

timeliness, completeness, and accuracy as well as subject flow through the study.

## REFERENCES

- [1] Hyman, S. L., Levy, S. E., Myers, S. M. *et al.* Identification, evaluation, and management of children with autism spectrum disorder. *Pediatrics* **145** (2020).
- [2] Kalb, L. G. *et al.* Determinants of appointment absenteeism at an outpatient pediatric autism clinic. *Journal of Developmental & Behavioral Pediatrics* **33**, 685–697 (2012).
- [3] Bisgaier, J., Levinson, D., Cutts, D. B. & Rhodes, K. V. Access to autism evaluation appointments with developmental-behavioral and neurodevelopmental subspecialists. *Archives of pediatrics & adolescent medicine* **165**, 673–674 (2011).
- [4] Fenikilé, T. S., Ellerbeck, K., Filippi, M. K. & Daley, C. M. Barriers to autism screening in family medicine practice: a qualitative study. *Primary health care research & development* **16**, 356–366 (2015).
- [5] Gordon-Lipkin, E., Foster, J. & Peacock, G. Whittling Down the Wait Time: Exploring Models to Minimize the Delay from Initial Concern to Diagnosis and Treatment of Autism Spectrum Disorder. *Pediatr. Clin. North Am.* **63**, 851–859 (2016).
- [6] Robins, D. L. *et al.* Validation of the modified checklist for autism in toddlers, revised with follow-up (m-chat-r/f). *Pediatrics* **133**, 37–45 (2014).
- [7] Jashar, D. T., Brennan, L. A., Barton, M. L. & Fein, D. Cognitive and adaptive skills in toddlers who meet criteria for autism in dsm-iv but not dsm-5. *Journal of autism and developmental disorders* **46**, 3667–3677 (2016).
- [8] Tye, C., Runicles, A. K., Whitehouse, A. J. O. & Alvares, G. A. Characterizing the Interplay Between Autism Spectrum Disorder and Comorbid Medical Conditions: An Integrative Review. *Front Psychiatry* **9**, 751 (2018).
- [9] Kohane, I. S. *et al.* The co-morbidity burden of children and young adults with autism spectrum disorders. *PLoS ONE* **7**, e33224 (2012).
- [10] Christensen, D. L. *et al.* Prevalence and characteristics of autism spectrum disorder among children aged 4 years—early autism and developmental disabilities monitoring network, seven sites, united states, 2010, 2012, and 2014. *MMWR Surveillance Summaries* **68**, 1 (2019).
- [11] Burkett, K., Morris, E., Manning-Courtney, P., Anthony, J. & Shambley-Ebron, D. African american families on autism diagnosis and treatment: The influence of culture. *Journal of Autism and Developmental Disorders* **45**, 3244–3254 (2015).
- [12] Baio, J. *et al.* Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years - Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. *MMWR Surveill Summ* **67**, 1–23 (2018).
- [13] Data & statistics on autism spectrum disorder — cdc (2019). URL <https://www.cdc.gov/ncbddd/autism/data.html>.
- [14] King, M. & Bearman, P. Diagnostic change and the increased prevalence of autism. *Int J Epidemiol* **38**, 1224–1234 (2009).
- [15] Elsabbagh, M. *et al.* Global prevalence of autism and other pervasive developmental disorders. *Autism Res* **5**, 160–179 (2012).
- [16] Schieve, L. A. *et al.* Population attributable fractions for three perinatal risk factors for autism spectrum disorders, 2002 and 2008 autism and developmental disabilities monitoring network. *Ann Epidemiol* **24**, 260–266 (2014).
- [17] Volkmar, F. *et al.* Practice parameter for the assessment and treatment of children and adolescents with autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry* **53**, 237–257 (2014).
- [18] Gordon-Lipkin, E., Foster, J. & Peacock, G. Whittling down the wait time: exploring models to minimize the delay from initial concern to diagnosis and treatment of autism spectrum disorder. *Pediatric Clinics* **63**, 851–859 (2016).
- [19] Althouse, L. A. & Stockman, J. A. Pediatric workforce: A look at pediatric nephrology data from the american board of pediatrics. *The Journal of pediatrics* **148**, 575–576 (2006).
- [20] Guthrie, W. *et al.* Accuracy of Autism Screening in a Large Pediatric Network. *Pediatrics* **144** (2019).
- [21] Satterstrom, F. K. *et al.* Large-scale exome sequencing study implicates both developmental and functional changes in the neurobiology of autism. *bioRxiv* (2019). <https://www.biorxiv.org/content/early/2019/04/24/484113.full.pdf>.
- [22] Sandin, S. *et al.* The Heritability of Autism Spectrum Disorder Reassessing the Heritability of Autism Spectrum Disorders Letters. *JAMA* **318**, 1182–1184 (2017). URL <https://doi.org/10.1001/jama.2017.12141>. [https://jamanetwork.com/journals/jama/articlepdf/2654804/jama\\_sandin\\_2017\\_id\\_170037.pdf](https://jamanetwork.com/journals/jama/articlepdf/2654804/jama_sandin_2017_id_170037.pdf).

- [23] Ohja, K. *et al.* Neuroimmunologic and Neurotrophic Interactions in Autism Spectrum Disorders: Relationship to Neuroinflammation. *Neuromolecular Med.* **20**, 161–173 (2018).
- [24] Gadysz, D., Krzywdziska, A. & Hozyasz, K. K. Immune Abnormalities in Autism Spectrum Disorder-Could They Hold Promise for Causative Treatment? *Mol. Neurobiol.* **55**, 6387–6435 (2018).
- [25] Sanders, S. J. *et al.* Insights into Autism Spectrum Disorder Genomic Architecture and Biology from 71 Risk Loci. *Neuron* **87**, 1215–1233 (2015).
- [26] Gaugler, T. *et al.* Most genetic risk for autism resides with common variation. *Nat. Genet.* **46**, 881–885 (2014).
- [27] Werling, D. M. The role of sex-differential biology in risk for autism spectrum disorder. *Biol Sex Differ* **7**, 58 (2016).
- [28] Abrahams, B. S. & Geschwind, D. H. Advances in autism genetics: on the threshold of a new neurobiology. *Nat. Rev. Genet.* **9**, 341–355 (2008).
- [29] Yamashita, Y. *et al.* Anti-inflammatory Effect of Ghrelin in Lymphoblastoid Cell Lines From Children With Autism Spectrum Disorder. *Front Psychiatry* **10**, 152 (2019).
- [30] Shen, L. *et al.* Proteomics Study of Peripheral Blood Mononuclear Cells (PBMCs) in Autistic Children. *Front Cell Neurosci* **13**, 105 (2019).
- [31] Theoharides, T. C., Tsilioni, I., Patel, A. B. & Doyle, R. Atopic diseases and inflammation of the brain in the pathogenesis of autism spectrum disorders. *Transl Psychiatry* **6**, e844 (2016).
- [32] Young, A. M. *et al.* From molecules to neural morphology: understanding neuroinflammation in autism spectrum condition. *Mol Autism* **7**, 9 (2016).
- [33] Croen, L. A. *et al.* Family history of immune conditions and autism spectrum and developmental disorders: Findings from the study to explore early development. *Autism Res* **12**, 123–135 (2019).
- [34] Zerbo, O. *et al.* Immune mediated conditions in autism spectrum disorders. *Brain Behav. Immun.* **46**, 232–236 (2015).
- [35] Hyde, K. K. *et al.* Applications of supervised machine learning in autism spectrum disorder research: a review. *Review Journal of Autism and Developmental Disorders* **6**, 128–146 (2019).
- [36] Abbas, H., Garberson, F., Liu-Mayo, S., Glover, E. & Wall, D. P. Multi-modular ai approach to streamline autism diagnosis in young children. *Scientific reports* **10**, 1–8 (2020).
- [37] Duda, M., Daniels, J. & Wall, D. P. Clinical evaluation of a novel and mobile autism risk assessment. *Journal of autism and developmental disorders* **46**, 1953–1961 (2016).
- [38] Duda, M., Kosmicki, J. & Wall, D. Testing the accuracy of an observation-based classifier for rapid detection of autism risk. *Translational psychiatry* **4**, e424–e424 (2014).
- [39] Fusaro, V. A. *et al.* The potential of accelerating early detection of autism through content analysis of youtube videos. *PLOS one* **9**, e93533 (2014).
- [40] Wall, D. P., Dally, R., Luyster, R., Jung, J.-Y. & DeLuca, T. F. Use of artificial intelligence to shorten the behavioral diagnosis of autism. *PloS one* **7**, e43855 (2012).
- [41] Wall, D. P., Kosmicki, J., Deluca, T., Harstad, E. & Fusaro, V. A. Use of machine learning to shorten observation-based screening and diagnosis of autism. *Translational psychiatry* **2**, e100–e100 (2012).
- [42] Hansen, L. The truven health marketscan databases for life sciences researchers. *Truven Health Analytics IBM Watson Health* (2017).
- [43] Hedegaard, H., Johnson, R. L., Garnett, M. & Thomas, K. E. The international classification of diseases, 10th revision, clinical modification (icd–10–cm): external cause-of-injury framework for categorizing mechanism and intent of injury (2019).
- [44] Chattopadhyay, I. & Lipson, H. Abductive learning of quantized stochastic processes with probabilistic finite automata. *Philos Trans A* **371**, 20110543 (2013).
- [45] Chattopadhyay, I. & Lipson, H. Data smashing: uncovering lurking order in data. *Journal of The Royal Society Interface* **11** (2014). URL <http://rsif.royalsocietypublishing.org/content/11/101/20140826>.
- [46] Huang, Y. & Chattopadhyay, I. Data smashing 2.0: Sequence likelihood (sl) divergence for fast time series comparison. *arXiv preprint arXiv:1909.12243* (2019).
- [47] Ke, G. *et al.* Lightgbm: A highly efficient gradient boosting decision tree. *Advances in neural information processing systems* **30**, 3146–3154 (2017).