

Funciones cognitivas y reconocimiento de emocional en pacientes con trastorno del espectro autista de alto funcionamiento

Nombres y apellidos:
Cristina Eliana Nieves Castro

Código estudiantil:
2014220462868

Trabajo de Investigación presentado como requisito para optar al título de:
Magister en Neuropsicología

Tutor(es):
Marta Martínez Banfi

RESUMEN

Introducción: El Trastorno del Espectro Autista (TEA) de alto funcionamiento constituye una condición del neurodesarrollo en la que, a pesar de un coeficiente intelectual dentro del rango normal o superior, persisten dificultades significativas en la cognición social y el reconocimiento emocional. Estas limitaciones repercuten en la integración escolar, social y laboral, lo que hace indispensable profundizar en la caracterización de sus perfiles cognitivos y emocionales. La investigación reciente ha puesto de relieve la coexistencia de fortalezas en razonamiento perceptivo y velocidad de procesamiento, junto con debilidades en comprensión verbal y reconocimiento de emociones, lo cual evidencia la necesidad de estrategias de intervención más específicas. En este contexto, el presente estudio buscó evaluar las funciones cognitivas y la capacidad de reconocimiento emocional en adolescentes con TEA de alto funcionamiento, comparándolos con pares neurotípicos, para aportar evidencia empírica que permita fundamentar programas de apoyo personalizados y culturalmente pertinentes.

Métodos: Se realizó un estudio analítico de corte transversal con una muestra de 40 adolescentes entre 12 y 15 años, divididos en dos grupos: 20 con diagnóstico de TEA de alto funcionamiento y 20 neurotípicos como grupo control. Se aplicó la Escala de Inteligencia de Wechsler para Niños-IV (WISC-IV) para identificar fortalezas y debilidades en dominios cognitivos, y la Evaluación Neuropsicológica

Infantil (ENI), centrada en el reconocimiento de expresiones emocionales faciales.

El análisis estadístico incluyó pruebas de comparación de medias y correlación, con el fin de determinar asociaciones significativas entre los índices de la comprensión verbal y la capacidad de reconocimiento emocional.

Resultados: Los adolescentes con TEA de alto funcionamiento mostraron un perfil cognitivo heterogéneo: puntuaciones significativamente más altas en razonamiento perceptivo y velocidad de procesamiento, pero déficits marcados en comprensión verbal y reconocimiento de emociones faciales. En particular, el grupo TEA obtuvo medianas bajas en la identificación de emociones (4 frente a 8 en neurotípicos; $p < 0.001$), lo que refuerza las limitaciones en cognición social. Además, se encontró una correlación positiva y significativa entre comprensión verbal y reconocimiento emocional ($Rho = 0.86$; $p < 0.05$), lo cual sugiere que las habilidades lingüísticas actúan como mediadoras del desempeño socioemocional en esta población.

Conclusiones: El estudio demuestra que los adolescentes con TEA de alto funcionamiento presentan un perfil cognitivo desequilibrado, caracterizado por fortalezas perceptivas junto a debilidades significativas en dominios socioemocionales y de comprensión verbal. Estos hallazgos ponen de relieve la necesidad de intervenciones multidimensionales que aprovechen las capacidades cognitivas conservadas y, al mismo tiempo, fortalezcan la cognición social y el reconocimiento emocional. El diseño de programas educativos y terapéuticos

personalizados se vislumbra como un camino esencial para favorecer la inclusión social y mejorar la calidad de vida de esta población.

Palabras clave: Autismo; Funciones cognitivas; Reconocimiento emocional; Adolescencia; Neuropsicología

COGNITIVE FUNCTIONS AND EMOTIONAL RECOGNITION IN PATIENTS WITH HIGH-FUNCTIONING AUTISM SPECTRUM DISORDER

Introduction: High-Functioning Autism Spectrum Disorder (HFA-ASD) is a neurodevelopmental condition in which, despite an intellectual quotient within the normal or above-average range, individuals present significant difficulties in social cognition and emotional recognition. These limitations affect school, social, and occupational integration, making it essential to further characterize their cognitive and emotional profiles. Recent research has highlighted the coexistence of strengths in perceptual reasoning and processing speed, alongside weaknesses in verbal comprehension and emotion recognition, which underscores the need for more specific intervention strategies. In this context, the present study aimed to evaluate cognitive functions and emotional recognition abilities in adolescents with

I'm HFA-ASD, compared with neurotypical peers, in order to provide empirical evidence to support the development of personalized and culturally relevant support programs.

Methods: An analytical cross-sectional study was conducted with a sample of 40 adolescents aged 12 to 15, divided into two groups: 20 diagnosed with HFA-ASD and 20 neurotypical controls. The Wechsler Intelligence Scale for Children-IV (WISC-IV) was administered to identify strengths and weaknesses across cognitive domains, while the Child Neuropsychological Assessment (ENI) was applied to assess the recognition of facial emotional expressions. Statistical analysis included mean comparisons and correlation tests to determine significant associations between verbal comprehension indices and emotional recognition ability.

Results: Adolescents with HFA-ASD showed a heterogeneous cognitive profile: significantly higher scores in perceptual reasoning and processing speed, but marked deficits in verbal comprehension and facial emotion recognition. Specifically, the HFA group obtained lower medians in emotion identification (4 versus 8 in neurotypical peers; $p < 0.001$), reinforcing limitations in social cognition. Moreover, a positive and significant correlation was found between verbal comprehension and emotional recognition ($Rho = 0.86$; $p < 0.05$), suggesting that linguistic skills act as mediators of socioemotional performance in this population.

Conclusions: The study demonstrates that adolescents with HFA-ASD present an unbalanced cognitive profile, characterized by preserved perceptual strengths

alongside significant weaknesses in socioemotional domains and verbal comprehension. These findings highlight the need for multidimensional interventions that both leverage existing cognitive abilities and strengthen social cognition and emotional recognition. The design of personalized educational and therapeutic programs emerges as an essential approach to promote social inclusion and improve the quality of life of this population.

Keywords: Autism; Cognitive functions; Emotional recognition; Adolescence; Neuropsychology

REFERENCIAS

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). American Psychiatric Publishing.
<https://doi.org/10.1176/appi.books.9780890425596>

Ameis, S. H., & Catani, M. (2015). Altered white matter connectivity as a neural substrate for social impairment in autism spectrum disorder. *Cortex*, 62, 158-181.
<https://doi.org/10.1016/j.cortex.2014.10.014>

Baranek, G. T., David, F. J., Poe, M. D., Stone, W. L., & Watson, L. R. (2006). Sensory Experiences Questionnaire: discriminating sensory features in young children with autism, developmental delays, and typical development. *Journal of Child Psychology and Psychiatry*, 47(6), 591-601. <https://doi.org/10.1111/j.1469-7610.2005.01546.x>

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" Test revised version: a study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry*, 42(2), 241-251. <https://doi.org/10.1111/1469-7610.00715>

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The autism-spectrum quotient (AQ): Evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders*, 31(1), 5-17. <https://doi.org/10.1023/A:1005653411471>

Black, M. H., Chen, N. T., Iyer, K. K., Lipp, O. V., Bölte, S., Falkmer, M., ... & Girdler, S. (2017). Mechanisms of facial emotion recognition in autism spectrum disorders: Insights from eye tracking and electroencephalography. *Neuroscience & Biobehavioral Reviews*, 80, 488-515. <https://doi.org/10.1016/j.neubiorev.2017.06.016>

Bookheimer, S.Y., Wang, T., Scott, A., Sigman, M., & Dapretto, M. (2008). Frontal contributions to face processing differences in autism: Evidence from fMRI of inverted face processing. *Journal of the International Neuropsychological Society*, 14, 922-932. <https://doi.org/10.1017/S135561770808140X>

Bottema-Beutel, K., Kim, S. Y., & Crowley, S. (2019). A systematic review and meta-regression analysis of social functioning correlates in autism and typical development. *Autism Research*, 12(2), 152-175. <https://doi.org/10.1002/aur.2055>

Bowler, D. M., Gardiner, J. M., & Grice, S. J. (2000). Episodic memory and remembering in adults with Asperger syndrome. *Journal of Autism and Developmental Disorders*, 30(4), 295-304. <https://doi.org/10.1023/A:1005575216176>

Brown, C., & Dunn, W. (2002). Adolescent/adult sensory profile: User's manual. Psychological Corporation. <https://doi.org/10.1037/t56705-000>

Casanova, M. F., Sokhadze, E. M., Opris, I., Wang, Y., & Li, X. (2020). Autism spectrum disorders: linking neuropathological findings to treatment with transcranial magnetic stimulation. *Acta Paediatrica*, 109(2), 346-355. <https://doi.org/10.1111/apa.12943>

CDC. (2021). Prevalence of autism spectrum disorder among children aged 8 years - Autism and Developmental Disabilities Monitoring Network, 2020. *Morbidity and Mortality Weekly Report*, 70(11), 202-205. <https://doi.org/10.15585/mmwr.mm7011a1>

Courchesne, E., Pramparo, T., Gazestani, V. H., Lombardo, M. V., Pierce, K., & Lewis, N. E. (2019). The ASD living biology: from cell proliferation to clinical phenotype. *Molecular Psychiatry*, 24(1), 88-107. <https://doi.org/10.1038/s41380-018-0056-y>

Critchley, H. D., Daly, E. M., Bullmore, E. T., Williams, S. C., Van Amelsvoort, T., Robertson, D. M., ... & Murphy, D. G. (2000). The functional neuroanatomy of social behaviour: changes in cerebral blood flow when people with autistic disorder process facial expressions. *Brain*, 123(11), 2203-2212. <https://doi.org/10.1093/brain/123.11.2203>

Dalton, K., Nacewicz, B., Johnstone, T., Schaefer, H., Gernsbacher, M., Goldsmith, H., Alexander, A., & Davidson, R.J. (2005). Gaze fixation and the neural circuitry of face processing in autism. *Nature Neuroscience*, 8, 519-526. <https://doi.org/10.1038/nn1421>

Delis, D. C., Kaplan, E., & Kramer, J. H. (2001). Delis-Kaplan Executive Function System (D-KEFS). The Psychological Corporation. <https://doi.org/10.1037/t15082-000>

Demetriou, E. A., Lampit, A., Quintana, D. S., Naismith, S. L., Song, Y. J. C., Pye, J. E., ... & Guastella, A. J. (2018). Autism spectrum disorders: a meta-analysis of executive function. *Molecular Psychiatry*, 23(5), 1198-1204. <https://doi.org/10.1038/mp.2017.75>

Demetriou, E. A., et al. (2020). Executive function profiles in high-functioning autism: A meta-analysis. *Autism Research*, 13(1), 1-16. <https://doi.org/10.1002/aur.2246>

Demetriou, E. A., et al. (2021). Executive function profiles in high-functioning autism: A meta-analysis. *Autism Research*, 14(4), 723-735. <https://doi.org/10.1002/aur.2470>

Frazier, T. W., Strauss, M., Klingemier, E. W., Zetzer, E. E., Hardan, A. Y., Eng, C., & Youngstrom, E. A. (2017). A meta-analysis of gaze differences to social and nonsocial information between individuals with and without autism. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(7), 546-555. <https://doi.org/10.1016/j.jaac.2017.05.005>

Fridenson-Hayo, S., Berggren, S., Lassalle, A., Tal, S., Pigat, D., Bölte, S., ... & Golan, O. (2016). Basic and complex emotion recognition in children with autism: cross-cultural findings. *Molecular Autism*, 7(1), 52. <https://doi.org/10.1186/s13229-016-0113-9>

Gates, J. A., Kang, E., & Lerner, M. D. (2017). Efficacy of group social skills interventions for youth with autism spectrum disorder: A systematic review and meta-analysis. *Clinical Psychology Review*, 52, 164-181. <https://doi.org/10.1016/j.cpr.2017.01.006>

Geurts, H. M., Corbett, B., & Solomon, M. (2009). The paradox of cognitive flexibility in autism. *Trends in Cognitive Sciences*, 13(2), 74-82. <https://doi.org/10.1016/j.tics.2008.11.006>

Gioia, G. A., Isquith, P. K., Guy, S. C., & Kenworthy, L. (2015). Behavior rating inventory of executive function (2nd ed.). Psychological Assessment Resources. <https://doi.org/10.1037/t79467-000>

Goris, J., Braem, S., Nijhof, A. D., Rigoni, D., Deschrijver, E., Van de Cruys, S., ... & Brass, M. (2018). Sensory prediction errors are less modulated by global context in autism spectrum disorder. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 3(8), 667-674. <https://doi.org/10.1016/j.bpsc.2018.02.003>

Grove, J., Ripke, S., Als, T. D., Mattheisen, M., Walters, R. K., Won, H., ... & Børghlum, A. D. (2019). Identification of common genetic risk variants for autism spectrum disorder. *Nature Genetics*, 51(3), 431-444. <https://doi.org/10.1038/s41588-019-0344-8>

Guillon, Q., Hadjikhani, N., Baduel, S., & Rogé, B. (2014). Visual social attention in autism spectrum disorder: Insights from eye tracking studies. *Neuroscience & Biobehavioral Reviews*, 42, 279-297. <https://doi.org/10.1016/j.neubiorev.2014.03.013>

Hampson, D. R., & Blatt, G. J. (2015). Autism spectrum disorders and neuropathology of the cerebellum. *Frontiers in Neuroscience*, 9, 420. <https://doi.org/10.3389/fnins.2015.00420>

Happé, F. (1994). An advanced test of theory of mind: Understanding of story characters' thoughts and feelings by able autistic, mentally handicapped, and normal children and adults. *Journal of Autism and Developmental Disorders*, 24(2), 129-154. <https://doi.org/10.1007/BF02172093>

Happé, F., & Frith, U. (2006). The weak coherence account: detail-focused cognitive style in autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 36(1), 5-25. <https://doi.org/10.1007/s10803-005-0039-0>

Happé, F., & Frith, U. (2014). Annual research review: Towards a developmental neuroscience of autism. *Journal of Child Psychology and Psychiatry*, 55(6), 553-563. <https://doi.org/10.1111/jcpp.12183>

Hill, E. L. (2004). Executive dysfunction in autism. *Trends in Cognitive Sciences*, 8(1), 26-32. <https://doi.org/10.1016/j.tics.2003.11.003>

Hull, J. V., Dokovna, L. B., Jacokes, Z. J., Torgerson, C. M., Irimia, A., & Van Horn, J. D. (2017). Resting-state functional connectivity in autism spectrum disorders: A review. *Frontiers in Psychiatry*, 7, 205. <https://doi.org/10.3389/fpsyt.2016.00205>

Joseph, R. M., & Tager-Flusberg, H. (2004). The Development of Communication and Language in Autism. *Journal of Autism and Developmental Disorders*, 34(4), 355-368. <https://doi.org/10.1023/B:JADD.0000018077.64617.5a>

Just, M., Cherkassyky, V., Keller, T., & Minshew, N. (2004). Cortical activation and synchronization during sentence comprehension in high-functioning autism: Evidence of underconnectivity. *Brain*, 127, 1811-1821 <https://doi.org/10.1093/brain/awh199>

Kana, R. K., Libero, L. E., & Moore, M. S. (2011). Disrupted cortical connectivity theory as an explanatory model for autism spectrum disorders. *Physics of Life Reviews*, 8(4), 410-437. <https://doi.org/10.1016/j.plrev.2011.10.001>

Kasari, C., Brady, N., Lord, C., & Tager-Flusberg, H. (2013). Assessing the minimally verbal school-aged child with autism spectrum disorder. *Autism Research*, 6(6), 479-493. <https://doi.org/10.1002/aur.1334>

Kazdoba, T. M., Leach, P. T., & Crawley, J. N. (2016). Behavioral phenotypes of genetic mouse models of autism. *Genes, Brain and Behavior*, 15(1), 7-26. <https://doi.org/10.1111/gbb.12256>

Kenworthy, L., Anthony, L. G., Naiman, D. Q., Cannon, L., Wills, M. C., Luong-Tran, C., ... & Wallace, G. L. (2014). Randomized controlled effectiveness trial of executive function intervention for children on the autism spectrum. *Journal of Child Psychology and Psychiatry*, 55(4), 374-383. <https://doi.org/10.1111/jcpp.12161>

Lai, M. C., Anagnostou, E., Wiznitzer, M., Allison, C., & Baron-Cohen, S. (2020). Evidence-based support for autistic people across the lifespan: maximising potential, minimising barriers, and optimising the person-environment fit. *The Lancet Neurology*, 19(5), 434-451. [https://doi.org/10.1016/S1474-4422\(20\)30034-X](https://doi.org/10.1016/S1474-4422(20)30034-X)

Lai, M. C., Kassee, C., Besney, R., Bonato, S., Hull, L., Mandy, W., ... & Ameis, S. H. (2019). Prevalence of co-occurring mental health diagnoses in the autism population: a systematic review and meta-analysis. *The Lancet Psychiatry*, 6(10), 819-829. [https://doi.org/10.1016/S2215-0366\(19\)30289-5](https://doi.org/10.1016/S2215-0366(19)30289-5)

Lawson, R. P., Rees, G., & Friston, K. J. (2014). An aberrant precision account of autism. *Frontiers in Human Neuroscience*, 8, 302. <https://doi.org/10.3389/fnhum.2014.00302>

Livingston, L. A., & Happé, F. (2017). Conceptualising compensation in neurodevelopmental disorders: Reflections from autism spectrum disorder. *Neuroscience & Biobehavioral Reviews*, 80, 729-742. <https://doi.org/10.1016/j.neubiorev.2017.06.005>

Livingston, L. A., Colvert, E., Bolton, P., & Happé, F. (2019). Good social skills despite poor theory of mind: exploring compensation in autism spectrum disorder. *Journal of Child Psychology and Psychiatry*, 60(1), 102-110. <https://doi.org/10.1111/jcpp.12886>

Lombardo, M. V., Lai, M. C., & Baron-Cohen, S. (2019). Big data approaches to decomposing heterogeneity across the autism spectrum. *Molecular Psychiatry*, 24(10), 1435-1450. <https://doi.org/10.1038/s41380-018-0321-0>

Loth, E., Garrido, L., Ahmad, J., Watson, E., Duff, A., & Duchaine, B. (2018). Facial expression recognition as a candidate marker for autism spectrum disorder: how frequent and severe are deficits? *Molecular Autism*, 9(1), 7. <https://doi.org/10.1186/s13229-018-0187-7>

Lyall, K., Croen, L., Daniels, J., Fallin, M. D., Ladd-Acosta, C., Lee, B. K., ... & Newschaffer, C. (2017). The changing epidemiology of autism spectrum disorders. *Annual Review of Public Health*, 38, 81-102. <https://doi.org/10.1146/annurev-publhealth-031816-044318>

Maenner, M. J., Shaw, K. A., Baio, J., Washington, A., Patrick, M., DiRienzo, M., ... & Dietz, P. M. (2020). Prevalence of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring network, 11 sites, United States, 2016. *MMWR Surveillance Summaries*, 69(4), 1. <https://doi.org/10.15585/mmwr.ss6904a1>

Magiati, I., Tay, X. W., & Howlin, P. (2014). Cognitive, language, social and behavioural outcomes in adults with autism spectrum disorders: A systematic review of longitudinal follow-up studies in adulthood. *Clinical Psychology Review*, 34(1), 73-86. <https://doi.org/10.1016/j.cpr.2013.11.002>

Manning, C., Kilner, J., Neil, L., Karaminis, T., & Pellicano, E. (2017). Children on the autism spectrum update their behaviour in response to a volatile environment. *Developmental Science*, 20(5), e12435. <https://doi.org/10.1111/desc.12435>

Matta, S. M., Hill-Yardin, E. L., & Crack, P. J. (2019). The influence of neuroinflammation in autism spectrum disorder. *Brain, Behavior, and Immunity*, 79, 75-90. <https://doi.org/10.1016/j.bbi.2019.04.037>

Maximo, J. O., Cadena, E. J., & Kana, R. K. (2014). The implications of brain connectivity in the neuropsychology of autism. *Neuropsychology Review*, 24(1), 16-31. <https://doi.org/10.1007/s11065-014-9250-0>

Mazefsky, C. A., & White, S. W. (2014). Emotion regulation: Concepts & practice in autism spectrum disorder. *Child and Adolescent Psychiatric Clinics*, 23(1), 15-24. <https://doi.org/10.1016/j.chc.2013.07.002>

McDonald, S., Flanagan, S., Rollins, J., & Kinch, J. (2003). TASIT: A new clinical tool for assessing social perception after traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, 18(3), 219-238. <https://doi.org/10.1097/00001199-200305000-00001>

Meilleur, A. A. S., Jelenic, P., & Mottron, L. (2015). Prevalence of clinically and empirically defined talents and strengths in autism. *Journal of Autism and Developmental Disorders*, 45(5), 1354-1367. <https://doi.org/10.1007/s10803-014-2296-2>

Mottron, L., Dawson, M., Soulières, I., Hubert, B., & Burack, J. (2006). Enhanced perceptual functioning in autism: an update, and eight principles of autistic perception. *Journal of Autism and Developmental Disorders*, 36(1), 27-43. <https://doi.org/10.1007/s10803-005-0040-7>

Ozonoff, S., Goodlin-Jones, B. L., & Solomon, M. (2005). Evidence-based assessment of autism spectrum disorders in children and adolescents. *Journal of Clinical Child and Adolescent Psychology*, 34(3), 523-540. https://doi.org/10.1207/s15374424jccp3403_8

Parham, L. D., Ecker, C., Miller Kuhaneck, H., Henry, D. A., & Glennon, T. J. (2007). *Sensory Processing Measure (SPM): Manual*. Western Psychological Services. <https://doi.org/10.1037/t49671-000>

Pellicano, E., & Burr, D. (2012). When the world becomes 'too real': a Bayesian explanation of autistic perception. *Trends in Cognitive Sciences*, 16(10), 504-510. <https://doi.org/10.1016/j.tics.2012.08.009>

Pelphrey, K. A., Shultz, S., Hudac, C. M., & Vander Wyk, B. C. (2011). Research review: constraining heterogeneity: the social brain and its development in autism spectrum disorder. *Journal of Child Psychology and Psychiatry*, 52(6), 631-644. <https://doi.org/10.1111/j.1469-7610.2010.02349.x>

Ronald, A., & Hoekstra, R. A. (2011). Autism spectrum disorders and autistic traits: a decade of new twin studies. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, 156(3), 255-274. <https://doi.org/10.1002/ajmg.b.31159>

Rosenblau, G., Kliemann, D., Heekeren, H. R., & Dziobek, I. (2015). Approximating implicit and explicit mentalizing with two naturalistic video-based tasks in typical development and autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 45(4), 953-965. <https://doi.org/10.1007/s10803-014-2249-9>

Rudovic, O., Lee, J., Dai, M., Schuller, B., & Picard, R. W. (2018). Personalized machine learning for robot perception of affect and engagement in autism therapy. *Science Robotics*, 3(19), eaao6760. <https://doi.org/10.1126/scirobotics.aao6760>

Russo-Ponsaran, N. M., Evans-Smith, B., Johnson, J., Russo, J., & McKown, C. (2016). Efficacy of a facial emotion training program for children and adolescents with autism spectrum disorders. *Journal of Nonverbal Behavior*, 40(1), 13-38. <https://doi.org/10.1007/s10919-015-0217-5>

Rutter, M., Le Couteur, A., & Lord, C. (2003). Autism diagnostic interview-revised. Western Psychological Services. <https://doi.org/10.1037/t18128-000>

Seltzer, M. M., Shattuck, P., Abbeduto, L., & Greenberg, J. S. (2004). Trajectory of development in adolescents and adults with autism. *Mental Retardation and Developmental Disabilities Research Reviews*, 10(4), 234-247. <https://doi.org/10.1002/mrdd.20038>

Simonoff, E., Kent, R., Stringer, D., Lord, C., Briskman, J., Lukito, S., ... & Baird, G. (2020). Trajectories in symptoms of autism and cognitive ability in autism from childhood to adult life: Findings from a longitudinal epidemiological cohort. *Journal of the American Academy of Child & Adolescent Psychiatry*, 59(12), 1342-1352. <https://doi.org/10.1016/j.jaac.2019.11.020>

Siu, A. M. H., et al. (2020). Understanding social cognition in children with autism spectrum disorder: A systematic review. *Research in Autism Spectrum Disorders*, 73, 101514. <https://doi.org/10.1016/j.rasd.2020.101514>

South, M., Ozonoff, S., & McMahon, W. M. (2005). Repetitive behavior profiles in Asperger syndrome and high-functioning autism. *Journal of Autism and Developmental Disorders*, 35(2), 145-158. <https://doi.org/10.1007/s10803-004-1992-8>

Stone, V. E., Baron-Cohen, S., & Knight, R. T. (1998). Frontal lobe contributions to theory of mind. *Journal of Cognitive Neuroscience*, 10(5), 640-656. <https://doi.org/10.1162/089892998562942>

Supekar, K., Uddin, L. Q., Khouzam, A., Phillips, J., Gaillard, W. D., Kenworthy, L. E., ... & Menon, V. (2013). Brain hyperconnectivity in children with autism and its links to social deficits. *Cell Reports*, 5(3), 738-747. <https://doi.org/10.1016/j.celrep.2013.10.001>

Schultz, R., Gauthier, I., Klin, A., Fulbright, R., Anderson, A., Volkmar, F., Skudlarski, P., Lacadie, C., Cohen, D.J., & Gore, J. (2000). Abnormal ventral temporal cortical activity during face discrimination among individuals with autism and Asperger syndrome. <https://doi.org/10.1001/archpsyc.57.4.331>

Uljarevic, M., & Hamilton, A. (2013). Recognition of emotions in autism: a formal meta-analysis. *Journal of Autism and Developmental Disorders*, 43(7), 1517-1526. <https://doi.org/10.1007/s10803-012-1695-5>

Van de Cruys, S., Evers, K., Van der Hallen, R., Van Eylen, L., Boets, B., de-Wit, L., & Wagemans, J. (2014). Precise minds in uncertain worlds: Predictive coding in autism. *Psychological Review*, 121(4), 649-675. <https://doi.org/10.1037/a0037665>

Wang, C., Geng, H., Liu, W., & Zhang, G. (2017). Prenatal, perinatal, and postnatal factors associated with autism: A meta-analysis. *Medicine*, 96(18). <https://doi.org/10.1097/MD.0000000000006696>

Zeidan, J., Fombonne, E., Scolah, J., Ibrahim, A., Durkin, M. S., Saxena, S., ... & Elsabbagh, M. (2022). Global prevalence of autism: A systematic review update. *Autism Research*, 15(5), 778-790. <https://doi.org/10.1002/aur.2696>