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Letter to Editor. Report "An investigation of the 'female camouflage effect' in autism using a new computerized test showing sex/gender differences during ADOS-2". IMFAR 2016, Baltimore, USA

IMFAR (International Meeting for Autism Research) is the biggest annual event where reports of autism (ASD) research from all over the world are presented. The conference is hosted by the International Society for Autism Research (INSAR). The conference presentation by Rynkiewicz et al. at IMFAR 2016 [1], based on the article published earlier in Molecular Autism [2], is valuable for several reasons and should be disseminated. The researchers have presented the results of their study of "female camouflage effect" in autism using a computerized ADOS-2 test [3] in the context of sex/gender differences and performed an in-depth analysis of the associated key issues. A unique computer-based technique was used for the first time ever, which enabled automated coding of gesture-based non-verbal communication. Owing to the high-end technology, it was possible to objectively evaluate the gesture activity of the study subjects, by quantifying the Gesture Index (GI), which eliminated the bias of subjective assessment by the diagnostician as it was independent on human judgment. The detailed description of the material and method can be found in the discussed papers [1, 2]. The analysis showed that ASD girls used gestures more vividly, that is, used longer gestures presented in shorter time, as compared to their male counterparts. As a result, such gestures may be perceived by a human observer (diagnostician) as more energetic, vivid and expressive, thus being attributed to the domain of non-verbal communication as a non-autistic trait. Next, the issue of credibility and reliability of parent-reported questionnaires assessment like Social Communication Questionnaire (SCQ) [4] or Autism Spectrum Quotient – Child (AQ) [5] is addressed, where parents are given the instrument and asked to answer the questions without direct supervision. Thus, the study also raises a question on the parent-report screening measures where parents are given the instrument and asked to answer the questions without direct supervision: Do parents take under consideration the non-verbal communication (gestures) when they judge their child's communication skills or perhaps parent's judgment is biased by only the verbal communication of their child?

The discussed IMFAR 2016 conference presentation [1] indicates several key issues in diagnostic assessment of ASD. For the first time, the new diagnostic criteria of Autism Spectrum Disorder in DSM-5 [6] include the social communication as

form of verbal and nonverbal communication together. Similarly, for the first time ever, the DSM-5 criteria include sensory hyper – or hyporactivity to sensory input and it is in line with the findings of the previous study by Rynkiewicz and Łucka [7] indicating more atypical sensory profile in girls with ASD as compared to their male counterparts. With ASD etiology still being unclear, and proposed causal factors including neurobiological impairment, genetic, neuroanatomy or immune defects as well as neurotransmitter dysfunction, oxytocin has become a subject of research worldwide. Oxytocin is considered as neuromodulator which is crucial for developing social relationships and can – according to one of the current autism theories – exert a protective effect on clinical manifestation of autistic traits in girls. The authors of the new diagnostic criteria of DSM-5 [6] emphasize that ASD girls with average or above average intellectual ability and with no speech delay (referred to as high-functioning), may go clinically unnoticed and underdiagnosed [6; p. 57].

The observed sex/gender differences may also be linked to neuroanatomical and neurobiological basis of autism. The concept of an "extreme male brain" initially coined by Hans Asperger, further developed and verified by Baron-Cohen et al. [8], assumes that structural and functional brain masculinization occurs as a part of ASD, and manifests as the superiority of system-based thinking over empathy as well as emotional recognition and expression. The recent study by Lai et al. [9] showed that in adult population, only ASD women presented with different brain anatomy as compared to neurotypical individuals.

Previous study by Rynkiewicz and Łucka [7] on sex/gender differences in clinical manifestation of ASD in high functioning adolescent girls are complementary with the discussed IMFAR 2016 presentation. It showed that Polish high-functioning autism female adolescents presented with fewer behavioral autistic traits than Polish high-functioning autism male adolescents under communication domain in both Autism Diagnostic Observation Schedule (ADOS) and ADOS-2 algorithms during a standard (non-computer based) assessment. At the same time adolescent ASD females scored higher on symptom severity scales in self-reported questionnaires and clinical history. Additionally, the ASD females presented with a more atypical sensory profile than ASD males. The results suggest that unlike their male counterparts, the autistic high-functioning females develop an ability to "mask" their deficits and tend to be more determined to learn the rules of social interaction. The researchers observed that high-functioning girls with ASD presented with an increased awareness of their own limitations and difficulties, especially relative to the principles of social interaction. They also tended to copy the behavior of their neurotypical girlfriends or even to imitate their gestures or voice intonation, thus hiding or "masking" their own deficits. However, the standardized tests commonly used worldwide and referred to as the "gold standard" in ASD diagnosis like ADOS-2 (Autism Diagnostic Observation Schedule, Second Edition) as well as the questionnaires assessing the intensity of manifested ASD traits, such as the above-mentioned SCQ or AQ, are primarily based on symptomatology typical of boys with ASD and do not address numerous traits typical of autistic girls.

The implications of this are important because the high-functioning adolescent females with autism are at risk in older age of receiving non-spectrum classification in ADOS-2 due to good performance in communication domain, defined in social communication by DSM-5 as both verbal and nonverbal ones, while these females' developmental history and clinical manifestation confirm the autism spectrum.

The "female camouflage effect" in ASD diagnosis described by Rynkiewicz et al., supports the development/revision of diagnostic assessment instruments to address the sex/gender differences in ASD manifestation.

Standardized, interactive instruments for the diagnosis of autism spectrum disorder, such as ADOS-2, are currently being implemented in Poland. Therefore it is legitimate to popularize the research done using Polish version of these diagnostic instruments with Polish population of patients and which has been recognized on a larger scale (IMFAR 2016).

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