



ΔΗΜΟΚΡΙΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ
ΣΧΟΛΗ ΚΛΑΣΙΚΩΝ ΚΑΙ ΑΝΘΡΩΠΙΣΤΙΚΩΝ ΣΠΟΥΔΩΝ

ΤΜΗΜΑ ΕΛΛΗΝΙΚΗΣ ΦΙΛΟΛΟΓΙΑΣ

σε συνεργασία με το

ΕΘΝΙΚΟ ΚΕΝΤΡΟ ΕΡΕΥΝΑΣ ΦΥΣΙΚΩΝ ΕΠΙΣΤΗΜΩΝ

«ΔΗΜΟΚΡΙΤΟΣ»

ΙΝΣΤΙΤΟΥΤΟ ΠΛΗΡΟΦΟΡΙΚΗΣ ΚΑΙ ΤΗΛΕΠΙΚΟΙΝΩΝΙΩΝ

ΔΙΔΡΥΜΑΤΙΚΟ ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ:
ΕΞΕΙΔΙΚΕΥΣΗ ΣΤΙΣ Τ.Π.Ε. ΚΑΙ ΕΙΔΙΚΗ ΑΓΩΓΗ – ΨΥΧΟΠΑΙΔΑΓΩΓΙΚΗ ΤΗΣ ΕΝΤΑΞΗΣ

ΜΕΤΑΠΤΥΧΙΑΚΗ ΔΙΑΤΡΙΒΗ

Τίτλος εργασίας

«Οι τροφές και τα συμπληρώματα διατροφής
που δρουν θεραπευτικά στα παιδιά με
Διαταραχή Αυτιστικού Φάσματος»

Ανασκόπηση ερευνών

Ονοματεπώνυμο:

Κιουρτσόγλου Παρασκευή

A.M. 749

Μεταπτυχιακή διατριβή που υποβάλλεται στην τριμελή επιτροπή για την απόκτηση του μεταπτυχιακού τίτλου του Προγράμματος Μεταπτυχιακών Σπουδών Εξειδίκευσης του Τ.Ε.Φ. – Δ.Π.Θ. σε συνεργασία με το Ε.Κ.Ε.Φ.Ε. Δημόκριτος – Ινστιτούτο Πληροφορικής και Τηλεπικοινωνιών με τίτλο: «Εξειδίκευση στις Τ.Π.Ε. και Ειδική Αγωγή – Ψυχοπαιδαγωγική της Ένταξης»

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Περίληψη

Η **διαταραχή αυτιστικού φάσματος (ΔΑΦ)** είναι μια πολύπλοκη **νευροαναπτυξιακή πάθηση** που χαρακτηρίζεται από δυσκολίες στην κοινωνική αλληλεπίδραση και επαναλαμβανόμενες συμπεριφορές. Παρόλο που έχει ισχυρή γενετική βάση, πρόσφατες έρευνες δείχνουν ότι **περιβαλλοντικοί παράγοντες** ίσως διαδραματίζουν σημαντικότερο ρόλο στην εμφάνισή της. Πολλά άτομα με ΔΑΦ εμφανίζουν **διατροφικές ανεπάρκειες, μεταβολικές δυσλειτουργίες και γαστρεντερικά προβλήματα**, και η αντιμετώπιση αυτών φαίνεται να έχει **θετικά θεραπευτικά αποτελέσματα**.

Υπάρχει συχνά **συννοσηρότητα** με τη **διαταραχή ελλειμματικής προσοχής και υπερκινητικότητας (ΔΕΠΥ/ADHD)**, η οποία χαρακτηρίζεται από απροσεξία, υπερκινητικότητα και παρορμητικότητα. Οι δύο διαταραχές μοιράζονται **γνωστικά και συμπεριφορικά ελλείμματα**, ιδιαίτερα στις **εκτελεστικές λειτουργίες**.

Η αιτιολογία τόσο της ΔΑΦ όσο και της ΔΕΠΥ είναι **πολυπαραγοντική**, με **γενετική επικάλυψη** και κοινά **νευρωνικά δίκτυα**.

Στη παρούσα εργασία παρουσιάζονται διατροφικές παρεμβάσεις που έχουν πραγματοποιηθεί για ορισμένα συμπληρώματα διατροφής, αναφέρονται ακόμη οι τροφές που βλάπτουν την υγεία και παρουσιάζεται η συνδυαστική διατροφική παρέμβαση σε παιδιά και ενήλικες με ΔΑΦ που εφαρμόστηκε στις ΗΠΑ. Ο συνδυασμός συμπληρωμάτων που ερευνηθήκε η επίδραση του ονομάστηκε **ANRC Essentials Plus (ANRC-EP: Autism Nutrition Research Center – Essentials Plus)** από τον μη κερδοσκοπικό οργανισμό στις ΗΠΑ για τη ΔΑΦ. Τα συμπληρώματα αυτά συνδυάστηκαν με το πρωτόκολλο διατροφής που περιλαμβάνει τροφές χωρίς γλουτένη, καζεΐνη και σόγια **HGCSF (=Healthy, Gluten-free, Casein-Free and Soy/Soya-free)**.

Η λήψη των συμπληρωμάτων και η εφαρμογή του πρωτοκόλλου στη διατροφή οδήγησε σε **ευεργετικά αποτελέσματά** την υγεία και τη συμπεριφορά παιδιών και ενηλίκων με Διαταραχή Αυτιστικού Φάσματος (ΔΑΦ).

Λέξεις κλειδιά: διαταραχή αυτιστικού φάσματος, ΔΑΦ, διατροφή, χωρίς γλουτένη, χωρίς καζεΐνη, συμπληρώματα διατροφής, παιδιά, προβιοτικά, ωμέγα 3, βιταμίνες, θεραπευτική αγωγή, βελτίωση συμπεριφοράς

Πηγές

1. Adams, J. B. (2013). *Summary of dietary, nutritional, and medical treatments for autism—Based on over 150 published research studies* (ARI Publication 40). Autism Research Institute. <https://ariconference.com/enews/treatment.pdf>
2. Adams, J. B., Audhya, T., Geis, E., Gehn, E., Fimbres, V., Pollard, E. L., Mitchell, J., Ingram, J., Hellmers, R., Laake, D., Matthews, J. S., Li, K., Naviaux, J. C., Naviaux, R. K., Adams, R. L., Coleman, D. M., & Quig, D. W. (2018). *Comprehensive nutritional and dietary intervention for autism spectrum disorder—A randomized, controlled 12-month trial*. *Nutrients*, 10(3), 369. <https://doi.org/10.3390/nu10030369>
3. Adams, J. B., Audhya, T., McDonough-Means, S., Rubin, R. A., Quig, D., Geis, E., Gehn, E., Loresto, M., Mitchell, J., Atwood, S., & others. (2011). Nutritional and metabolic status of children with autism vs. neurotypical children, and the association with autism severity. *Nutrition & Metabolism*, 8(1), 34. <https://doi.org/10.1186/1743-7075-8-34>
4. Adams, J. B., Audhya, T., McDonough-Means, S., Rubin, R. A., Quig, D., Geis, E., Gehn, E., Loresto, M., Mitchell, J., Atwood, S., et al. (2011). Effect of a vitamin/mineral supplement on children and adults with autism. *BMC Pediatrics*, 11, 111. <https://doi.org/10.1186/1471-2431-11-111>
5. Adams, J. B., Johansen, L. J., Powell, L. D., Quig, D., & Rubin, R. A. (2011). Gastrointestinal flora and gastrointestinal status in children with autism—comparisons to typical children and correlation with autism severity. *BMC Gastroenterology*, 11, Article 22. <https://doi.org/10.1186/1471-230X-11-22>
6. Adams, J. B., Kirby, J., Audhya, T., Whiteley, P., & Bain, J. (2022). Vitamin/mineral/micronutrient supplement for autism spectrum disorders: A research survey. *BMC Pediatrics*, 22(1), 590. <https://doi.org/10.1186/s12887-022-03628-0>
7. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing. <https://doi.org/10.1176/appi.books.9780890425596>
8. Bandini, L. G., Anderson, S. E., Curtin, C., Cermak, S., Evans, E. W., Scampini, R., Maslin, M., & Must, A. (2010). Food selectivity in children with autism spectrum

- disorders and typically developing children. *The Journal of Pediatrics*, 157(2), 259–264. <https://doi.org/10.1016/j.jpeds.2010.02.013>
9. Bent, S., Hendren, R. L., Zandi, T., Law, K., Choi, J. E., Widjaja, F., Kalb, L., Nestle, J., & Law, P. (2014). Internet-based, randomized, controlled trial of omega-3 fatty acids for hyperactivity in autism. *Journal of the American Academy of Child & Adolescent Psychiatry*, 53(6), 658–666. <https://doi.org/10.1016/j.jaac.2014.01.018>
 10. Bent, S., Lawton, B., Warren, T., Widjaja, F., Dang, K., Fahey, J. W., Cornblatt, B., Kinchen, J. M., Delucchi, K., & Hendren, R. L. (2018). Identification of urinary metabolites that correlate with clinical improvements in children with autism treated with sulforaphane from broccoli. *Molecular Autism*, 9(1), 35. <https://doi.org/10.1186/s13229-018-0218-4>
 11. Buie, T., Fuchs, G. J., Furuta, G. T., Kooros, K., Levy, J., Lewis, J. D., Wershil, B. K., & Winter, H. (2010). Recommendations for evaluation and treatment of common gastrointestinal problems in children with ASDs. *Pediatrics*, 125(Supplement 1), S19–S29. <https://doi.org/10.1542/peds.2009-1878D>
 12. Cade, R., Privette, M., Fregly, M., Rowland, N., Sun, Z., Zele, V., Wagemaker, H., & Edelstein, C. (2000). Autism and schizophrenia: Intestinal disorders. *Nutritional Neuroscience*, 3(1), 57–72. <https://doi.org/10.1080/1028415X.2000.11747303>
 13. Chakraborty, S. P. (2019). Patho-physiological and toxicological aspects of monosodium glutamate. *Toxicology Mechanisms and Methods*, 29(6), 389–396. <https://doi.org/10.1080/15376516.2018.1528649>
 14. De Felice, C., Signorini, C., Durand, T., Ciccoli, L., Leoncini, S., D’Esposito, M., Filosa, S., Oger, C., Guy, A., Bultel-Poncé, V., & others. (2012). Partial rescue of Rett syndrome by ω -3 polyunsaturated fatty acids (PUFAs) oil. *Genes & Nutrition*, 7(3), 447–458. <https://doi.org/10.1007/s12263-012-0285-7>
 15. De Magistris, L., Picardi, A., Siniscalco, D., Riccio, M. P., Sapone, A., Cariello, R., Abbadessa, S., Medici, N., Lammers, K. M., Schiraldi, C., & others. (2013). Antibodies against food antigens in patients with autistic spectrum disorders. *BioMed Research International*, 2013, 1–11. <https://doi.org/10.1155/2013/729349>
 16. Dellapiazza, F., Audras-Torrent, L., Michelon, C., & Baghdadli, A. (2021). Clinical characteristics of children with autism spectrum disorder and comorbid attention-

- deficit/hyperactivity disorder: Association with social impairment and externalizing and internalizing behaviors. *Research in Developmental Disabilities*, 113, 103930. <https://doi.org/10.1016/j.ridd.2021.103930>
17. Doaei, S., Bourbour, F., Teymoori, Z., Jafari, F., Kalantari, N., Toriki, S. A., Ashoori, N., Nemat Gorgani, S., & Gholamalizadeh, M. (2021). The effect of omega-3 fatty acids supplementation on social and behavioral disorders of children with autism: A randomized clinical trial. *Pediatric Endocrinology, Diabetes and Metabolism*, 27(1), 12–18. <https://doi.org/10.5114/pedm.2020.101806>
 18. Driga, A. M., Zavitsanou, A., & Drigas, A. (2023). Negative impacts of 15 white foods on health and brain and the role of mobiles in healthy living education. *Journal Health and Technology - JHT*, 2(2), e2235. <https://doi.org/10.47820/jht.v2i2.35>
 19. Dyerberg, J., Madsen, P., Møller, J. M., Aardestrup, I., & Schmidt, E. B. (2010). Bioavailability of marine n-3 fatty acid formulations. *Prostaglandins, Leukotrienes and Essential Fatty Acids*, 83(3), 137–141. <https://doi.org/10.1016/j.plefa.2010.06.007>
 20. Fahmy, S. F., El-hamamsy, M. H., Zaki, O. K., & Badary, O. A. (2013). L-Carnitine supplementation improves the behavioral symptoms in autistic children. *Research in Autism Spectrum Disorders*, 7(1), 159–166. <https://doi.org/10.1016/j.rasd.2012.07.006>
 21. Frye, R. E., Melnyk, S., Fuchs, G., Reid, T., Jernigan, S., Pavliv, O., Hubanks, A., Gaylor, D. W., Walters, L., & James, S. J. (2013). Effectiveness of methylcobalamin and folinic acid treatment on adaptive behavior in children with autistic disorder is related to glutathione redox status. *Autism Research and Treatment*, 2013, Article 609705. <https://doi.org/10.1155/2013/609705>
 22. Frye, R. E., Slattery, J., Delhey, L., Furgerson, B., Strickland, T., Tippet, M., Sailey, A., Wynne, R., Rose, S., Melnyk, S., James, S. J., Sequeira, J. M., & Quadros, E. V. (2018). Folinic acid improves verbal communication in children with autism and language impairment: A randomized double-blind placebo-controlled trial. *Molecular Psychiatry*, 23(2), 247–256. <https://doi.org/10.1038/mp.2016.168>
 23. Geier, D. A., Kern, J. K., Davis, G., King, P. G., Adams, J. B., Young, J. L., & Geier, M. R. (2011). A prospective double-blind, randomized clinical trial of levocarnitine to

- treat autism spectrum disorders. *Medical Science Monitor*, 17(1), PI15–PI23. <https://doi.org/10.12659/MSM.881792>
24. Geier, D. A., Kern, J. K., Davis, G., King, P. G., Adams, J. B., Young, J. L., & Geier, M. R. (2011). A prospective double-blind, randomized clinical trial of levocarnitine to treat autism spectrum disorders. *Medical Science Monitor*, 17(6), PI15–PI23. <https://doi.org/10.12659/MSM.881792>
25. Grimaldi, R., Gibson, G. R., Vulevic, J., Giallourou, N., Castro-Mejía, J. L., Hansen, L. H., Gibson, E. L., Nielsen, D. S., & Costabile, A. (2018). A prebiotic intervention study in children with autism spectrum disorders (ASDs). *Microbiome*, 6(1), 133. <https://doi.org/10.1186/s40168-018-0523-3>
26. Harikumar, A., Evans, D. W., Dougherty, C. C., Carpenter, K. L. H., & Michael, A. M. (2021). A review of the default mode network in autism spectrum disorders and attention deficit hyperactivity disorder. *Brain Connectivity*, 11(4), 253–263. <https://doi.org/10.1089/brain.2020.0865>
27. Hendren, R. L., James, S. J., Widjaja, F., Lawton, B., Rosenblatt, A., & Bent, S. (2016). Randomized, placebo-controlled trial of methyl B12 for children with autism. *Journal of Child and Adolescent Psychopharmacology*, Volume X(Issue x), 1–10. <https://doi.org/10.1089/cap.2015.0159>
28. Hill, Z., McCarty, P. J., Boles, R. G., & Frye, R. E. (2025). A mitochondrial supplement improves function and mitochondrial activity in autism: A double-blind placebo-controlled cross-over trial. *International Journal of Molecular Sciences*, 26(6), 2479. <https://doi.org/10.3390/ijms26062479>
29. Horvath, K., & Perman, J. A. (2002). Autistic disorder and gastrointestinal disease. *Current Opinion in Pediatrics*, 14(5), 583–587. <https://doi.org/10.1097/00008480-200210000-00004>
30. Iovene, M. R., Bombace, F., Maresca, R., Sapone, A., Iardino, P., Picardi, A., Marotta, R., Schiraldi, C., Siniscalco, D., Serra, N., de Magistris, L., & Bravaccio, C. (2016). Intestinal dysbiosis and yeast isolation in stool of subjects with autism spectrum disorders. *Mycopathologia*, 182(3–4), 349–363. <https://doi.org/10.1007/s11046-016-0068-6>
31. Kang, D. W., Adams, J. B., Gregory, A. C., Borody, T., Chittick, L., Fasano, A., Khoruts, A., Geis, E., Maldonado, J., McDonough-Means, S., Pollard, E. L., Roux, S.,

- Sadowsky, M. J., Lipson, K. S., Sullivan, M. B., Caporaso, J. G., & Krajmalnik-Brown, R. (2017). Microbiota Transfer Therapy alters gut ecosystem and improves gastrointestinal and autism symptoms: An open-label study. *Microbiome*, 5(1), Article 10. <https://doi.org/10.1186/s40168-016-0225-7>
32. Kofler, M. J., Irwin, L. N., Soto, E. F., Groves, N. B., Harmon, S. L., & Sarver, D. E. (2019). Executive functioning heterogeneity in pediatric attention-deficit/hyperactivity disorder. *Journal of Abnormal Child Psychology*, 47(2), 273–286. <https://doi.org/10.1007/s10802-018-0438-2>
33. Kong, X.-J., Liu, J., Liu, K., Koh, M., Sherman, H., Liu, S., Tian, R., Sukijthamapan, P., Wang, J., Fong, M., Xu, L., Clairmont, C., Jeong, M.-S., Li, A., Lopes, M., Hagan, V., Dutton, T., Chan, S.-T. (P.), Lee, H., Kendall, A., Kwong, K., & Song, Y. (2021). Probiotic and oxytocin combination therapy in patients with autism spectrum disorder: A randomized, double-blinded, placebo-controlled pilot trial. *Nutrients*, 13(5), 1552. <https://doi.org/10.3390/nu13051552>
34. Kushak, R. I., Lauwers, G. Y., Winter, H. S., & Buie, T. M. (2011). Intestinal disaccharidase activity in patients with autism: Effect of age, gender, and intestinal inflammation. *Autism*, 15(3), 285–294. <https://doi.org/10.1177/1362361310369142>
35. Li, Y. J., Ou, J. J., Li, Y. M., & Xiang, D. X. (2017). Dietary supplement for core symptoms of autism spectrum disorder: Where are we now and where should we go? *Frontiers in Psychiatry*, 8, 155. <https://doi.org/10.3389/fpsy.2017.00155>
36. Marigiò, M. A., Palumbi, R., Vinella, A., Laterza, R., Petruzzelli, M. G., Pescechera, A., Gabellone, A., Gentile, O., Vincenti, A., & Margari, L. (2021). DRD1 and DRD2 receptor polymorphisms: Genetic neuromodulation of the dopaminergic system as a risk factor for ASD, ADHD and ASD/ADHD overlap. *Frontiers in Neuroscience*, 15, 705890. <https://doi.org/10.3389/fnins.2021.705890>
37. Munasinghe, S. A., Oliff, C., Finn, J., & Wray, J. A. (2010). Digestive enzyme supplementation for autism spectrum disorders: A double-blind randomized controlled trial. *Journal of Autism and Developmental Disorders*, 40(9), 1131–1138. <https://doi.org/10.1007/s10803-010-0974-2>
38. Mazahery, H., Conlon, C., Beck, K. L., Kruger, M. C., Stonehouse, W., Camargo, C. A. Jr., Meyer, B. J., Tsang, B., Mugridge, O., & von Hurst, P. R. (2016). Vitamin D and

- omega-3 fatty acid supplements in children with autism spectrum disorder: A study protocol for a factorial randomised, double-blind, placebo-controlled trial. *Trials*, 17(1), 295. <https://doi.org/10.1186/s13063-016-1428-8>
39. Mazahery, H., Stonehouse, W., Delshad, M., Kruger, M. C., Conlon, C. A., Beck, K. L., & von Hurst, P. R. (2017). Relationship between long chain n-3 polyunsaturated fatty acids and autism spectrum disorder: Systematic review and meta-analysis of case-control and randomised controlled trials. *Nutrients*, 9(2), 155. <https://doi.org/10.3390/nu9020155>
40. Meguid, N. A., Anwar, M., Bjørklund, G., Hashish, A., Chirumbolo, S., Hemimi, M., & Sultan, E. (2017). Dietary adequacy of Egyptian children with autism spectrum disorder compared to healthy developing children. *Metabolic Brain Disease*, 32(2), 607–615. <https://doi.org/10.1007/s11011-016-9948-1>
41. Melnyk, S., Fuchs, G. J., Schulz, E., Lopez, M., Kahler, S. G., Fussell, J. J., Bellando, J., Pavliv, O., Rose, S., Seidel, L., Gaylor, D. W., & James, S. J. (2012). Metabolic imbalance associated with methylation dysregulation and oxidative damage in children with autism. *Journal of Autism and Developmental Disorders*, 42(3), 367–377. <https://doi.org/10.1007/s10803-011-1260-7>
42. Nardone, S., Sams, D. S., Zito, A., Reuveni, E., & Elliot, E. (2017). Dysregulation of cortical neuron DNA methylation profile in autism spectrum disorder. *Cerebral Cortex*, 27(12), 5739–5754. <https://doi.org/10.1093/cercor/bhw336>
43. Otterman, D. L., Koopman-Verhoeff, M. E., White, T. J., Tiemeier, H., Bolhuis, K., & Jansen, P. W. (2019). Executive functioning and neurodevelopmental disorders in early childhood: A prospective population-based study. *Child and Adolescent Psychiatry and Mental Health*, 13(1). <https://doi.org/10.1186/s13034-019-0299-7>
44. Port, R. G., Gaetz, W., Bloy, L., Wang, D. J., Blaskey, L., Kuschner, E. S., Levy, S. E., Brodtkin, E. S., & Roberts, T. P. L. (2017). Exploring the relationship between cortical GABA concentrations, auditory gamma-band responses and development in ASD: Evidence for an altered maturational trajectory in ASD. *Autism Research*, 10(4), 593–607. <https://doi.org/10.1002/aur.1686>
45. Purkayastha, P., Malapati, A., Yogeewari, P., & Sriram, D. (2015). A review on GABA/glutamate pathway for therapeutic intervention of ASD and ADHD. *Current*

<https://doi.org/10.2174/0929867322666150209152712>

46. Rau, S., Skapek, M. F., Tiplady, K., Seese, S., Burns, A., Armour, A. C., & Kenworthy, L. (2020). Identifying comorbid attention-deficit/hyperactivity disorder in autism: Attending to the inattentive presentation. *Research in Autism Spectrum Disorders*, 69, 101468. <https://doi.org/10.1016/j.rasd.2019.101468>
47. Rojo-Marticella, M., Arija, V., & Canals-Sans, J. (2025). *Effect of probiotics on the symptomatology of autism spectrum disorder and/or attention deficit/hyperactivity disorder in children and adolescents: Pilot study*. *Research on Child and Adolescent Psychopathology*, 53, 163–178. <https://doi.org/10.1007/s10802-024-01278-7>
48. Saad, K., Abdel-Rahman, A. A., Elserogy, Y. M., Al-Atram, A. A., Cannell, J. J., Bjørklund, G., Abdel-Reheim, M. K., Othman, H. A., El-Houfey, A. A., Abd El-Aziz, N. H., & others. (2016). Vitamin D status in autism spectrum disorders and the efficacy of vitamin D supplementation in autistic children. *Nutritional Neuroscience*, 19(8), 346–351. <https://doi.org/10.1179/1476830515Y.0000000012>
49. Sun, C., Zou, M., Zhao, D., Xia, W., & Wu, L. (2016). Efficacy of folic acid supplementation in autistic children participating in structured teaching: An open-label trial. *Nutrients*, 8(6), 337. <https://doi.org/10.3390/nu8060337>
50. Watson, W. H., Burke, T. J., Doll, M. A., & McClain, C. J. (2014). S-adenosylhomocysteine inhibits NF-κB-mediated gene expression in hepatocytes and confers sensitivity to TNF cytotoxicity. *Alcohol: Clinical and Experimental Research*, 38(4), 889–896. <https://doi.org/10.1111/acer.12308>
51. Cerdó, T., Ruíz, A., Suárez, A., & Campoy, C. (2017). Probiotic, prebiotic, and brain development. *Nutrients*, 9(11), 1247. <https://doi.org/10.3390/nu9111247>
52. Barrio, C., Arias-Sánchez, S., & Martín-Monzón, I. (2022). The gut microbiota-brain axis, psychobiotics and its influence on brain and behaviour: A systematic review. *Psychoneuroendocrinology*, 137, 105640. <https://doi.org/10.1016/j.psyneuen.2021.105640>
53. Dash, S., Syed, Y. A., & Khan, M. R. (2022). Understanding the role of the gut microbiome in brain development and its association with neurodevelopmental psychiatric disorders. *Frontiers in Cell and Developmental Biology*, 10, 808. <https://doi.org/10.3389/fcell.2022.880544>

54. Iglesias-Vázquez, L., Riba, G. V. G., Arija, V., & Canals, J. (2020). Composition of gut microbiota in children with autism spectrum disorder: A systematic review and meta-analysis. *Nutrients*, *12*(3), 792. <https://doi.org/10.3390/nu12030792>
55. Shirvani-Rad, S., Ejtahed, H. S., Etehad Marvasti, F., Taghavi, M. S., Sharifi, F., Arzaghi, S. M., & Larijani, B. (2022). The role of gut microbiota-brain axis in pathophysiology of ADHD: A systematic review. *Journal of Attention Disorders*, *26*(13), 1698–1710. <https://doi.org/10.1177/108705472111073474>
56. Su, Q., Wong, O. W. H., Lu, W., Wan, Y., Zhang, L., Xu, W., Li, M. K. T., Liu, C., Cheung, C. P., Ching, J. Y. L., Cheong, P. K., Leung, T. F., Chan, S., Leung, P., Chan, F. K. L., & Ng, S. C. (2024). Multikingdom and functional gut microbiota markers for autism spectrum disorder. *Nature Microbiology*, 1–12. <https://doi.org/10.1038/s41564-024-01739-1>
57. Bundgaard-Nielsen, C., Lauritsen, M. B., Knudsen, J. K., Rold, L. S., Larsen, M. H., Hindersson, P., Villadsen, A. B., Leutscher, P. D. C., Hagstrøm, S., Nyegaard, M., & Sørensen, S. (2023). Children and adolescents with attention deficit hyperactivity disorder and autism spectrum disorder share distinct microbiota compositions. *Gut Microbes*, *15*(1). <https://doi.org/10.1080/19490976.2023.2211923>