic (ROC) analysis was conducted to investigate the diagnostic efficiency of the Diagnostic Inventory for Disharmony (DID) with respect to the clinical diagnosis. The area under the curve (AUC) is an overall index of the accuracy of the predictive power of a scale. The strength of an instrument is manifested by the degree to which its corresponding AUC value is greater than .50. In the absence of gold standard for diagnosing Disharmony, we used the clinical diagnosis made according to the team best estimate procedure (Klein et al., 1994). The total cut-off score which held the highest clinical efficiency was 12 (sensitivity: .93; specificity: .91). The AUC for the whole sample was .97 ($p < .001$).

3.2. Social adjustment in Disharmony

All children with Disharmony were severely impaired. The mean CGAS score was 33.83 (SD: 5.45) denoting major impairments of functioning in several areas in this group. The CGAS score was inversely correlated with the total score on the

Table 3
Interrater reliability of the Diagnostic Inventory for Disharmony ($N = 32$).

		ICC	95% CI	$p<$
Item interrater reliability				
1	Threat of breach of reality	.70	.48–.84	.001
2	Absence or poor self-consciousness and reality testing	.67	.42–.82	.001
3	Tendency to be overflooded with affects	.36	.02–.63	.05
4	Mental representations marked with extreme crudity	.64	.38–.81	.001
5	Direct pulsional expression in behaviors	.67	.43–.83	.001
6	Direct pulsional expression in fantasy life	.54	.24–.74	.001
7	Direct pulsional expression in somatization	.44	.11–.68	.01
8	Nihilistic anxiety	.67	.42–.82	.001
9	Separation anxiety	.31	−.04–.60	.05
10	Panic attacks	.49	.18–.71	.01
11	Predominance of dual relationships with inability to access mature identification processes	.62	.35–.79	.001
12	Predominance of primitive psychic functioning	.71	.48–.84	.001
Section interrater reliability				
Reality testing (items 1 + 2)		.73	.52–.86	.001
Thought content (items 3 + 4)		.60	.32–.88	.001
Raw expression of the impulses (items 5 + 6 + 7)		.67	.42–.82	.001
Anxiety (items 8 + 9 + 10)		.61	.34–.79	.001
Dual relationship (item 11)		.62	.35–.79	.001
Immaturity (item 12)		.71	.48–.84	.001
Total raw score		.70	.45–.84	.001

ICC, Intra-Class Correlation; CI, confidence interval.

Diagnostic Inventory for Disharmony (Spearman correlation: .67; $p < .01$). Furthermore we were interested in the way children with Disharmony behave in social domains. In the Vineland Adaptive Behavior Scales (VABS) we selected the four subdomains which evaluate social behaviors and adjustment: community daily living skills, interpersonal relationships, play and leisure time and coping skills, the last three being regrouped in the scale's socialization domain. In order to know to which extent psychopathology impede social adjustment, we conducted Spearman correlations using continuous scores on the Diagnostic Inventory for Disharmony (DID) and ADI-R present functioning scales (Table 4). Spearman correlations between the DID total continuous score and the three subscales in the VABS socialization domain were significantly negative, thus confirming an association between Disharmony and impairments in socialization. However no correlation was found between Disharmony and community daily living skills, likely reflecting a better autonomy in daily activities. Of note the Disharmony VABS profile was similar to the MCDD profile. In addition, the ADI-R present functioning score was significantly correlated with the four VABS subdomains.

3.3. Concordance with PDD, AD and PDD-NOS

Regarding the autism phenomenology as captured by the ADI-R, we found a significant correlation between the ADI-R total score at 4 years and the DID total score (Spearman $\rho = .48$, $p < .01$). Using diagnosis as a dichotomous variable according to each instrument threshold, we found a significant concordance between Disharmony and PDD (kappa: .41; $p < .01$). But no concordance between Disharmony and specific Autism Spectrum Disorders whether AD (kappa: .10; NS) or PDD-NOS was found. Using a narrow or a broader definition of PDD-NOS, analyses yielded the same negative result. Using the narrow definition for PDD-NOS, 14 children fulfilled criteria for AD and 3 children for PDD-NOS at 4-year-old among the 30 children with Disharmony (kappa coefficient = .01, $p = .64$). The broader definition for PDD-NOS identified 14 children with AD and 8 children with PDD-NOS at 4-year-old among the 30 children with Disharmony (kappa coefficient = .04, $p = .48$).

Table 4
Correlations between VABS and total scores of the different clinical inventory constructs (DID, MCDD and ADI-R).

VBAS	DID total score	ADI-R current functioning	MCDD inventory total score
	Spearman correlation coefficients		
Community daily living skills	−.151 ($p = .425$)	−.392 ($p = .035$)	−.089 ($p = .64$)
Interpersonal relationships	−.431 ($p = .017$)	−.52 ($p = .004$)	−.51 ($p = .004$)
Play and leisure time	−.47 ($p = .009$)	−.62 ($p < .001$)	−.37 ($p = .045$)
Coping skills	−.36 ($p = .048$)	−.63 ($p < .001$)	−.26 ($p = .16$)

DID, Diagnostic Inventory for Disharmony; MCDD, Multiplex Complex Developmental Disorder; ADI-R, Autism Diagnostic Interview-Revised; VBAS, Vineland Adaptive Behavior Scales.

3.4. Concordance with MCDD

Diagnosis concordance between Disharmony and MCDD was assessed using continuous and dichotomic variables. Using the inventory's continuous total scores, Spearman correlation between Disharmony and MCDD was .81 ($p < .001$). Using DID threshold and MCDD threshold recommended by Buitelaar and van der Gaag (1998), the kappa coefficient between categorical diagnosis of Disharmony and MCDD was .51 ($p < .01$). Among the 30 children with Disharmony, 23 fulfilled criteria for MCDD while concordance between MCDD and PDD was significant (kappa: .34; $p < .05$).

4. Discussion

In keeping with the current state of knowledge which pleads for further research in differential diagnosis and validation of assessment instruments (Matson & Boisjoli, 2007; Matson et al., 2007; Rondeau et al., 2011), our study is the first to provide empirical data on the validity of the Disharmony construct as an Autism Spectrum Disorders entity. Several limitations of this study are noteworthy. First, its design and limited sample size did not allow for a factorial analysis. In addition, the temporal stability of the measure was not assessed. Therefore, our results should be considered as preliminary. Second, the absence of a concurrent assessment with the Autism Diagnostic Observation Schedule limited the clinical conclusions we could derive on associations with the current functioning in our participants (Gotham, Risi, Pickles, & Lord, 2007).

Reliability properties of the Diagnostic Inventory for Disharmony (DID) which emerge in our sample are good with mean interrater reliabilities and internal consistency equalling .58 and .75 respectively. Furthermore the diagnostic efficiency of the instrument yielded by the ROC analysis was very promising with an AUC equalling .97. Using a cutoff score of 12/36, the DID presented a very good clinical efficiency with a sensitivity value of .93 and a specificity value of .91.

Our findings support the distinction between Autistic Disorder and Disharmony as previously reported in monographic studies (e.g. Leroy et al., 2010). We found no concordance between AD and Disharmony. However, 14 children fulfilled criteria for AD among the 30 children with Disharmony, pleading for a certain degree of overlap which should be further investigated. Of note our results confirm that Disharmony phenomenology overlaps with Autism Spectrum Disorders as shown by the significant concordance between Disharmony and PDD (kappa: .41; $p < .01$). This would support the relevance of including Disharmony in the autism spectrum.

The Disharmony construct nevertheless seems to differ from PDD-NOS and be closer to the notion of MCDD developed by the Netherlands group. Although emerging from different backgrounds, in our sample the two constructs showed a significant concordance and shared similar figures in the realm of social adjustment. They might constitute complementary views on the same group of severely impaired children, the Netherlands group stressing the developmental perspective and the French group emphasising psychopathology conceptualizations (Tordjman et al., 1997).

Recent literature reviews on PDDs stressed the need to further delineate among the autism spectrum, subgroups with likely discrete developmental trajectories. Our recent meta-analysis confirmed the hypothesis that AD bears a higher diagnosis stability than PDD-NOS which tends to be unstable over time (Rondeau et al., 2011). Therefore the literature seems not to support the discriminant and predictive validity of PDD-NOS. Given that PDD-NOS covers a wide variety of pathological conditions including less severe forms of AD, better trajectories of some children with AD at 4/5 years and PDD-NOS at 10/12 years, and developmental delays in interaction and communication, further exploration of psychopathological entities such as MCDD and Disharmony might be promising.

To support this line of research, we recently conducted two different studies in children with PDD-NOS, each participant fulfilling criteria for Disharmony (D) and MCDD (Demouy et al., in press; Ringeval et al., 2011; Vannezel, Chaby, Cautru, Cohen, & Plaza, 2011). The first study explored processing of neutral and emotional human stimuli (by auditory, visual and multimodal channels). Compared to typically developing children, the PDD-NOS/D/MCDD group (a) accurately processed neutral human stimuli; (b) had difficulty processing emotional stimuli in general and more easily identified happy compared to angry or neutral faces; (c) had a strong discrepancy between emotional and neutral human stimuli processing; (d) used the multimodal channel to compensate for unimodal deficits, especially for angry faces; and (e) was strongly heterogeneous (Vannezel et al., 2011). Second, we investigated language impairment in ASD and Specific Language Impairment (SLI) by comparing children with AD, SLI and PDD-NOS/D/MCDD matched for age, sex and academic skills (Demouy et al., in press; Ringeval et al., 2011). A similar delay in phonology and vocabulary was observed in all three groups as were significant but variable differences between the groups in syntax, pragmatics and prosody. SLI showed correlations between chronological age and raw scores in all language tasks, while AD and PDD-NOS/D/MCDD did not. Furthermore, SLI showed correlation within all raw scores in language tasks. Most of those correlations were also found in the PDD-NOS/D/MCDD but not in AD. In sum, language skills in AD and SLI rely on different mechanisms, while PDD-NOS/D/MCDD show an intermediate profile sharing some characteristics of both AD and SLI. They also suggest that expressive syntax, pragmatic skills and some intonation features could be considered as language differential markers of pathology, challenging the DSM-V proposal of broad criteria.

With respect to the current proposed revision of DSM-IV-TR criteria for ASD including merging the three subtypes, AD, AS and PDD-NOS, into one category, namely Autism Spectrum Disorder (ASD), our studies, together with those of the Utrecht group, clearly demonstrated the heterogeneity of the PDD-NOS group which will impact the predictive validity of the proposed DSM-V entity. The international clinical and research consensus on the robustness of AD as defined by currently

more stringent DSM criteria, would be lost. International communication and comparison between interventions will be jeopardized. Given that PDD-NOS covers a wide variety of pathological conditions including less severe forms of AD, further exploration of psychopathological entities such as MCDD and Disharmony definitively deserves attention.

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