Abstract

Background: The significant changes in the DSM 5 diagnostic criteria for ASD need to be assessed in an Indian population by comparing it with ICD-10 DCR and DSM-IV TR. There are very few studies that look at the concordance between the criteria and practically none from India. An understanding on the diagnostic concordance will help in reliable diagnoses, service delivery and not miss out on any previously diagnosed child with ASD.

Aim: To compare the diagnostic criteria for ASD using DSM 5, DSM-IV-TR and ICD-10 (DCR-10)

Methods: Hundred children in age of 2.5-16 years without any co-morbid severe/profound mental retardation and any one symptom suggestive of ASD, presenting consecutively to the outpatient department were assessed using DSM 5, ICD-10 (DCR-10) and DSM-IV-TR manuals It was a cross sectional study in which agreement analysis between the diagnostic criteria was done using Cohen’s Kappa coefficient (κ) using IBM SPSS Statistics 20.

Results: Agreement analysis revealed DSM-5 ASD showed κ' = 0.846 and 0.874 with DSM-IV-TR, ICD 10 (DCR-10) respectively for childhood autism/autistic disorder. This agreement dropped for the analysis between DSM 5 ASD criteria and the DSM-IV-TR ASD (κ' =0.699 );
and ICD 10 (DCR-10) ASD (κ' = 0.703). DSM-5 ASD criteria overall had specificity values as 1 and 0.961 when compared with DSM-IV-TR ASD and ICD 10 (DCR-10) ASD.

**Conclusions:** The diagnosis of autism will not be missed. Some children will no longer meet criteria for ASD under DSM-5 and will most likely be those diagnosed with Atypical Autism/PDD NOS, but possibly would meet criteria for DSM-5 SCD.

**Key words:** Autism, DSM, ASD, diagnosis, ICD.

**Introduction**

Autism spectrum disorders (ASD) are a group of neuro-developmental disorders which have been under scrutiny because of changes in diagnostic criteria and increase in prevalence rates. The report from Centres for Disease Control and Prevention (CDC), in multiple communities in the U.S.A states the latest estimate of 1.7 percent (1 in 59) is higher than the previous ADDM estimate released in 2016, which found a prevalence of 1.5 percent or 1 in 68 children [1]. In India, a community-based study has reported the prevalence to be 0.9/1000 [2]. As per the recent research the un-weighted and weighted prevalence for broader autism spectrum is estimated to be 0.1% and 0.23% [3]. In a community-based study from South India, the prevalence was reported to be 23.3/10,000 [4], however, carefully reviewing the entire population screened for this study, the prevalence comes out to be 10/10,000 [5]. The factors that might have contributed to an increase in the prevalence, apart from increasing awareness, is also broadening of the diagnostic criteria [6]. Conversely, there are also apprehensions that with the changes and modifications to the diagnostic criteria especially after launch of DSM 5 [7] in May 2013, it is feared that some individuals may be unrecognized or misdiagnosed under the new diagnostic criteria [8].

These debates arise because of the lack of a specific ‘autism gene’ or any other biochemical marker to help in the diagnosis of ASD [9]. Hence the diagnosis mainly relies on behaviour
dimensions which serve as descriptive of the child’s behaviour, indicating that the child may need different services and respond differently to treatments and additionally guide regarding the risk for associated problems [10]. The current diagnostic systems in India are both DSM and ICD, which have defined these behaviour dimensions as 1) deficits in social reciprocity, 2) deficits in communication and 3) presence of restricted, repetitive behaviour and interests.

An agreement between diagnostic systems is helpful to clinicians, service providers, researchers, in making the diagnosis of ASD, giving compassionate advice, planning resource allocation, providing disability benefits, assessing the stability of outcomes, informing the development of studies that will assess be helpful in prognostication, assessing the current and refining the future diagnostic classification systems [11,12].

In a developing nation like India, there is no definite consensus on the prevalence of autism. The utilization of services depends on reliable identification of a person with ASD, which is done through these diagnostic criteria. Diagnostic manuals namely ICD-10 (DCR-10) [13] and DSM-IV-TR [14] both are used in different parts of the nation. DSM 5 has made changes in the ASD criteria and it remains to be seen how the existing diagnostic system agrees with DSM 5.

Although, existing diagnostic systems have been compared and written about, focussing on the sensitivity and specificity [15-20], there have been very few studies [21-23] which have looked at the concordance between the criteria. Few studies that have done an agreement analysis, which are mostly western, have either used the draft criteria of DSM 5 [15–18,20,24-30] or have done retrospective analyses [17-18,20,25] where children previously diagnosed with Autism on DSM IV or ICD 10 were re-diagnosed using DSM 5.

Our study is unique as it includes all cases of “suspected” autism, with ANY symptom suggestive of autism and hence each case is prospectively assessed using all three diagnostic criteria. To the best of our knowledge, no study has examined the concordance of ASD using the complete DSM-5 ASD criteria and Pervasive Developmental Disorder, PDD using DSM-
IV-TR criteria and ICD-10 (DCR-10) criteria within an Indian sample. Hence, the present study was conducted to examine the concordance of DSM-5 criteria, DSM-IV-TR and ICD-10 (DCR-10) criteria in Indian children in the age range of 2.5 – 16 years.

**Methods**

*Participants*

In this study data was collected from the Child Guidance Clinic (CGC) of Out Patient Department of Government Medical College and Hospital, which is a tertiary care multi speciality hospital in Northern India and Government Rehabilitation Institute for Intellectual Disabilities, GRIID, a state of art institute in the north India catering to the needs of children with intellectual disability and autism and provides special education, vocational training and rehabilitation.

*Inclusion Criteria*

Participants between the age 2.5 to 16 years, clinically suspected to have *any single feature* indicative of ASD e.g. difficulty in making eye to eye contact, deficits in social communication, repetitive behaviour or brought by the parent for any of these complaints, were inducted. It was a cross sectional study where the participants coming for the first time in O.P.D or those coming for follow up were assessed by principal investigator (PK). For the children below 7 years, written informed consent was taken from either parent or guardian of the child. Informed assent was taken from children above the age of 7 years [31].

*Materials*

*Instruments*

*Socio-demographic profile sheet*: the parameters of participants that were collected were age, sex, visit psychiatry OPD, the source of referral.
Clinical profile sheet: Including the detailed clinical, treatment history, IQ report, past history, clinical observation, mental status examination, general physical examination.

*ICD-10 (DCR-10) Diagnostic Criteria:* In ICD-10 (DCR-10), the childhood autism included 12 criteria grouped into 3 categories (social, communication-play, and restricted interests and behaviors) with a minimum requirement of a total of 6 criteria, 2 of which had to be social (highlighting the strength of social dysfunction being the best predictor of diagnosis of autism), 1 of which had to be communicative, and 1 of which needing to be behavioral with the remaining two capable of coming from any domain. [13] Other diagnostic categories under pervasive developmental disorders are: Atypical autism, Rett's syndrome, other childhood disintegrative disorder, Overactive disorder associated with mental retardation and stereotyped movements, Asperger’s syndrome, Other pervasive developmental disorder, Pervasive developmental disorder, unspecified. [13]

*DSM-IV-TR Diagnostic criteria:* In DSM-IV-TR, autism is defined on the basis of behavioral features and age of onset (age of onset must be before 3 years). Behavioral difficulties must include some feature of social disturbance, communicative disturbance, and restricted interests or repetitive behaviors. It consists of 5 diagnostic categories: Autistic disorder, Asperger’s Disorder, Childhood Disintegrative Disorder, Rett’s Disorder, Pervasive Developmental Disorder Not Otherwise Specified, PDD NOS. [14]

*DSM-5 Diagnostic criteria for ASD:* consists of a single diagnostic category Autism Spectrum Disorder. It is to be noted that under the Social Communication“ domain (Criteria A, 3 items), all 3 items were "required" to meet the diagnosis of DSM-5 ASD criteria. It includes specifiers of impairment, and the change of three to two symptom domains, i.e. Social communication Interaction, Restricted repetitive behaviour. Where ever applicable, "Note" under the DSM-5 ASD diagnostic rule was applied, according to which the individuals having marked deficits in
social communication, but otherwise not meeting the criteria for ASD, were evaluated for social (pragmatic) communication disorder. [7]

**Procedure**

**Phase A (Figure-1)**

A total of 135 participants having any single feature indicative of ASD were assessed for the purpose of the study. First 10 consecutive participants were assessed as a pilot phase (not included in the final study) and the process of carrying out the complete assessment for the study was streamlined.

Among the 125 participants with suspected features of ASD, 9 participants were excluded as they did not meet the age criteria. Intelligence Quotient, I.Q report was sought for the 116 participants. I.Q testing was repeated in case there were any discrepancies in the I.Q testing, which included a) Prior I.Q testing done in a service facility other than Government hospital b) Variability in former I.Q report and the potential observed clinically in the child c) In case former I.Q testing had not been done properly due to any reason, I.Q testing was done using appropriate tests like Vineland Social Maturity Scale (0-15 years) [32], Malin’s Intelligence Scale for Indian Children (5-15 years) [33], Bhatia’s Battery Performance tests (11-16 years) [34], Seguin Form Board test (11-17 years) [35], Coloured Progressive Matrices (5-11 years) [36], which was carried out by professionals who are trained in the application of these tests, before the assessment of child for the study. Participants with severe and profound co-morbid mental retardation were excluded as making a diagnosis of ASD becomes difficult in such cases [37]. As a result, 16 participants were further excluded.

**Phase B: Data Collection Phase (Figure-2)**

A total of 100 participants, either first visit or follow up, who met the inclusion criteria were inducted for the study after taking appropriate written informed consent.
Figure-1: Participant intake procedure

N = 135
Assessed for the study

Pilot phase, N= 10

Included history taking and clinical assessment

Phase 2
N=125,
(CGc=92,GRID=33)

Excluded due to age=9
(CGc =5, RIMH = 4)

I.Q testing of 116 participants  (CGc=87, GRID=29)

No previous I.Q reports available=44
IQ available and appropriate i.e. (done from CGc/GRID/PGI)=60
IQ Repeated =12

Excluded on basis of I.Q.=16; (CGc=3, GRID=13)

N=100 (CGc =84, GRID=16)
Figure-2: The three stages of carrying out the assessment

Stage 1: Assessment
History taking and clinical observation, play behaviour observation, audio recording.

Stage 2: Arriving at diagnosis
a. Application of ICD-10 (DCR-10) b. Application of DSM-IV-TR

Stage 3: Diagnosis as per DSM 5
Listening to audio recording, recalling clinical observation, application of DSM 5

Stage- 1: Assessment
The assessment done by PK comprised of interviewing the parent/s and the child for gathering the socio-demographic profile, followed by detailed assessment. The interview with the parents was open-ended, allowing parents to elaborate on the presenting symptoms. During the interview, since the child was present with the parents and the clinical assessment was able to include the observation of the parent-child interaction as well.

PK also tried to talk to each participant, offer toys and attempted to engage each participant in conversation and play with toys as much as possible. Additionally, play behaviour observation was done in the play room which included observing the child play with toys such as doll, ball, doctor set, kitchen set and toy phone available in the play room. The audio recording of this interview was done. This process of interviewing the parent and observing the parent and child was observed for all participants alike and it took about 45-60 minutes.
**Stage- II: Arriving at a diagnosis**

This stage included the application of respective diagnostic criteria by PK, i.e. ICD-10 (DCR-10) first, using manual based approach. This was followed by application of DSM-IV-TR manual to make a diagnosis of ASD. This took additional 15-20 minutes.

**Stage- III: Re-diagnosing on DSM-5**

This stage included listening to the audio recording of the interview on the next day by PK, in addition to recalling the behaviour of the child observed the previous day. The DSM 5 ASD criteria was then applied on that participant. To minimize a potential concordance bias, a period of one day was kept between application of DSM-IV-TR/ICD-10 (DCR-10) and DSM-5. The process of application of DSM-5 took 30-45 minutes.

The purpose and the design of the study were explained to the participants’ parents or guardians and confidentiality was maintained. Written informed consent was obtained from either parent or guardian, or/and assent was taken. No expenses were incurred by them. The principles enunciated in the Declaration of Helsinki [38] and Indian Council of Medical Research [39] were complied with. The study was approved and cleared by the Institutional Ethics Committee.

**Statistical Analysis**

This was a cross sectional study in which agreement analysis was done using Cohen’s Kappa coefficient. This coefficient indicates the level of agreement beyond the level expected due to chance. \( \kappa' \) values can range from +1.00 (perfect agreement) to -1.00 (total disagreement). \( \kappa' \) of 0.8 and above indicates very good agreement, from 0.6<= to <0.8 indicates good agreement, 0.4<= to <0.6 indicates moderate agreement, 0.2<= to<0.4 indicates fair agreement and <0.2 indicates poor agreement [40]. The agreement analysis was between DSM-IV-TR PDD and
DSM-5 ASD; and ICD-10 (DCR-10) PDD and DSM-5 ASD. IBM SPSS Statistics 20 was used for the analysis.

The DSM-5 ASD category has lumped all diagnostic entities which were earlier separately diagnosed, it becomes an umbrella term which includes early infantile autism, childhood autism, Kanner’s autism, high functioning autism, atypical autism, pervasive developmental disorder not otherwise specified, Childhood Disintegrative Disorder, and Asperger’s Disorder [7].

To be able to study the concordance of an encompassing DSM 5 ASD entity, an approach to lump all diagnosed cases by DSM-IV-TR and ICD-10 (DCR-10) has been made in which all cases diagnosed have been combined together and formed an ASD category for both DSM IV-TR and ICD-10 (DCR-10).

This lumping approach has been followed similarly by other studies by combining the criteria for Autism, Asperger’s syndrome, PDD NOS from DSM IV-TR-TR PDD criteria under ASD and hence have been compared to DSM-5 ASD criteria [15-18.20,23-27].

Hence the concordance analysis was specifically done in two ways:

1. Concordance Analysis of DSM 5 ASD with EACH of the subcategories under DSM-IV-TR PDD and ICD-10 (DCR-10) separately (Table 2,3) to specifically see the agreement with each subcategory

2. Following a lumping approach, ASD category was formed for both DSM-IV-TR and ICD-10 (DCR-10) and then compared with DSM 5 (Table 4) to see the agreement of the complete diagnostic entities.
Results

Table-1: Demographic profile

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency / Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in months)</td>
<td>28-176</td>
</tr>
<tr>
<td>Range</td>
<td>80.82 (40.12)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>83</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
</tr>
<tr>
<td>Visit</td>
<td></td>
</tr>
<tr>
<td>First visit</td>
<td>52</td>
</tr>
<tr>
<td>Follow up</td>
<td>48</td>
</tr>
<tr>
<td>Source of Intake</td>
<td></td>
</tr>
<tr>
<td>CGC</td>
<td>84</td>
</tr>
<tr>
<td>GRIID</td>
<td>16</td>
</tr>
<tr>
<td>IQ score</td>
<td></td>
</tr>
<tr>
<td>Normal (90-110)</td>
<td>20</td>
</tr>
<tr>
<td>Dull Average (80-89)</td>
<td>21</td>
</tr>
<tr>
<td>Borderline (70-79)</td>
<td>23</td>
</tr>
<tr>
<td>Mild MR (50-69)</td>
<td>31</td>
</tr>
<tr>
<td>Moderate MR (35-49)</td>
<td>5</td>
</tr>
<tr>
<td>Co-morbid diseases</td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>52 (70.3%)</td>
</tr>
<tr>
<td>Seizures</td>
<td>18 (24.3%)</td>
</tr>
<tr>
<td>Asthma</td>
<td>3 (4.1%)</td>
</tr>
<tr>
<td>Others including cerebral palsy</td>
<td>1 (1.4%)</td>
</tr>
</tbody>
</table>

Table-1 shows that a majority of participants (83%) were males with a mean age of 80.82 months. 52% of the participants had no co-morbidity.
Table 2: Agreement between each subcategory of DSM-IV-TR criteria for Pervasive Developmental Disorder (PDD) and DSM-5 criteria for Autism Spectrum Disorder (ASD)

<table>
<thead>
<tr>
<th>DSM-IV –TR Pervasive Developmental Disorder</th>
<th>299.00 Autistic Disorder</th>
<th>299.80 Pervasive Developmental Disorder Not Otherwise Specified (Including Atypical Autism)</th>
<th>299.10 Childhood Disintegrative Disorder (CDD)</th>
<th>299.80 Asperger’s Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met Criteria</td>
<td>Did not meet criteria</td>
<td>Total</td>
<td>Met Criteria</td>
<td>Did not meet criteria</td>
</tr>
<tr>
<td>Met Criteria</td>
<td>62</td>
<td>1</td>
<td>0</td>
<td>63</td>
</tr>
<tr>
<td>Did not meet criteria</td>
<td>5</td>
<td>32</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>32</td>
<td>1</td>
<td>95</td>
</tr>
<tr>
<td>$\kappa$, [S.E,C.I.]</td>
<td>0.846, [0.056, (0.736) to (0.956)]</td>
<td>-0.102, [0.045, (-0.190) to (-0.138)]</td>
<td>0.012, [0.012, (-0.012) to (0.036)]</td>
<td>-0.040, [0.028, (-0.095) to (0.015)]</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.912</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.969</td>
<td>0.337</td>
<td>0.374</td>
<td>0.357</td>
</tr>
</tbody>
</table>

Table 2 shows that out of 68 participants who met the DSM IV –TR criteria for autistic disorder, 62 (91.2%) also met DSM-5 criteria for ASD. $\kappa' = 0.846$ shows very good agreement between DSM –IV TR Autistic Disorder and high specificity, while poor agreement was observed between DSM-IV-TR PDD NOS, CDD, Asperger’s Disorder with DSM-5 ASD.
Table-3: Agreement between each subcategory of ICD-10 (DCR-10) criteria for Pervasive Developmental Disorder (PDD) with DSM-5 criteria for Autism Spectrum Disorder (ASD)

<table>
<thead>
<tr>
<th>ICD-10 Pervasive developmental disorder</th>
<th>F84.0 Childhood autism</th>
<th>F84.1 Atypical autism</th>
<th>F 84.3 Other childhood disintegrative disorder</th>
<th>F84.5 Asperger’s syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met Criteria</td>
<td>Did not meet criteria</td>
<td>Total</td>
<td>Met Criteria</td>
<td>Did not meet criteria</td>
</tr>
<tr>
<td>DSM-5 ASD</td>
<td>58</td>
<td>5</td>
<td>63</td>
<td>3</td>
</tr>
<tr>
<td>Did not meet criteria</td>
<td>1</td>
<td>36</td>
<td>37</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>41</td>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td>$\kappa'$, S.E, C.I.</td>
<td>0.874,[0.050;(0.776 to 0.972)]</td>
<td>-0.152,[0.063;(-0.275) to (-0.0285)]</td>
<td>0.012,[0.012;(-0.012) to (0.036)]</td>
<td>-0.040,[0.028;(-0.095) to (0.015)]</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.983</td>
<td>0.25</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.878</td>
<td>0.318</td>
<td>0.374</td>
<td>0.357</td>
</tr>
</tbody>
</table>

Table-3 shows that out of 59 participants who met the ICD -10 DCR criteria for Childhood autism, 58 participants (98.3%) also met the DSM-5 criteria for ASD, $\kappa'$ =0.874, which shows very good agreement; and high specificity and sensitivity being 0.878 and 0.983 respectively. However, the “poor” agreement between ICD-10 (DCR-10) Atypical autism, Other childhood disintegrative disorder, Asperger’s syndrome.
Table-4: Agreement between DSM 5 ASD, ICD-10 (DCR-10) ASD and DSM-IV-TR ASD

<table>
<thead>
<tr>
<th>DSM-5 ASD</th>
<th>ICD-10 (DCR-10) ASD</th>
<th>DSM-IV-TR ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Met Criteria</td>
<td>Did not meet criteria</td>
</tr>
<tr>
<td>DSM-5 ASD</td>
<td>Met Criteria</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Did not meet criteria</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>74</td>
</tr>
<tr>
<td>κ' [S.E., C.I.]</td>
<td>0.703, [0.074, 0.558 to 0.847]</td>
<td>0.699, 0.074, [0.554 to 0.845]</td>
</tr>
<tr>
<td>Sensitivity,</td>
<td>0.838</td>
<td>0.829</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.961</td>
<td>1</td>
</tr>
</tbody>
</table>

Table-4 indicates that DSM 5 ASD has **good agreement** with both ICD-10 (DCR-10) ASD and DSM-IV-TR ASD; High specificity and sensitivity is also observed.
Table-5: Diagnostic breakdown on DSM 5

<table>
<thead>
<tr>
<th>DSM-5 Neurodevelopmental disorder</th>
<th>DSM-5 ASD</th>
<th>DSM-5 Social (pragmatic) Communication Disorder (SCD)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=100, Met criteria=72, Did not meet any criteria =28</td>
<td>63</td>
<td>9</td>
<td>72</td>
</tr>
</tbody>
</table>

Table-5 shows that out of 72 participants that obtained a diagnostic label using DSM 5, 9 participants were diagnosed with SCD.

**Discussion**

The present study was carried out to determine the concordance between the most commonly used diagnostic criteria for autism spectrum disorder i.e. ICD-10 (DCR-10), DSM-IV-TR and DSM-5.

It was observed in our study that DSM-5 ASD has maximum agreement with *Autistic Disorder* or *Childhood Autism* and the agreement values keep decreasing if the subcategories are lumped together. While other subcategories under DSM-IV-TR/ICD-10 (DCR-10) when compared with DSM 5 ASD separately, show “poor agreement”.

While comparing these findings with the available research on agreement analyses, Matilla [23] argued that there is less agreement between DSM-5 draft and DSM-IV-TR criteria regarding any ASD diagnosis. However, it is important to note that this study was based on proposed DSM-5 draft, as on Feb 2010, and the draft criterion has undergone many revisions after that.

A study by Mayes et al [18], suggested that there was 84% agreement between DSM-5 ASD and DSM-IV ASD while there was 52% agreement between DSM-5 ASD and DSM-IV-TR PDD NOS. However, in this study also, draft version of DSM-5 was used, which could explain the difference with respect to findings in our study. Another study by Frazier et al [21] reported *good* agreement between DSM-5 ASD and DSM-IV-TR ASD which is in keeping with our finding. In our study we applied full DSM-5 ASD criteria and observed “very good” to “good”
agreement between DSM-5 ASD and DSM-IV-TR/ICD-10 DCR. The more typical the feature of autism, the better is the agreement between the diagnostic criteria. Of the few studies that have done the agreement analysis, most studies have compared DSM-5 ASD with DSM IV-TR ASD/ICD-10 (DCR-10) ASD and there is no such study from India.

While comparing sensitivity and specificity, DSM-5 ASD has maximum specificity when compared with DSM-IV-TR ASD, while the specificity decreases when DSM 5 ASD is compared with DSM-IV-TR autistic disorder. This indicates that when DSM-5 ASD is applied on children who have previous diagnosis on DSM-IV-TR, there will be very few false positives and almost all children will receive a diagnostic label under DSM 5.

The findings were similar while comparing DSM-5 and ICD-10 (DCR-10) i.e. a higher specificity when compared with ICD-10 (DCR-10) ASD and comparatively lesser specificity with ICD-10 (DCR-10) childhood autism. This reflects that with the changes in the DSM-5 ASD diagnostic criteria, DSM-5 ASD became more specific. For the children with high functioning Autism and Asperger’s syndrome, this, in turn, has a major impact as they might have received the diagnosis as per DSM-IV-TR or ICD 10 (DCR-10) [15] but they may be at risk of losing a diagnostic label.

Similar findings were reported a study by McPartland et al which reported that 60.6% of cases with a clinical diagnosis of ASD met revised DSM-5 diagnostic criteria for ASD when proposed DSM-5 diagnostic criteria for ASD was applied. Overall DSM 5 ASD was reported to have high specificity but there is variability in specificity when it comes to different diagnostic subgroups [15]. Hence, the children with more typical features of Autism will certainly receive a diagnosis on applying DSM-5 ASD.

Out of the few studies that have looked at ICD-10, they have made a checklist of DSM IV/ICD 10 and have then compared the specificity and sensitivity (24-27,30). In the present study, it
was found that the participants who met DSM-IV-TR ASD (n=76) and ICD 10-DCR ASD (n=74), participants receiving DSM-5 ASD diagnostic label ranged from 82.89 to 83.78%.

In the meta analyses by Smith et al [41], Kulage et al [42] and Sturmey and Dalfren [43], there was a 25-50%, 31% and 37% reduction when previously diagnosed cases on DSM-IV-TR were re-diagnosed under DSM 5 ASD. In the recent meta-analysis [29], consisting of 16 studies, it was reported that an average of 63% patients with DSM-IV-TR diagnoses of Pervasive Developmental Disorder, retained their diagnoses when diagnosed with DSM 5. It was further reported in the same study that 55% of patients with Asperger’s Syndrome retained the diagnosis under DSM 5, 80% of patients with Autistic disorder and 26% patients with PDD-NOS retained their diagnosis under DSM 5. These studies are broadly similar to our findings and highlight the fact that though DSM-5 ASD will be able to exclude the cases not meeting the criteria of classical/typical autism, however, DSM-5 ASD may miss out on a few cases of Atypical autism/PDD NOS and Asperger’s Disorder, as seen in our study as well.

One explanation for the increased specificity is given in a study by Frazier [21], that the during the re-analysis, the information gathered by clinicians was based on DSM IV-TR and hence all the information required for DSM-5 criteria may not have been gathered/recorded. Regardless, the results suggested significant reduction in the numbers of individuals diagnosed with ASD, when the proposed DSM-5 criteria was applied.

Interestingly, in a couple of studies it was observed that out of the subjects who no longer met criteria for ASD but did meet criteria for the diagnosis of SCD ranged between 4.2 % (2/48) [20] to 63.2% (12/19) [25]. Hence, the individuals with symptoms in the social-communication domain, but who did not display restrictive repetitive behaviours or interests, were provided with “diagnostic-coverage” under DSM-5 SCD [25]. Another study by Gibbs et al also claimed that after coming of DSM-5, participants will not lose out on a diagnostic label, rather they would shift from ASD group to SCD group in DSM-5 [16,44]. We saw a similar trend in our
study with albeit small sample size and it was seen that when DSM 5 SCD was applied to the participants with marked deficits in social communication, but otherwise not meeting the criteria for ASD, were evaluated for social (pragmatic) communication disorder, 9 participants met the criteria for DSM 5 SCD, hence providing the diagnostic cover.

Earlier studies [17,18,20,26,44] consisted of patients who were already carrying a diagnostic label and were tried to be fit into DSM-5 ASD criteria. This could have potentially led to a bias. While in the present study, the prospective sample of participants was taken with suspected autism and we have used the DSM 5 ASD criteria and not the draft criteria [15-18,20,24-30]. Hence the participants were not carrying any diagnostic label, thus making best effort to do away with any kind of bias. Additionally, many studies have used the clinical records as the information source and not the clinical interview [15,16,18,23,28]; the present study stands on robust methodology with clinical interview and play observation as the core of the study.

Although present findings are comparable with the previous studies, it is also worth noting that out of the total DSM -5-TR ASD sample, the number of participants meeting PDD NOS and Asperger’s Disorder was less. So, it may be helpful to have a larger sample of ASD, with more representation from disorders other than childhood autism/autistic disorder.

Though the present study was conducted using sound methodology, certain limitations need to be considered while interpreting the result. Since this is a cross sectional study, to generalize the results of this study into a larger population, retrospective, as well as prospective study, including long term follow up; should be included. No formal scales or tests were used in this study. The diagnostic criteria, DSM-IV-TR, ICD-10 (DCR-10) and DSM-5 ASD were applied during clinical assessment by the same person as the idea the primary research question under consideration is, when the same information about a particular subject is faced by same clinician, whether the clinician would come to the same diagnostic conclusion under ICD-10
(DCR-10), DSM-IV-TR and DSM-5 criteria. Although an effort was made to minimize the bias, by applying DSM-5 ASD criteria the following day, after listening to the audio interview and recalling the clinical assessment; still a potential bias cannot be ruled out.

To conclude, as per our study DSM 5 appears to have good agreement with DSM-IV-TR, ICD-10 (DCR-10). DSM 5 is seen to have high specificity and relatively good sensitivity when compared with DSM-IV-TR and ICD-10 (DCR-10). The debate surrounding the dimensional approach followed in DSM 5 versus categorical approach in DSM-IV-TR or ICD-10 (DCR-10) leading to apprehension of loss of diagnostic label can be somewhat rested as patients with autism will not be missed on DSM-5. Some patients with less typical symptoms of autism may get a diagnostic label of DSM-5 SCD. This is an important finding as many clinicians across India use either DSM or ICD manuals for assessment and diagnoses. Since the latest diagnostic criteria as defined in ICD-11 [45], in line with the DSM 5 ASD criteria has also lumped all categories under “Neurodevelopmental disorders” [46], an understanding of this new diagnostic direction will have great implications for diagnosis, service delivery and insurance coverage over the world. For generalization of these results in a larger population, a study with a larger sample size and more representation from disorders other than autism is needed. In a developing nation grappling with resources to meet the needs of children with ASD, and lack of awareness and understanding of a new diagnostic label like SCD, will take its time to fit in and will be at risk of losing public support [47] and reaching out for treatment.

As the changes in a diagnostic criterion can have a significant impact on service provision, a diagnostic identification for the patient and his/her family, other professionals dealing with developmental disorders, and also research in form of epidemiological studies, longitudinal studies as well as studies of treatments that span decades; having an understanding of the impact of changes in DSM-5 is consequential. There is a need for public awareness regarding
nosological changes, so as to prevent confusion and ensure the availability of services for the entire spectrum.

**Funding**: None

**Acknowledgements**: None

**Conflict of Interest**: None

**References**


Dr. Priyanka Kalra, Consultant Psychiatrist, Global Child Wellness Centre, Ludhiana, Dr. Priti Arun, Prof. B.S. Chavan, Professor, Government Medical College and Hospital, Chandigarh, Dr. Nitin Gupta, Senior Neuropsychiatrist, Gupta Mind Healing and Counseling center, Chandigarh.