Application of the Final DSM-5 Criteria for Young Children with Autism Spectrum Disorder

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Abstract

Background: DSM-5 has received considerable attention all over the world. This study aimed to compare the diagnostic outcomes using both DSM--TR and the final version of DSM-5.

Methods: One hundred eighty children under 5 years old at risk for neurodevelopmental disorders had been detected by a regional screening system in Nagoya, Japan. We collected their information from diagnostic records including scores of the Pervasive Developmental Disorders Autism Society Japan Rating Scale.

Results: All 8 cases with autistic disorder and all 27 with Asperger's disorder corresponded to the ASD criterion. Although 2 cases with PDD-NOS were suspected of social communication disorder, 27 cases with PDD-NOS corresponded to ASD. Among 47 cases with specific language impairment, 5 cases were suspected of social communication disorder.

Conclusion: Most of the cases (62/64) with PDDs met the ASD criterion, but the abolition of subcategories of PDDs results in one criteria of ASD covering a wide range, from extremely severe to more mild types. Further investigation and discussion are necessary for an appropriate use of DSM-5.

Keywords: Autism; Autism spectrum disorder; Neurodevelopmental disorders; DSM-5; Social communication disorder

Introduction

The fifth version of the Diagnostic and Statistical Manual of the Mental Disorders (DSM-5) was published in May 2013 [1]. Changes were made throughout this manual. Updates to the neurodevelopmental disorders may have an effect on children's diagnoses, their treatments, and the concept of pediatric psychiatry. The remarkable changes are listed below.

- A single diagnosis, Autism Spectrum Disorder (ASD), has been substituted for Pervasive Developmental Disorders (PDDs) consisting of five subcategories.
- Whereas the PDDs diagnostic framework consisted of a triad of impairments, the new one consists of two: one is the Social Communication (SC) dimension, and another is the Restricted and Repetitive Behaviors (RRB) dimension.
- Sensory abnormalities have been added to symptoms in the RRB dimension.
- There was the development of a new category, Social Communication Disorder (SCD), which is used for individuals who present only SC problems and do not display RRB.

Before the final version of DSM-5 was released in May 2013, several investigations with the proposed draft had been done [2-11]. These preliminary studies showed that a considerable percentage (8.8%~53.8%) of children with PDDs diagnoses did not meet the new criterion of ASD. The results made families anxious whether their affected children not meeting the new criteria might therefore lose necessary services. Therefore, a relaxed rule for ASD was argued for [2,7,8,11]. In the draft, whereas the strict rule which requires all three factors of the SC dimension and two out of four factors of the RRB dimension was employed, several researchers have proposed original relaxed rules. After much argument, the sentence mentioning the numbers of the SC dimension is completely deleted in the final version, while the 2/4 rule of the RRB dimension is maintained [1]. Furthermore, the additional comment that individuals with a DSM-diagnosis of PDDs should be given the diagnosis of ASD is added to this version. These changes were the most drastic change in the process from the draft to this version. It seems that the final version aims at the correspondence of the range between DSM-4 and DSM-5, whereas the draft aimed to make a strict category of ASD.

Another topic was SCD, but a detailed diagnostic procedure of SCD has not been determined yet. Even the final version of DSM-5 shows only an outline of the concept SCD. It shows merely a few examples of SCD in older ages, but none in toddlers. Furthermore, a field trial focusing on this disorder has not been done yet. Therefore, there seems to be much current confusion about the diagnosis of SCD

[12,13]. Gibson et al. [12] suggested that SCD is a developmental disorder outside ASD, but SCD does not belong to a group of ASD, but to a group of communication disorders in the textbook of DSM-5[1].

As there is a consensus that an early intervention in young children with ASD contributes greatly to improved outcomes, it is important to discriminate among ASD, SCD and other neurodevelopmental disorders at this early period. In the current study we compare the DSM--TR and DSM-5 criteria for young children with neurodevelopmental disorders in order to clarify the problems at this age.

Method

Screening system

This study was conducted using a regional, routine screening system for infants and toddlers. A screening system for developmental disorders in the western region of Nagoya city in Japan is well organized [14]. The first stage is a routine health check-up at general health centers for 18-month-old and 3-year-old children.The participation rate for each check-up has reached more than 90%. All infant with developmental problems are referred to the Nagoya West District Care Center for Disabled Children (NWDC center). The second stage is based on observations at day nurseries and kindergartens. If toddlers present behavioral problems there, they are referred to the center, too. Therefore, even if the 18 month-old and 3-year-old check-up failed to detect any developmental problems, the next step can.

When children visit the NWDC center at the first time before 5 years old, approximately 60% of them had a delay of language development, 20 % had behavioral problems, and 10% complain a delay of intellectual development

Subjects

In the year of 2012, 320 children under 5 years old visited the NWDC center for the first time. As shown in Figure 1, 28 cases with a known medical or genetic disease were excluded. Next, 3 cases with mental disorders, except neurodevelopmental disorders, were excluded.

Furthermore, 17 cases under 24 months of age, and 92 cases with a developmental age under 24 months were also excluded. Finally, 180 cases suspected of neurodevelopmental disorders were selected. As shown in Table 1, age and Intelligence Quotient (IQ) score of the excluded cases were lower than those of the included cases.

The statistic difference between included cases and excluded cases was analyzed with a student t test for age and intelligence quotient, and with a Chi-square test for gender and race. When there is a statistical difference (p<0.05), an asterisk (*)is indicated. **Japanese parent means that both mother and father were Japanese, whereas non-Japanese means that at least one was not Japanese.IQ, Intelligence Quotient.

The ratio of autistic disorder/whole PDDs was smaller (0.125) than that in our previous report (0.274)[14], likely a result of the selection process in which severely delayed cases were excluded.
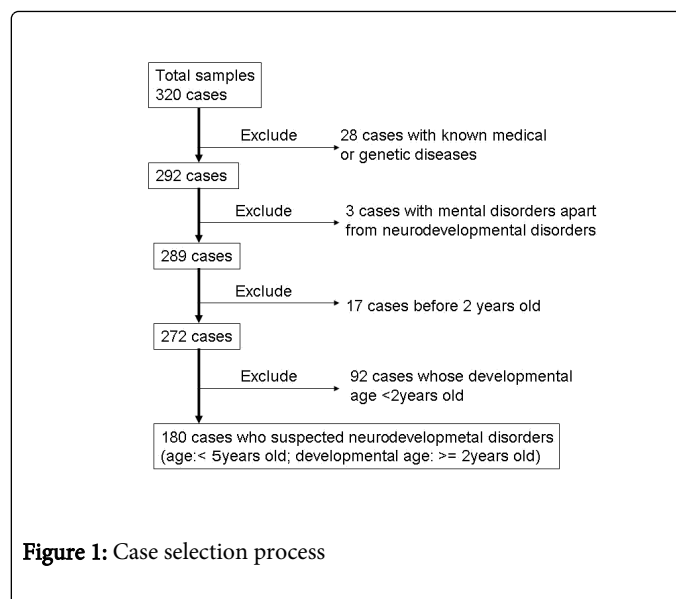

Figure 1: Case selection process

Subjects	Included cases	Excludes cases
( ): number	180	140
Months of age (mean ± S.D.)	43.3 ± 7.7 * 29.6 ± 10.2	
[ ]:range	[2759] [357]	
IQ test (mean ± S.D.)	88.5 ± 14.0 * 66.3 ± 19.9	
[ ]:range	[54124] [7117]	
Gender (male/female)	135/45	93/47
Race** (non-Japanese/Japanese parent)	7/173 * 1/139	

Table 1: Sample characteristics of included and excluded cases

Regular diagnostic process at the NWDC center

An initial interview: Psychologists use an original interview form for parents in order to obtain information about a family history, a medical history, and an early developmental history, such as motor milestones, the first single word, and the first phrase with two words. Furthermore, they ask parents about toilet training, problems at play, any loss of skills, abnormal sensitivities and anxious symptoms.

A semi-structured interview: The Pervasive Developmental Disorders Autism Society Japan Rating Scale (PARS) [15] is performed. PARS consist of 34 questions including those for abnormal sensitivities. Questions divide into four subgroups, the SC, the sensitivity/difficulty, the stereotype behavior and the restricted interests. The symptoms of the SC subgroup correspond to the SC dimension of DSM-5, and the latter three subgroups correspond to the RRB dimension. It consists of both an evaluation of symptoms when they were most pronounced(the peak symptom scale)and an evaluation of current symptoms (the current symptom scale). Only the current symptom scale is employed for toddlers because there is a possibility that more severe symptoms may appear in the future. The subgroup score and the total score of PARS are roughly correlated with those of Autism Diagnostic Interview-Revised (ARI-R) [15,16].

A standardized test on a child: The Tanaka-Binet test (the Japanese version of Stanford-Binet test) or the Shinban-K-Shiki developmental test is used for the evaluation of intellectual function.

Observation: Pediatric psychiatrists observe a child's behaviors carefully in a play space with assistant of public health nurses.

Clinical judgment: All available information is used for clinical judgments. Diagnoses are made by pediatric psychiatrists (authors SS and TM) with over 15 years of experience in the field of developmental disorders. Apart from language impairment, DSM-4-TR criteria have been used. As it required a complicated examination to evaluate separately expressive or receptive language ability, we have employed a single criterion, Specific Language Impairment (SLI), instead of the two language criteria of DSM-4-TR.

Procedure of this study

In the period between August 2013 and November 2013 we collected information about the symptoms and the DSM-4-TR criteria from diagnostic records, and re-examined each subject.

In the process of re-examination we used the final version of DSM-5 in which the required number of the SC dimension was deleted. Therefore, we disregarded the number of factors, but attached importance to evaluating the whole ability of SC, befitting for their age. On the other hand, the rule which requires 2/4 factors of the RRB dimension was used in this process.

When a case had a difficulty in SC, but presented no or only one factor of the RBB dimension, we classified him temporarily into "SCD suspected". But we could not make a final diagnosis of SCD because a detailed diagnostic procedure in this early period has not yet been shown.

Ethics approval was obtained from the ethics committee of Nagoya City University Medical School.

Results

Comparison between DSM-4-TR and DSM-5 criteria

According to DSM-4-TR criteria, the number of children with PDDs accounted for 64 cases (autistic disorder, 8 cases; Asperger's disorder, 27 cases; Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), 29 cases). All children with autistic disorder or Asperger's disorder corresponded to ASD of DSM-5 criteria (Figure 2).

Arabic numbers following the diagnoses show numbers of the cases. PDDs, pervasive developmental disorder ; Autism, autistic disorder; Asperger, Asperger's disorder, PDD-NOS, pervasive developmental disorder not otherwise specified; SLI, specific language impairment; MR, mental retardation; Border, borderline intellectual functioning; Phonol.,phonological disorder; Attachment, reactive attachment disorder; Diag.Def., diagnosis deferred; ADHD, attention-deficit/hyperactivity disorder; DCD, developmental coordination disorder; ASD, autism spectrum disorder; SCD susp., social communication disorder suspected; Language, language disorder; Intellectual, intellectual developmental disorder; Sound, sound disorder. Twenty-seven cases with PDD-NOS corresponded to ASD, but two to SCD suspected because they presented only one factor of the RRB dimension.

Among 47 cases with SLI, 41 were language disorder of DSM-5, 5 were SCD suspected, and one was "diagnosis deferred". The cases with SCD suspected presented a delay in verbal development and atypical behaviors in social interaction, whereas they did not display RRB. The atypical behaviors mean a little interest in their parent, occasional poor eye-to-eye contact, or sometimes a lack of response when their names were called.
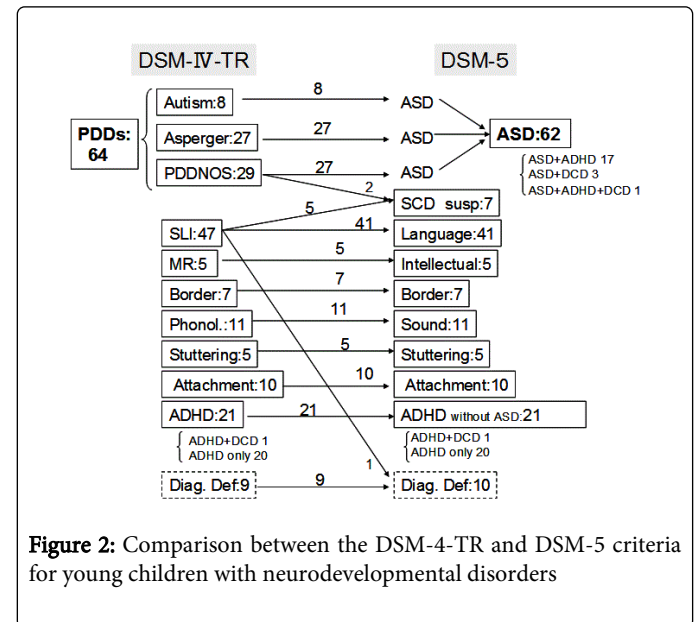

Figure 2: Comparison between the DSM-4-TR and DSM-5 criteria for young children with neurodevelopmental disorders

The case with diagnosis deferred showed a delay in verbal development and a mild hypersensitivity to particular sounds. As sensory abnormalities become more important in DSM-5, we thus suspected ASD as well as a language disorder.

There were a lot of ASD cases with comorbidity: 17 cases were ASD with Attention Deficit/Hyperactivity Disorder (ADHD); 3 cases were ASD with Developmental Coordination Disorder (DCD); 1 case was ASD with DCD and ADHD.

Distribution of total scores of Pervasive Developmental Disorders Autism Society Japan Rating Scale

As shown in Figure 3, total scores of PAR distributes continuously.

PARS, Pervasive Developmental Disorders Autism Society Japan Rating Scale. The current symptom scale of PARS was used. Abbreviations of diagnostic classifications are equal to those in Figure 2.

The distributions overlapped between ASD and other disorders, namely there was no distinct boundary. Most of the cases with ASD (56/62) were on or above the cut-off line (score=9), while cases with SCD suspected were on or around this line. Considerable parts of attachment disorder and ADHD (7/10 and 8/21) were on or above the line, while a small part of intellectual disability (1/5) was above.

Comparison of profiles of Pervasive Developmental Disorders Autism Society Japan Rating Scale

When several scores in PDDs were compared with those in ASD, all scores showed no statistical difference (in the left column of Table 2).
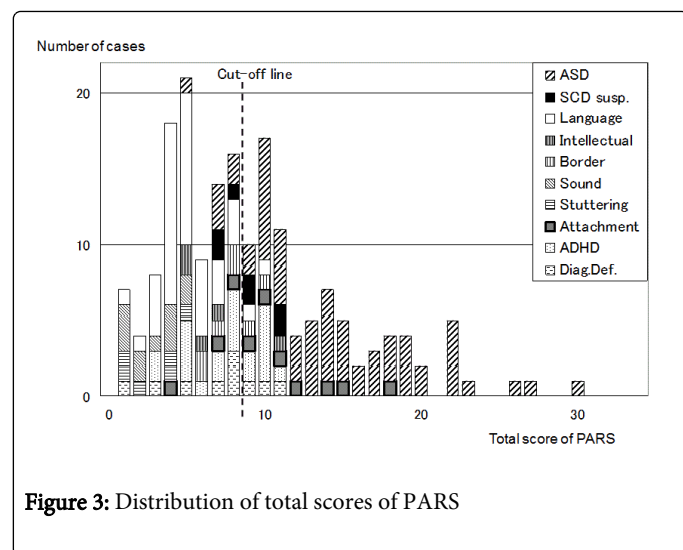
Figure 3: Distribution of total scores of PARS

A comparison between PDDs and ASD is shown in the left column, that among subcategories of PDDs in the center, and that among ASD, SCD suspected and language disorder in the right. The difference in each comparison was analyzed with a student t test. When there is a statistical difference (p<0.05), an asterisk (*) is indicated.

PARS, Pervasive Developmental Disorders Autism Society Japan Rating Scale; IQ, Intelligence Quotient; SC, the social communication subgroup; Sensitivity, the sensitivity/difficulty subgroup; Stereotype, the stereotype behavior subgroup; restricted, the restricted interests subgroup. Abbreviations of diagnostic classifications are equal to those in Figure 2.

In comparison among subcategories of PDDs (in the center column), total scores of PARS (mean ± S.D.) in autistic disorder, in Asperger's disorder and in PDD-NOS were 20.4 ± 3.3, 14.2 ± 5.6 and 13.3 ± 4.5. Scores of the SC subgroup in autistic disorder, in Asperger's disorder and in PDD-NOS were 8.6 ± 2.6, 3.8 ± 1.3 and 5.0 ± 1.9, with statistically significant difference (student t, p<0.05).

Criteria	DSM-4-TR	DSM-5	PDDs subcategories in DSM-4-TR			Criterion in DSM-5		
	PDD	ASD	Autism	Asperger	PDD-NOS	ASD	SCD susp	SCD susp
Number of cases	64	62	8	27	29	62	7	41
Months of age (mean ± S.D.)	42.6 ± 7.4	42.8 ± 7.4	41.9 ± 8.7	44.4 ± 7.3	41.1 ± 7.0	42.8 ± 7.4	39.7 ± 7.6	39.8 ± 6.9
IQ score (mean ± S.D.)	85.0 ± 15.9	85.0 ± 16.1	69.1 ± 11.2	96.3 ± 12.8	79.0 ± 12.4	85.0 ± 16.1	80.9 ± 10.1	82.6 ± 8.1
Total score of PARS (mean ± S.D.)	14.5 ± 5.3	14.7 ± 5.3	20.4 ± 3.3	14.2 ± 5.6	13.3 ± 4.5	14.7 ± 5.3	8.9 ± 1.7	5.1 ± 1.9
SC (mean ± S.D.)	4.9 ± 2.5	4.8 ± 2.5	8.6 ± 2.6	3.8 ± 1.3	5.0 ± 1.9	4.8 ± 2.5	5.1 ± 2.2	2.8 ± 1.2
Sensitivity (mean ± S.D.)	3.4 ± 2.5	3.5 ± 2.6	4.1 ± 1.9	4.0 ± 2.8	2.6 ± 2.4	3.5 ± 2.6	1.0 ± 1.2	0.49 ± 0.78
Stereotype (mean ± S.D.)	2.7 ± 1.8	2.7 ± 1.8	3.1 ± 5.6	2.6 ± 1.8	2.7 ± 1.7	2.7 ± 1.8	1.6 ± 0.79	1.0 ± 1.0
Restricted (mean ± S.D.)	3.5 ± 2.4	3.6 ± 2.4	4.5 ± 2.4	3.8 ± 2.5	3.0 ± 2.2	3.6 ± 2.4	1.1 ± 1.2	0.76 ± 0.97

Table 2: Comparisons of PARS and IQ among different criteria

When we compared scores among three criteria of DSM-5, total scores of PARS in ASD, in SCD suspected and in language disorder were 14.7 ± 5.3, 8.9 ± 1.7 and 5.1 ± 1.9 , with statistical difference (in the right column). Scores of the SC subgroup in ASD, in SCD suspected and in language disorder were 4.8 ± 2.5, 5.1 ± 2.2 and 2.8 ± 1.2, with statistical difference between language disorder and other two criteria. On the other hand, scores of the other three subgroups associated with RRB presented statistical difference between ASD and other two criteria.

Discussion

The change of DSM has received considerable attention because it will have a great influence, not only on medicine but also on education and social welfare. The main criticism is that individuals with PDDs might be excluded if the ASD criterion of DSM-5 is employed. For example, Matson et al.[4] reported that 48% of toddlers with PDDs did not meet the new criterion, ASD. Several studies have also shown that a considerable percentage (8.8%~53.8%) of children with PDDs diagnoses did not meet ASD [2-11] (Table 3).

Author (year)	Country	Age	Number of PDD	Reduction* in the draft		Reduction* in the relaxed rule	
				Number	Rate(%)	The relaxed rule	Rate(%)
Mattila et al. [2]	Finland	8 y	26	14	53.8	SC 2, RRB 2	3.9
Worley et al .[3]	UK	316 y	180	59	33	Not examined	
Matson et al. [4]	USA	1736 m	795	380	47.8	Not examined	

Beighley et al. [5]	USA	218 y	219	109	33.2	Not examined	
Huerta et al.[6]	USA	217 y	2130	188	8.8	Not examined	
Gibbs et al. [7]	Australia	216 y	111	26	23.4	SC 3, RRB 1	10.8
Taheri et al. [8]	Canada	212 y	129	47	36.4	SC 3, RRB 1 SC 2, RRB 1	25.6 15.5
Mc Partland et al. [9]	USA etc.	143 y	657	259	39.4	Not examined	
Dickerson Mayes et al. [10]	USA	116 y	67	10	14.9	Not examined	
Kent et al. [11]	UK	34140 m	36	05**	027.8**	SC 2, RRB 2	011.1**
This study (2014)	Japan	27-59 m	64		Not examined	The final DSM-5	3.10%

Table 3: Characteristics of the previous studies

*Reduction means the number (or rate) of cases who lost the ASD diagnosis in the draft or in relaxed rules. **When authors reported more than two procedures for each rule, the range of reduced number (or rate) is shown. y, years of age; m, months of age; Number following SC (in the right column), the required number of factors in the SC dimension; Number following RRB, the required number of factors in the RRB dimension.

The reason for these reductions might be caused by the strict rule of the draft. In the draft of DSM-5, it had been necessary for the ASD criterion to meet all three factors (3/3) of the SC dimension and two out of four factors (2/4) of the RRB dimension

To avoid a loss of the ASD diagnosis, modified algorithms for ASD were argued for (Table 3).Mattila et al. demonstrated a relaxed rule which required 2/3 of the SC dimension, resulting that more than 90% of PDDs met the ASD criteria [2]. Gibbs et al. [7] and Taheri et al.[8] demonstrated another relaxed rule which required 1/4 of the RRB dimension, resulting that more than 70% of PDDs met the ASD criteria.

In the final version (the May 2013 version) of DSM-5, surprisingly, the sentence mentioning the numbers of the SC dimension was completely deleted, and, moreover, a new sentence, that individuals with a well-established DSM-4 diagnosis of autistic disorder, Asperger's disorder, or PDD-NOS should be classified as ASD, was added. These changes appear to aim at the correspondence between the PDDs criterion of DSM-4 and the ASD criterion of DSM-5.

In our study with the final version of DSM-5, most of the young children with PDDs met the ASD criterion. This result may ease the anxiousness about a loss of the diagnosis and social services. However, a detailed procedure for ASD has not been shown yet because the DSM-5 textbook describes only the concept of ASD and a rough procedure. How do we draw a threshold line of the ASD criterion? At present the answer has not been prepared yet. Further investigation into a more detailed procedure for the ASD diagnosis is necessary.

Another criticism was combining five subcategories of PDDs into a single criterion, ASD. But the abolition of subcategories result in one criteria having to cover a wide range of children, from the extremely severe to the more mild types. As needed support for these children seems to be in accord with their severity, it is necessary to evaluate the severity of their autistic features.

As shown in Figure 3, total scores of PARS in ASD varied widely, from about 10 to 30.

In comparison among subcategories of PDDs (in the center column of Table 2), the total score in autistic disorder was much higher than those in Asperger's disorder and PDD-NOS. We hypothesize that total score of PARS may be roughly correlated with their autistic severity. But correlations between this score and a support need, and a prognosis, and other assessment's score have not been examined yet. Further studies of PARS seem to be necessary.

It is well known that children with PDDs are often accompanied with other neurodevelopmental conditions, but neither ADHD nor DCD could be applied for individuals with PDDs. But now both criteria, ADHD and DCD, can be added to the ASD criterion in DSM-5. In the current study, the rate of comorbidity of ASD and ADHD was below 50%. But we speculate the rate will probably rise later because it is still difficult to diagnose ADHD or DCD at this early period.

Another noteworthy change in DSM-5 was the new criteria, SCD. SCD is characterized by a primary difficulty in social use of verbal and nonverbal communication. However, currently there seems to be much confusion about the diagnosis of SCD. Firstly, it is uncertain how to diagnose in detail. Secondly, the change of symptom over developmental time is unknown, so that we do not know the best age for diagnosis.

Furthermore, we believe there are inconsistencies between the criterion of SCD and the SC dimension of ASD. The former attaches importance to the ability ofpragmatic language. Therefore, the textbook of DSM-5 mentions it is difficult to diagnose SCD before 4 years old. On the other hand, the latter attaches importance to earlier symptoms in social interaction before language.

It is well known that the earlier symptoms appear in infants (or toddlers) with ASD [17,18]. For example, they present atypical development in the behaviors of social interaction, such as eye gazing, joint attention, reciprocal smiling, shared enjoyment and oriented name calling, and also present earlier symptoms in the RRB dimension such as repetitive actions with toys, limited toy play and repetitive motor behavior.

Our study demonstrated the existence of young children who showed abnormal developments only in the SC dimension, but not in

the RRB dimension. As shown in Table 2, the cases with SCD suspected showed a high score only in the SC subgroup of PARS, being consistent with the concept of SCD.

Moreover, we found several young children with SCD suspected presented atypical behaviors in social interaction as such occasional poor eye-to-eye contact. These behaviors seem to be similar to "earlier symptoms" of ASD. However, we need to observe how these behaviors change over developmental time. At present we merely locate on the starting line for exploring SCD.

From a view point of welfare services, ASD children can be treated with more intensive services than communication disorders. But SCD belongs to communication disorders in the DSM-5 classification. We suggest SCD should belong to the group of ASD if SCD is a milder form of ASD. Now we have to argue whether SCD should be supported as a communication disorder or as one type of ASD. And we have to know what is the best intervention or best therapy for children with SCD.

There were several limitations in this study. Firstly, this was not a prospective investigation, but a retrospective one. Therefore, it was possible that we could not obtain all information that would be necessary for the DSM-5 diagnosis. Secondly, we analyzed only information which was obtained at the first visit. Therefore, it was possible that the symptoms could have changed later. Thirdly, we used PARSas an assessment tool because it had been difficult to employ ADI-R in Japan.Although the evaluation by PARS was roughly correlated with that by ADI-R, it was not a worldwide "gold standard"

On the other hand, the current study has several remarkable characteristics. Firstly, this study was based on a regional, routine screening system for infants and toddlers. As the subjects included a lot of children with atypical developments such as language disorder, our results may be very informative in clinical practice. Moreover, the results of atypical development may provide useful data for understanding the new category, SCD. Secondly, we employed the final version of DSM-5, while the draft was used in the previous reports.

In conclusion most of the cases with PDDs met the ASD criterion of DSM-5 in the current study. This result suggested that there may be a little possibility of a loss of the ASD diagnosis, but the abolition of subcategories of PDDs results in one criterion of ASD covering a wide range, from extremely severe to more mild types. Additionally, a detailed diagnostic procedure of SCD has not been shown yet. Further investigation and discussion should be done urgently for an appropriate use of DSM-5.

Conflict of Interests

The authors declare that there is no conflict of interests.

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