

Review

Sex differences in the prevalence of common comorbidities in autism: a narrative review

Yoo Hwa Hong¹, Da-Yea Song², Heejeong Yoo^{3,4}

¹With You ABA Centre, Surrey, BC, Canada

²Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

³Department of Psychiatry, Seoul National University Bundang Hospital, Seongnam, South Korea

⁴Department of Psychiatry, Seoul National University College of Medicine, Seoul, South Korea

Running title: Sex differences in autism and comorbid conditions

Corresponding author: Heejeong Yoo, MD, PhD

Department of Psychiatry, Seoul National University Bundang Hospital

82 Gumi-ro 173beon-gil, Bundang-gu, Seongnam 13620, South Korea

Tel: +82-31-787-7436, Fax: +82-31-787-4058, Email: hjyoo@snu.ac.kr

Yoo Hwa Hong and Da-Yea Song contributed equally as co-first authors.

Abstract

Autism spectrum disorder (ASD) involves challenges in social communication and restricted, repetitive behaviors. Historically, males have received autism diagnoses at comparatively high rates, prompting an

underrepresentation of females in research and an incomplete understanding of sex-specific symptom presentations and comorbidities. This review examines sex differences in the prevalence of common comorbidities of autism to inform tailored clinical practices. These conditions include attention deficit hyperactivity disorder (ADHD), anxiety disorders, conduct disorder, depression, epilepsy, intellectual disability, and tic disorders. ADHD is prevalent in both sexes; however, females may more frequently exhibit the inattentive subtype. Anxiety disorders display inconsistent sex differences, while conduct disorder more frequently impacts males. Depression becomes more common with age; some studies indicate more pronounced symptoms in adolescent girls, while others suggest greater severity in males. Epilepsy is more prevalent in females, especially those with intellectual disabilities. Despite displaying a male predominance, intellectual disability may exacerbate the severity of autism to a greater degree in females. No clear sex differences have been found regarding tic disorders. Overall, contributors to sex-based differences include biases stemming from male-centric diagnostic tools, compensatory behaviors like camouflaging in females, genetic and neurobiological differences, and the developmental trajectories of comorbidities. Recognizing these factors is crucial for developing sensitive diagnostics and sex-specific interventions. Inconsistencies in the literature highlight the need for longitudinal studies with large, diverse samples to investigate autism comorbidities across the lifespan. Understanding sex differences could facilitate earlier identification, improved care, and personalized interventions, thus enhancing quality of life for individuals with autism.

Keywords: Attention deficit disorder with hyperactivity; Autism spectrum disorder; Intellectual disability; Sex factors; Psychomotor agitation; Comorbidity

Introduction

Background

Autism is a neurodevelopmental condition that affects an individual's ability to communicate and interact socially, often accompanied by restricted and repetitive behaviors (RRBs). Its presentation varies widely across individuals, leading to the popular saying, "If you've met one person with autism, you've met one person with autism," which emphasizes the distinct strengths and challenges of each individual. Numerous genetic and neurobiological studies have sought to understand the etiology behind the observed sex differences in autism, but the multifactorial nature of the condition has posed challenges. Historically, males with autism have been over-represented compared to females. This disparity is largely reflected in epidemiological research, with an analysis of data from 43 studies indicating a mean male:female prevalence ratio of 4.2:1 [1].

The imbalanced ratio of males to females diagnosed with autism has resulted in an incomplete understanding of core symptom presentations across sexes. Previous studies comparing the social communication skills of males and females with autism have yielded mixed results; some studies have identified distinct challenges faced by each sex [2, 3], while others have found no statistically significant differences [4-6]. Similar inconsistencies have been reported concerning RRBs, with certain studies suggesting greater severity in males [4, 6] and other research not corroborating these results [3, 5].

A variety of factors could explain the observed or unobserved sex differences in autism, ranging from the limitations of measurement tools to participant characteristics such as the developmental stage of the individual, their overall severity of autism, or the presence of comorbid conditions. Comorbidities, which may include neurological, cognitive, psychiatric, and physical conditions, increase the complexity of the person's needs and underscore the critical importance of seeking medical advice and interventions [7, 8]. Moreover, comorbid conditions may influence the manifestation of symptoms [9]. For instance, a study by Gu et al. [10] revealed that boys were more likely than girls to be diagnosed between the ages of 3 and 11, whereas girls were more likely to receive a diagnosis either before age 3 or after age 11. However, after adjusting for comorbid neurodevelopmental and psychiatric conditions, these age-related patterns were no

longer significant. The interaction between the core symptoms of autism and these additional challenges emphasizes the necessity for a more comprehensive understanding of sex differences. This understanding is crucial for the development of tailored intervention strategies and could explain how a subset of the autistic population could be overlooked.

Objectives

This review aims to explore the differences in the prevalence of comorbid conditions between males and females with autism, establishing a necessary foundation to understand the baseline disparities. These insights could guide further investigation into sex-specific clinical presentations and targeted interventions. By examining sex-based discrepancies, we intend to highlight areas in need of additional research and suggest considerations for clinical practice, thus fostering a more inclusive understanding of autism.

Sex differences in psychiatric and neurologic comorbidities

Attention deficit hyperactivity disorder

is characterized by challenges in maintaining attention, along with hyperactivity and impulsivity. It represents one of the most common childhood neurodevelopmental disorders, with a weighted prevalence of 10.47% in the United States from 2021 to 2022 [11]. Clinical observations have indicated that a substantial number of children with autism also exhibit symptoms of ADHD, with reported comorbidity rates ranging widely from 30% to 80% [12, 13, 14]. Additionally, the behavioral overlaps between these two conditions suggest they may share a pathophysiological basis [15]. While ADHD has traditionally been recognized to display a male predominance, with a male-to-female prevalence ratio of 2.28 to 1 [16], a study by Margari et al. [17] found no significant sex differences in the prevalence of ADHD as a comorbid condition in adolescents with autism. Notably, female sex was more frequently associated with the predominantly inattentive presentation of ADHD, whereas male participants tended to display the combined presentation.

Anxiety disorders

Anxiety disorders represent prevalent and chronic mental conditions, with large-scale research suggesting that it may affect around 33.7% of the population at some point in their lives [18]. Up to 40% of individuals with autism may experience at least one comorbid anxiety disorder, most commonly specific phobia [19]. Although anxiety disorders are generally more prevalent among females, research on individuals with autism has yielded mixed results. Some studies have found comparable levels of anxiety between sexes [17, 20], while others have reported higher anxiety scores [21] or more internalizing problems in females with autism [22].

Conduct disorder

Conduct disorder is a complex behavioral disorder characterized by aggressive and destructive behavior patterns. The lifetime prevalence of conduct disorder in the general population is approximately 9.5% [23], and it increases to around 13% among individuals with autism [24]. Regarding sex differences, males typically exhibit higher rates of physical aggression [25]. Within the autism community, studies indicate higher rates in males, with a greater manifestation of externalizing problems [24, 26]. Notably, however, this research has generally involved small sample sizes, underscoring the need for further large-scale research to fully understand the extent of conduct disorder comorbidity in autism.

Depression

The prevalence of depression among individuals with autism, particularly those without intellectual disability, appears to increase with age. DeFilippis [27] noted that adolescents with autism encounter substantial challenges as they navigate their identity and interpersonal relationships. Oswald et al. [28] found that early adolescent girls with autism show more severe depressive symptoms than either their male counterparts or girls without autism. In a statistical analysis by Stacy et al. [29], the rates of mild and moderate/severe depression in girls with autism were estimated at 7.2% and 3.6%, respectively, while boys with autism experience these conditions at rates of 4.5% and 7.8%. These findings not only emphasize the occurrence of depression among individuals with autism but also highlight sex differences in its prevalence, suggesting that males tend to experience more severe forms of depression.

Epilepsy

Epilepsy, a neurological condition characterized by recurrent seizures, affects approximately 1.2% of the general population [30]. A comprehensive meta-analysis conducted by Liu et al. [31] revealed a disparity in the prevalence of epilepsy between children (7%) and adults (19%) with autism. In a pooled analysis of 14 studies, females with autism were found to have a higher prevalence of epilepsy at 34.5%, compared to 18.5% in males [32]. Furthermore, Amiet et al. [32] observed that the incidence of epilepsy is positively correlated with the severity of intellectual disability, suggesting that an increase in cognitive impairment is associated with a heightened risk of epilepsy.

Intellectual disability

Intellectual disability is a lifelong condition characterized by below-average cognitive functioning. A systematic review conducted in 2016 examined the prevalence and incidence of intellectual disabilities, yielding prevalence estimates ranging from 0.05% to 1.55% [33]. Among six studies that compared sex differences, five reported higher rates of intellectual disability in males [33]. Intellectual disability is also a common comorbid condition in children with autism, with an estimated prevalence of 21.7% [9]. Among individuals with autism, the male-to-female ratio of comorbid intellectual disability was 1.9:1 [34]. In a meta-analysis, Saure et al. [35] found that intellectual disability tends to exacerbate the severity of autism symptoms more in females than in males. These findings indicate that phenotypic differences in autism may be influenced by the level of cognitive functioning.

Tic disorders

Tic disorders are characterized by sudden, rapid motor movements or vocal outbursts and are estimated to affect between 5 and 6 per 1,000 school-aged children [36]. Among individuals with autism, tic disorders are a common comorbidity, affecting approximately 18% to 22% [37, 38]. Generally, females with tic disorders are diagnosed less frequently than males and typically report a later age of symptom onset [39]. Kim et al. [38] found no significant sex differences between a group of individuals with autism alone and one with both autism and tic disorders, based on parental reports. However, further research is warranted. Studies that

utilize clinician assessments to evaluate the type and severity of tics by sex could provide a deeper understanding of their manifestation in individuals with autism.

Potential factors contributing to sex differences in prevalence

The exploration of sex-based differences in the prevalence of comorbid conditions among individuals with autism is complex. It involves diagnostic and reporting biases, sex-specific symptom presentations, biological factors, and distinct patterns of comorbidity. In the present exploration of current research, we aim to provide a thorough understanding of these contributing factors.

Measurement bias

Concerns have arisen regarding the measurement tools used in autism diagnosis, which are often developed with a male-centric bias due to the disproportionate representation of the sexes. This bias toward the male autism phenotype may result in the misclassification of female patients. In an investigation of potential sex biases in widely used diagnostic instruments, Belcher et al. [40] conducted a confirmatory factor analysis on the Autism Spectrum Quotient using data from a large UK adult cohort. Their findings revealed that all but two items showed sex biases, notably indicating that women were more likely than men to endorse items related to social skills and communication. Similarly, Kalb et al. [41] examined the Autism Diagnostic Observation Schedule-2 via differential item functioning (DIF) analysis and identified five items with significant DIF. This suggests that these items function differently for males and females, potentially impacting diagnostic accuracy [42]. Furthermore, there is a clear deficiency in accurate and reliable tools for assessing the wide range of psychiatric comorbid conditions in individuals with autism. Although efforts have been made to validate modified screening tools for psychopathology in children and adolescents with autism, research specifically addressing sex differences remains scarce.

Compensatory behaviors

The term “camouflaging” refers to the use of compensatory behaviors or coping strategies by individuals

with autism to mask their autistic traits and conform to social norms. These methods often involve mimicking the behaviors and interests of others or deliberately making eye contact. Camouflaging is commonly reported among females and is considered a key reason why this demographic is often overlooked. Such masking strategies contribute to a higher likelihood of misdiagnosis in females with autism compared to their male counterparts [43]. In their research, Cage and Troxell-Whitman [44] underscore the critical need for clinicians to recognize the impact of camouflaging. Acknowledging these behaviors is essential for improving the well-being of individuals with autism, especially when addressing comorbid mental health conditions.

Different trajectories of comorbid conditions

Considering an individual's age and developmental stage is crucial when examining psychiatric conditions. It is well-established that certain internalizing and externalizing disorders manifest at different times, often influenced by sex-specific developmental trajectories. For example, in the general population, boys are more likely to experience externalizing problems, such as aggression, hyperactivity, and conduct problems, and these patterns tend to remain stable across adolescence [45]. Conversely, males have a lower risk of internalizing problems, such as mood and anxiety issues [46], with the onset of such conditions typically occurring at a later age compared to females. Therefore, the inherent characteristics of these comorbid conditions may meaningfully impact the observed sex differences in individuals with autism.

Implications

In the context of autism, understanding sex-based differences in prevalence is critical, as it can lead to the creation of more sensitive screening and diagnostic tools, as well as the development of therapeutic plans tailored to individual needs.

Sensitive measurement tools

Early and accurate identification of autism is crucial for improving outcomes in young children. However, research has shown that girls are consistently diagnosed later than boys, highlighting the need for diagnostic tools that are sensitive to sex differences. Additionally, females with autism often have a higher incidence of

comorbid conditions compared to males [14], including internalizing behaviors that result in anxiety, depression, and social withdrawal [47]. The overlap between these psychiatric comorbidities and the core features of autism can complicate the diagnostic process, potentially leading to delayed diagnoses in female patients.

Sex-specific intervention planning

Creating a sex-specific intervention strategy for autism requires a nuanced understanding of the ways in which the condition presents in females versus males. Females with autism often demonstrate better communication and social interaction skills and exhibit fewer RRBs than their male counterparts. The use of compensatory mechanisms, such as masking, may further complicate the development of effective intervention strategies, as these behaviors can conceal the true extent of the challenges these individuals face. For females with autism, creating a sex-specific intervention strategy could involve focusing on the management of psychiatric comorbidities through a combination of various therapies and self-advocacy education. By customizing interventions to address both shared characteristics and sex-specific differences in autism, we can improve support for individuals, helping them to realize their full potential.

Conclusion

This review examines the prevalence of various comorbid conditions among males and females with autism. The current body of research on comorbidities is mixed, with some studies finding no significant differences between sexes and others reporting certain conditions as more common in one sex. These inconsistencies may stem from differences in measurement tools, masking behaviors that complicate diagnosis, and the age of study participants. The recognition of distinct patterns of comorbidity could indicate the presence of subgroups within the autism spectrum. Consequently, longitudinal studies with larger sample sizes are required to explore comorbid conditions from a life-course perspective, considering the developmental trajectories of both sexes. Given our preliminary findings on the differences in the prevalence of common comorbid conditions among individuals with autism, it is imperative that future research expand upon this

work by examining potential sex differences in their manifestation. A deeper understanding of these patterns could support earlier autism diagnosis and improve access to care, enabling the creation of more personalized intervention plans that improve quality of life for those on the autism spectrum.

ORCID

Yoo Hwa Hong: <https://orcid.org/0009-0008-9718-6046>

Da-Yea Song: <https://orcid.org/0000-0002-7144-4739>

Hee Jeong Yoo: <https://orcid.org/0000-0003-0521-2718>

Authors' contributions

Project administration: Yoo H

Conceptualization: Yoo H

Methodology & data curation: Hong YH, Song DY

Funding acquisition: Yoo H

Writing - original draft: Hong YH, Song DY

Writing - review & editing: Hong YH, Song DY, Yoo H

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Funding

This research was supported by the Bio & Medical Technology Development Program of the National

Research Foundation (NRF), funded by the Korean government (MSIT) (No. 2021M3E5D9021878).

Data availability

Not applicable.

Acknowledgements

Not applicable.

Supplementary materials

Not applicable.

Epub

References

1. Fombonne E. Epidemiology of pervasive developmental disorders. *Pediatr Res.* 2009;65(6):591-598.
2. Evans SC, Boan AD, Bradley C, Carpenter LA. Sex/Gender Differences in Screening for Autism Spectrum Disorder: Implications for Evidence-Based Assessment. *J Clin Child Adolesc Psychol.* 2019;48(6):840-854.
3. Song DY, Kim SY, Bong G, Kim YA, Kim JH, Kim JM, et al. Exploring sex differences in the manifestation of autistic traits in young children. *Res Autism Spectr Disord.* 2021;101848.
4. Mandy W, Chilvers R, Chowdhury U, Salter G, Seigal A, Skuse D. Sex differences in autism spectrum disorder: evidence from a large sample of children and adolescents. *J Autism Dev Disord.* 2012;42(7):1304-1313.
5. Sutherland R, Hodge A, Bruck S, Costley D, Klieve H. Parent-reported differences between school-aged girls and boys on the autism spectrum. *Autism.* 2017;21(6):785-794.
6. Wilson CE, Murphy CM, McAlonan G, Robertson DM, Spain D, Hayward H et al. Does sex influence the diagnostic evaluation of autism spectrum disorder in adults? *Autism.* 2016;20(7), 808-819.
7. de Bruin EI, Ferdinand RF, Meester S, de Nijs PF, Verheij F. High rates of psychiatric co-morbidity in PDD-NOS. *J Autism Dev Disord.* 2007;37(5):877-886.
8. Joshi G, Petty C, Wozniak J, Henin A, Fried R, Galdo M, et al. The heavy burden of psychiatric comorbidity in youth with autism spectrum disorders: a large comparative study of a psychiatrically referred population. *J Autism Dev Disord.* 2010;40(11):1361-1370.
9. Khachadourian V, Mahjani B, Sandin S, Kolevzon A, Buxbaum JD, Reichenberg A, et al. Comorbidities in autism spectrum disorder and their etiologies. *Transl Psychiatry.* 2023;13(1):71.
10. Gu Z, Dawson G, Engelhard M. Sex differences in the age of childhood autism diagnosis and the impact of co-occurring conditions. *Autism Res.* 2023;16(12):2391-2402.

11. Li Y, Yan X, Li Q, Li Q, Xu G, Lu J, et al. Prevalence and Trends in Diagnosed ADHD Among US Children and Adolescents, 2017-2022. *JAMA Netw Open*. 2023;6(10):e2336872.
12. van der Meer JM, Oerlemans AM, van Steijn DJ, et al. Are autism spectrum disorder and attention-deficit/hyperactivity disorder different manifestations of one overarching disorder? Cognitive and symptom evidence from a clinical and population-based sample. *J Am Acad Child Adolesc Psychiatry*. 2012;51(11):1160-1172.e3.
13. Gnanavel S, Sharma P, Kaushal P, Hussain S. Attention deficit hyperactivity disorder and comorbidity: A review of literature. *World J Clin Cases*. 2019;7(17):2420-2426.
14. Vadukapuram R, Elshokiry AB, Trivedi C, Abouelnasr A, Bataineh A, Usmani S, et al. Sex Differences in Psychiatric Comorbidities in Adolescents With Autism Spectrum Disorder: A National Inpatient Sample Analysis. *Prim Care Companion CNS Disord*. 2022;24(5):21m03189.
15. Hours C, Recasens C, Baleyte JM. ASD and ADHD Comorbidity: What Are We Talking About?. *Front Psychiatry*. 2022;13:837424.
16. Ramtekkar UP, Reiersen AM, Todorov AA, Todd RD. Sex and age differences in attention-deficit/hyperactivity disorder symptoms and diagnoses: implications for DSM-V and ICD-11. *J Am Acad Child Adolesc Psychiatry*. 2010;49(3):217-28.e283.
17. Margari L, Palumbi R, Pescechera A, Craig F, de Giambattista C, Ventura P, et al. Sex-Gender Comparisons in Comorbidities of Children and Adolescents With High-Functioning Autism Spectrum Disorder. *Front Psychiatry*. 2019;10:159.
18. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. *Dialogues Clin Neurosci*. 2015;17(3):327-335.
19. van Steensel FJ, Bögels SM, Perrin S. Anxiety disorders in children and adolescents with autistic spectrum disorders: a meta-analysis. *Clin Child Fam Psychol Rev*. 2011;14(3):302-317.

20. Sukhodolsky DG, Scahill L, Gadow KD, Arnold LE, Aman MG, MaDoughle DJ, et al. Parent-rated anxiety symptoms in children with pervasive developmental disorders: frequency and association with core autism symptoms and cognitive functioning. *J Abnorm Child Psychol.* 2008;36(1):117-128.
21. Solomon M, Miller M, Taylor SL, Hinshaw SP, Carter CS. Autism symptoms and internalizing psychopathology in girls and boys with autism spectrum disorders. *J Autism Dev Disord.* 2012;42(1):48-59.
22. Prosperi M, Turi M, Guerrera S, Napoli E, Tancredi R, Iglizzi R, et al. Sex Differences in Autism Spectrum Disorder: An Investigation on Core Symptoms and Psychiatric Comorbidity in Preschoolers. *Front Integr Neurosci.* 2021;14:594082.
23. Nock MK, Kazdin AE, Hiripi E, Kessler RC. Prevalence, subtypes, and correlates of DSM-IV conduct disorder in the National Comorbidity Survey Replication. *Psychol Med.* 2006;36(5):699-710.
24. Ivanović I. Psychiatric Comorbidities in Children With ASD: Autism Centre Experience. *Front Psychiatry.* 2021;12:673169.
25. Moffitt TE, Caspi A, Rutter M, Silva PA. *Sex Differences in Antisocial Behaviour: Conduct disorder, delinquency, and violence in the Dunedin Longitudinal Study.* Cambridge University Press. 2001.
26. Napolitano A, Schiavi S, La Rosa P, et al. Sex Differences in Autism Spectrum Disorder: Diagnostic, Neurobiological, and Behavioral Features. *Front Psychiatry.* 2022;13:889636.
27. DeFilippis M. Depression in Children and Adolescents with Autism Spectrum Disorder. *Children (Basel).* 2018;5(9):112.
28. Oswald TM, Winter-Messiers MA, Gibson B, Schmidt AM, Herr CM, Solomon M. Sex Differences in Internalizing Problems During Adolescence in Autism Spectrum Disorder. *J Autism Dev Disord.* 2016;46(2):624-636.
29. Stacy ME, Zablotzky B, Yarger HA, Zimmerman A, Makia B, Lee LC. Sex differences in co-occurring

conditions of children with autism spectrum disorders. *Autism*. 2014;18(8):965-974.

30. Zack MM, Kobau R. National and State Estimates of the Numbers of Adults and Children with Active Epilepsy - United States, 2015. *MMWR Morb Mortal Wkly Rep*. 2017;66(31):821-825.
31. Liu X, Sun X, Sun C, Zou, M., Chen, Y., Huang, J, et al. Prevalence of epilepsy in autism spectrum disorders: A systematic review and meta-analysis. *Autism*. 2022;26(1):33-50.
32. Amiet C, Gourfinkel-An I, Bouzamondo A, Tordjman S, Baulac M, Lechat P, et al. Epilepsy in autism is associated with intellectual disability and gender: evidence from a meta-analysis. *Biol Psychiatry*. 2008;64(7):577-582.
33. McKenzie K, Milton M, Smith G, Ouellette-Kuntz H. Systematic Review of the Prevalence and Incidence of Intellectual Disabilities: Current Trends and Issues. *Curr Dev Disord Rep*. 2016;3:104–115.
34. Fombonne E. Epidemiological surveys of autism and other pervasive developmental disorders: an update. *J Autism Dev Disord*. 2003;33(4):365-382.
35. Saure E, Castrén M, Mikkola K, Salmi J. Intellectual disabilities moderate sex/gender differences in autism spectrum disorder: a systematic review and meta-analysis. *J Intellect Disabil Res*. 2023;67(1):1-34.
36. Scahill L, Specht M, Page C. The Prevalence of Tic Disorders and Clinical Characteristics in Children. *J Obsessive Compuls Relat Disord*. 2014;3(4):394-400.
37. Canitano R, Vivanti G. Tics and Tourette syndrome in autism spectrum disorders. *Autism*. 2007;11(1):19-28.
38. Kim YR, Song DY, Bong G, Han JH, Kim JH, Yoo HJ. Clinical characteristics of comorbid tic disorders in autism spectrum disorder: exploratory analysis. *Child Adolesc Psychiatry Ment Health*. 2023;17(1):71.
39. Baizabal-Carvalho JF, Jankovic J. Sex differences in patients with Tourette syndrome. *CNS Spectr*. 2022:1-7.

40. Belcher HL, Ugluk-Marucha N, Vitoratou S, Ford RM, Morein-Zamir S. Gender bias in autism screening: measurement invariance of different model frameworks of the Autism Spectrum Quotient. *BJPsych Open*. 2023;9(5):e173.
41. Kalb LG, Singh V, Hong JS, Holingue C, Ludwig NN, Pfeiffer D et al. Analysis of Race and Sex Bias in the Autism Diagnostic Observation Schedule (ADOS-2). *JAMA Netw Open*. 2022;5(4):e229498.
42. Brickhill R, Atherton G, Piovesan A, Cross L. Autism, thy name is man: Exploring implicit and explicit gender bias in autism perceptions. *PLoS One*. 2023;18(8):e0284013.
43. Lai MC, Lombardo MV, Ruigrok AN, Chakrabarti B, Auyeung B, Szatmari P, et al. Quantifying and exploring camouflaging in men and women with autism. *Autism*. 2017;21(6):690-702.
44. Cage E, Troxell-Whitman Z. Understanding the Reasons, Contexts and Costs of Camouflaging for Autistic Adults. *J Autism Dev Disord*. 2019;49(5):1899-1911.
45. Fernandez Castela C, Kröner-Herwig B. Developmental trajectories and predictors of externalizing behavior: a comparison of girls and boys. *J Youth Adolesc*. 2014;43(5):775-789.
46. Kovess-Masfety V, Woodward MJ, Keyes K, Bitfoi A, Carta MG, Koç C, et al. Gender, the gender gap, and their interaction; analysis of relationships with children's mental health problems [published correction appears in *Soc Psychiatry Psychiatr Epidemiol*. 2022 Jan;57(1):219. *Soc Psychiatry Psychiatr Epidemiol*. 2021;56(6):1049-1057.
47. Bauminger N, Solomon M, Rogers SJ. Externalizing and internalizing behaviors in ASD. *Autism Res*. 2010;3(3):101-112.