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Reviewing biomedical and educational research in the field of autism and related disorders

New CDC study finds that autism prevalence among children in the U.S. has risen to one in 31

The prevalence of autism spectrum disorders (ASD) continues to increase in the United States, according to the Centers for Disease Control and Prevention (CDC).

The new statistics come from the CDC's Autism and Developmental Disabilities Monitoring (ADDM) Network, which estimates the national prevalence of ASD based on data from multiple sites (currently 16) in the United States and Puerto Rico. Each biannual ADDM Network report estimates the prevalence of diagnosed ASD among children at eight years of age, as well as the prevalence of diagnosed or suspected cases of ASD among children at four years of age.

The ADDM Network's previous analysis, based on data from 2020, found that one in 36 eight-year-old children had ASD. According to the 2022 data used in the new study, the prevalence is now one in 31 children. In addition, the researchers say, "Children born in 2018 (aged 4 years in 2022) had 1.7 times the cumulative incidence of ASD diagnosis or eligibility by age 48 months as children born in 2014 (aged 8 years in 2022)."

The researchers found that the numbers of diagnosed cases of ASD varied widely by location, ranging from 9.7 in Laredo, Texas to 53.1 in California. The highest rates of ASD were found in Asian/Pacific Island, Native American/Alaska Native, Black, Hispanic, and multiracial children, a finding that the authors say "is consistent with increased access to and provision of identification services among previously underserved groups." ASD was 3.4 times more prevalent among boys than girls, and nearly 40% of children with ASD also had a diagnosis of intellectual disability.

The authors conclude, "Increased identification of autism, particularly among very young children and previously underidentified groups, underscores the increased demand and ongoing need for enhanced planning to provide equitable diagnostic, treatment, and support services for all children with ASD."

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"Prevalence and early identification of autism spectrum disorder among children aged 4 and 8 years—Autism and Developmental Disabilities Monitoring Network, 16 sites, United States, 2022," Kelly A. Shaw et al., CDC *Morbidity and Mortality Weekly Report*, April 17, 2025 (free online). Address: Kelly A. Shaw, National Center on Birth Defects and Developmental Disabilities, CDC, nrb7@cdc.gov.

Editor's note: It is important to recognize that the data used by the ADDM Network is based on eight-year-old children, and it typically takes about two years to collect, analyze, and publish the ADDM Network report. Consequently, the newly reported statistics, along with future statistics published by the CDC, are not estimates of the* current *odds of having an autistic child.

"Western-style" maternal diets may raise odds of ASD, ADHD

Maternal diet during pregnancy may play a significant role in a child's likelihood of developing an autism spectrum disorder (ASD) or attention-deficit/hyperactivity disorder (ADHD), according to research from Denmark.

David Horner and colleagues analyzed data from 508 mother-child pairs participating in a long-term study conducted by the University of Copenhagen. The researchers reviewed dietary information collected from the mothers at 24 weeks of pregnancy and identified diagnoses of neurodevelopmental disorders among the children at ten years of age. After controlling for a wide range of potential confounders, they found that a "Western-style" maternal diet—one low in fresh foods, fish, and whole grains and high in processed foods, animal fats, and sugar—was associated with a significant increase in the likelihood of a child being diagnosed with ASD or ADHD. Even minor deviations toward this diet, they say, were associated with a 122% increase in the odds of a child having autism and a 66% increase in the odds of a child having ADHD.

Horner and colleagues conducted three additional studies involving more than 60,000 mother-child pairs, focusing on ADHD alone, and say that these studies validated the findings of the first study. They say the strongest associations between diet and ADHD risk were observed during the first and second trimesters, suggesting that early fetal brain development is particularly sensitive to maternal diet.

Examining blood samples, the researchers identified 43 metabolites associated with a processed diet. Horner says, "We found that 15 of these 43 metabolites were particularly linked to the increased risk of ADHD. Many of these metabolites are derived from dietary intake and play key roles in regulating inflammation and oxidative stress—factors believed to be critical in early neurodevelopment."

Horner comments, "By understanding how maternal diet influences fetal development, we can better identify the key nutrients and dietary adjustments needed to reduce the risk of neurodevelopmental disorders. This opens new possibilities for refining dietary recommendations and promoting healthier outcomes for future generations."

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"A western dietary pattern during pregnancy is associated with neurodevelopmental disorders in childhood and adolescence," David Horner, Jens Richardt M. Jepsen, Bo Chawes, Kristina Aagaard, Julie B. Rosenberg, Parisa Mohammadzadeh, Astrid Sevelsted, Nilo Vahman, Rebecca Vinding, Birgitte Fagerlund, Christos Pantelis, Niels Bilenberg, Casper-Emil T. Pedersen, Anders Eliasen, Sarah Brandt, Yulu Chen, Nicole Prince, Su H. Chu, Rachel S. Kelly, Jessica Lasky-Su, Thorhallur I. Halldorsson, Marin Strøm, Katrine Strandberg-Larsen, Sjurdur F. Olsen, Birte Y. Glenthøj, Klaus Bønnelykke, Bjørn H. Ebdrup, Jakob Stokholm, and Morten Arendt Rasmussen, *Nature Metabolism*, March 3, 2025 (online). Address: Morten Arendt Rasmussen, COPSAC, Copenhagen Prospective Studies on Asthma in Childhood, Herlev and Gentofte Hospital, University of Copenhagen, Copenhagen, Denmark, morten.arendt@dbac.dk.

—and—

"Strong link between Western diet during pregnancy and ADHD," news release, University of Copenhagen—Faculty of Science, March 3, 2025.

Pesticide exposure during prenatal development or early childhood may increase odds of ASD

A study by researchers at the University of California at Davis adds to evidence that environmental pollutants may play a role in autism spectrum disorders (ASD).

The study, by Amanda Goodrich and colleagues, examined data on 1,526 children between two and five years of age who were enrolled in the CHARGE (Childhood Autism Risk from Genetics and the Environment) study. Of the children, 810 had ASD, 186 had a developmental disability (DD), and 530 were neurotypical controls. The researchers examined the relationship between household insecticide use and ASD or DD, focusing on the timeframes between three months pre-conception and the children's second birthdays. They examined household pesticide use, timing, and frequency, as well as the types of applications used (including professional or non-professional applications, indoor or outdoor use, and flea applications).

The researchers report, "Professionally applied indoor insecticides were associated with greater than two-fold increased odds of ASD for all time periods." In addition, they say, "Higher exposure frequency was associated with greater odds of ASD for nearly all application types and time periods." They also detected an association between increased odds of DD and non-professional indoor insecticide use during the third trimester and the pregnancy period overall.

The researchers say stratification of their data showed that the association of indoor insecticide exposure with ASD was stronger for male children than female children, noting that this "parallels the higher baseline risk of ASD in males and may reflect underlying sex-specific neurobiological vulnerabilities."

They conclude, "These findings add to [a] growing body of evidence that exposure to household insecticides during pregnancy and early life may be associated with ASD, underscoring the need for heightened awareness and precautionary measures regarding household insecticide use, particularly in environments inhabited by pregnant women and young children. Secondly, these results highlight the potential need for regulatory oversight in the approval and marketing of these chemicals, advocating for stricter safety standards and the promotion of non-chemical pest control alternatives."

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"Professionally and non-professionally applied household insecticides during pregnancy and early life and their associations with autism spectrum disorder and developmental delay in the CHARGE case-control study," Amanda J. Goodrich, Daniel J. Tancredi, Yunin J. Ludeña, Deborah H. Bennett, Irva Hertz-Picciotto, and Rebecca J. Schmidt, *Environmental Research*, February 2025 (free online). Address: Amanda J. Goodrich, Dept. of Public Health Sciences, School of Medicine, University of California Davis, Sacramento, CA 95616, ajgoodrich@ucdavis.edu.

Gut metabolites altered in children with autism; links found between gut, brain, and behavior

A new study by U.S. researchers adds to evidence that the "gut-brain" axis plays a significant role in autism spectrum disorders (ASD).

Lisa Aziz-Zadeh and colleagues collected data on 43 children with ASD and 41 neurotypical children between eight and 17 years of age. The researchers evaluated the children's behavior and analyzed stool samples obtained from them, looking specifically at metabolites in the tryptophan pathway. They also used functional magnetic resonance imaging (fMRI) to study the children's brain function during tasks, focusing on brain regions involved in interoception (the awareness of internal sensations), emotions, and sensory processing.

The researchers found that levels of several tryptophan-related fecal metabolites differed significantly between the two groups of children. In particular, children in the ASD group had lower levels of kynurenate (KA), a neuroprotective compound. The researchers note that a reduction in plasma levels of KA and a corresponding alteration of the ratio of KA to kynurenine (KYN)—a tryptophan metabolite that is neurotoxic—could "lead to neurotoxic effects, impact blood serotonin levels, and have profound behavioral and cognitive effects."

Analyzing fMRI and behavioral data, the researchers found that "different fecal tryptophan metabolites are significantly correlated with task-based brain activity… and with ASD severity and symptomatology."

Aziz-Zadeh comments, "We demonstrated that gut metabolites impact the brain, and the brain, in turn, affects behavior. Essentially, the brain acts as the intermediary between gut health and autism-related behaviors. Previous studies highlighted differences in gut microbiomes and brain structures in autism, but our research connects the dots."

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The researchers note that they did not find any significant relationships between fecal KA levels and GI problems in the children with ASD, indicating that their findings may not be limited to children with GI issues.

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"Relationships between brain activity, tryptophan-related gut metabolites, and autism symptomatology," Lisa Aziz-Zadeh, Sofronia M. Ringold, Aditya Jayashankar, Emily Kilroy, Christiana Butera, Jonathan P. Jacobs, Skylar Tanartkit, Swapna Mahurkar-Joshi, Ravi R. Bhatt, Mirella Dapretto, Jennifer S. Labus, and Emeran A. Mayer, *Nature Communications*, April 14, 2025 (free online). Address: Lisa Aziz-Zadeh, Mrs. T.H. Chan Division of Occupational Science and Occupational Therapy, University of Southern California, Los Angeles, CA 90089, lazizzad@usc.edu.

—and—

"Gut imbalances in autism linked to brain and behavior changes," Neuroscience News, April 14, 2025.

Did you know? The Autism Research Institute recently received its fifth annual four-star rating—the highest possible rating—from Charity Navigator.

Quotable...

"Addressing aging in autism is crucial for tailoring support to older autistic adults and improving diagnostic accuracy for middle-aged and older individuals. A deeper understanding of… aging processes will not only aid in identifying neurodegenerative diseases more effectively but also enhance support for older autistic adults by facilitating the adaptation of interventions and the development of more precise cognitive remediation programs tailored to their specific needs and abilities. Continued research is essential to evaluate how aging affects autistic symptomatology and to provide appropriate support to an ever-growing proportion of the population."

—Marine Bessé et al., in "Cognitive and cerebral aging research in autism: a systematic review on an emerging topic," Autism Research*, April 2025*

EDITORIAL: Stephen M. Edelson, Ph.D.

Why evidence-based autism research still matters

In the recent past, the landscape surrounding research has undergone significant changes, marked by increased skepticism toward scientific findings by some families, clinicians, and others. Basically, researchers along with healthcare providers report a noticeable shift: Patients and caregivers are less inclined to adhere to scientifically validated approaches (Boyle, 2022; Thayer, 2023). Instead, there has been a troubling rise in reliance on unproven or potentially dangerous treatments, such as Miracle Mineral Solution (MMS)—a substance essentially consisting of diluted bleach (Autism Research Institute, 2015). Understanding why this shift has occurred is important, as it has considerable impact on the health and well-being of autistic individuals and their families. History has a way of repeating itself, and we must listen to what it has taught us (Godlee et al., 2011).

Research shows us that there are factors that influence anti-science attitudes (Tuffy, 2023). Historically, parents were blamed without evidence for their child's autism (Rimland, 1964), leading to deserved skepticism. Today, in 2025, political and cultural influences are a major factor driving skepticism toward science-based autism research. Recently, public figures, including Robert F. Kennedy, Jr., have openly challenged established scientific findings and promoted alternative narratives, contributing to a climate of mistrust among some people. Additionally, recent reductions in research funding from key institutions, such as the National Institutes of Health, signal a diminished institutional emphasis on rigorous research, including research on autism (Kozlov & Mallapaty, 2025). This shift away from scientific validation has further empowered narratives that prioritize anecdotal evidence or personal beliefs over evidence-based research (*The Economist*, 2025).

Moreover, controversies surrounding autism representation, such as the puzzle-piece symbol historically associated with autism advocacy, have played a role in alienating the neurodiverse community (A.J. Drexel Autism Institute, 2023). Many autistic individuals have expressed discomfort with the puzzle-piece imagery, interpreting it as implying that something is inherently missing or broken within them. While this is a very important argument, perhaps in some people's minds it has unintentionally reinforced a broader skepticism toward autism-related scientific research, which some perceive as inherently pathologizing (Hare, 2024). The neurodiversity movement has increasingly advocated the perspective that autism is a natural variation rather than a disorder needing a cure. Rightly so, many in the community assert their right to autonomy and self-acceptance, with a strong message: "Leave us alone—we're fine with who we are," while not detracting from the very human understanding that we all need support (Brown & Wolf, 2025). This message, though empowering for self-advocates, may have sometimes contributed to confusion about the critical role research continues to play, particularly concerning medical and communicative challenges.

The value of research

Despite these societal and cultural shifts, the value of rigorous autism research remains undeniable (Haar et al., 2024). Approximately half of all autistic individuals face significant medical challenges (Khachadourian et al., 2023), ranging from gastrointestinal issues—such as constipation, diarrhea, abdominal pain, and gastroesophageal reflux disease (GERD)—to allergies, anxiety, metabolic dysregulation, seizures, and sleep disturbances (Muskens et al., 2017). The prevalence and burden of these medical conditions underscore the need for ongoing, detailed scientific investigations. For example, emerging research into the microbiome has highlighted the importance of diet and gut issues in managing many health conditions affecting autistic individuals, demonstrating how robust scientific inquiry can directly enhance quality of life (Yap et al., 2021).

Education represents another crucial domain where autism research has had transformative impacts. Scientifically validated interventions, such as augmented communication devices and the Picture Exchange Communication System (PECS), have enabled countless autistic individuals to express themselves effectively, significantly improving their independence and emotional well-being (Santos, 2021; Sterrett et al., 2023). Additionally, evidence-based teaching methods, including social stories and targeted behavioral interventions, can facilitate improved social interactions and reduce misunderstandings among peers (Como et al., 2024). Increased awareness of autism within educational settings has also begun to make classrooms safer, more inclusive spaces by addressing bullying and fostering understanding among students and educators (Rodriguez et al., 2020).

As autism research moves forward, it is essential for the field to increasingly focus on translational research—efforts that bridge the gap from basic scientific understanding to practical, real-world applications. Translating fundamental discoveries into concrete interventions has the potential to significantly enhance the lives of autistic individuals. For example, basic research on neural connectivity patterns could inform new educational techniques or therapeutic interventions designed to enhance social skills or emotional regulation. By prioritizing this translational approach, researchers can more effectively address pressing practical challenges faced daily by autistic individuals and the autism community.

Moreover, translational research fosters a dynamic cycle of discovery and implementation, encouraging multidisciplinary collaboration between researchers, clinicians, educators, and autistic individuals. This collaborative approach ensures that research outcomes are directly responsive to the community's real-world needs, accelerating the transition of laboratory findings into clinical practice and educational strategies. Ultimately, a deliberate emphasis on translational research will not only validate the importance of scientific inquiry but also rebuild trust within the autism and autistic communities by demonstrating tangible improvements in quality of life.

Thus, while it is understandable and even beneficial to challenge outdated narratives around autism, dismissing scientific research altogether poses substantial risks. *Rather than rejecting research outright, the most constructive path forward involves engaging actively with the autistic community to ensure that research priorities align closely with their lived experiences and genuine needs.*

A promising strategy for rebuilding trust and relevance in autism research involves deeper collaboration with autistic individuals and their families. Researchers must prioritize listening carefully to autistic voices to understand better which topics matter most from their perspective. Encouragingly, there has been a growing effort to reach and include autistic individuals in all aspects of the research process—including in leadership roles as principal investigators. Co-production in research, in which autistic researchers are involved in design, implementation, and translation, should be regarded as best practice in autism research (See Autism Co-operative Research Centre, www.autismcrc.com.au).

Two important areas of inquiry in autism science

Although perspectives may vary regarding research priorities, one area consistently emphasized by community advocates is the development of valid subtyping strategies.

continued on page 7

Research Updates

Study finds that benefits of physical exercise for youth with ASD vary by age

A meta-analysis by researchers in China and Poland concludes that exercise can significantly benefit children with autism spectrum disorders (ASD).

YanAn Wang and colleagues analyzed data from 23 randomized, controlled trials investigating the effects of exercise on children with ASD, and found that the benefits of physical activity varied by age. In older children, they say, exercise led to significant improvements in flexibility and cognitive control. Elementary-age children showed significant improvements in motor skills and coordination, while preschool children exhibited significant enhancements in social skills. Across all age groups, exercise led to improvements in behavioral problems.

In particular, the researchers say, children appeared to benefit from martial arts and ball games. They note that team and interactive sports, in addition to providing the benefits of physical exercise, can enhance social, cooperative, communication, and conflict resolution skills.

The researchers conclude, "Exercise interventions significantly improve flexibility, cognitive control, motor skills, coordination, social skills, and behavioral problems in children with ASD. This study supports exercise interventions as an effective method to enhance multiple abilities in children with ASD and emphasizes the importance of designing personalized intervention programs tailored to different ages and needs."

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"The impact of physical exercise interventions on social, behavioral, and motor skills in children with autism: a systematic review and meta-analysis of randomized controlled trials," YanAn Wang, Guoping Qian, Sujie Mao, and Shikun Zhang, *Frontiers in Pediatrics*, February 26, 2025 (free online). Address: Sujie Mao, Graduate School, Harbin Institute of Physical Education, Harbin Sport University, Harbin, Heilongjiang, China, 403578488@qq.com.

Remote microphones may aid speech perception

Remote microphone systems (RMS) may improve speech perception in children with autism spectrum disorders (ASD), according to a literature review conducted by researchers in Brazil. RMS involves the use of a microphone that picks up the sound of a speaker's voice and transmits it directly to the user's in-ear device or to speakers in a room, reducing distracting noise and providing a clearer acoustic signal.

Bianca Stephany Barbosa Vital and colleagues analyzed data from eight studies on RMS. Five of the studies involved in-ear RMS, two involved room RMS, and one evaluated both technologies. The researchers report, "Although the included studies evaluated different skills, there was an advance in speech perception in all subjects with ASD who used the RMS." Individual studies also reported improvements in social interaction, behavior, attention, auditory memory, noise tolerance, stress, and neural activity.

The researchers caution that the studies were highly heterogenous in their design, and that more research is needed. However, they say current evidence suggests that "the RMS is promising for use in this population, by minimizing difficulties in speech perception, providing secondary behavioral benefits, [and] reducing auditory effort and stress."

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"Remote microphone systems in children and adolescents with autism spectrum disorder: scope review," Bianca Stephany Barbosa Vital, Karen Melissa Gonzaga Dos Santos, Aryelly Dayane da Silva Nunes Araújo, Joseli Soares Brazorotto, Regina Tangerino de Souza Jacob, Karinna Veríssimo Meira Taveira, and Sheila Andreoli Balen, *CoDAS*, February 24, 2025 (free online in Portuguese). Address: Sheila Andreoli Balen, Department of Speech Therapy, Federal University of Rio Grande do Norte–UFRN Rua Gen. Gustavo Cordeiro de Faria, 601, Ribeira, Natal (RN), Brazil, 59012-570, sheila.balen@ufrn.

Autism alert cards receive high marks from users

Researchers in Australia report that "autism alert" cards—now widely available in several countries for individuals with autism spectrum disorders (ASD) or their caregivers—appear to be a useful tool, although their value is limited by societal attitudes.

Autism alert cards inform strangers that an individual has autism and provide information to help them understand issues such as communication problems and sensory sensitivity. To determine whether users found the cards valuable, Chris Edwards and colleagues surveyed 272 individuals who had received them. Participants included 136 adults with ASD, 128 parents or other caregivers of individuals with ASD, and eight children with ASD.

The researchers found that 55.7% of autistic individuals and 44.9% of caregivers who received an autism alert card had used it, most often on public transport or in healthcare and retail settings. While many individuals used the cards only rarely, one-third reported using them monthly or weekly, and about one in ten used them daily. Of the users, 70% said that most reactions from strangers were positive, while 9% said most reactions were negative and the remainder reported mixed reactions.

Individuals who experienced negative responses when using the cards said that these were often due to recipients' ignorance about autism or disbelief that the individual actually had autism. Others reported that strangers "infantilized" them after seeing the cards, or that they themselves were too embarrassed to use them.

"Despite these challenges," the researchers say, "the majority of participants (76.2%) would recommend the card."

The researchers conclude, "The findings accentuate the dual nature of autism alert cards: They can serve as powerful tools for facilitating disclosure and enhancing social interactions, yet their effectiveness is heavily contingent upon the knowledge and attitudes of those receiving the disclosure." They call for more training and awareness programs for the general public, as well as for professionals including doctors and police officers, to maximize the value of the cards.

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"'Just knowing it's there gives me comfort:' Exploring the benefits and challenges of autism alert cards," Chris Edwards, Abigail M. A. Love, Rebecca L. Flower, Ru Ying Cai, and Vicki Gibbs, *Autism*, March 2025 (free online). Address: Chris Edwards, Aspect Research Centre for Autism Practice, Autism Spectrum Australia, Level 5, Tower B, The Zenith, 821 Pacific Highway, Chatswood, NSW 2067, Australia, chrisedwards@aspect.org.au.

Are you an adult with autism?

Increasing numbers of adults are being diagnosed with autism spectrum disorders (ASD). To learn more about the characteristics of autism in adults, see ARI's article at:

https://autism.org/autism-symptoms-and-diagnosis-in-adults/

Moving? Please let us know well in advance, so your next issue will reach you on time!

Research Updates

Anxiety may begin early in life for children with ASD

While elevated rates of anxiety are well-documented in teens and adults with autism spectrum disorders (ASD), a study from Spain suggests that this problem can begin very early in life.

Montserrat Durán-Bouza and colleagues analyzed data on 82 Spanish children with ASD, all between three and six years of age. Parents of the children provided demographic information and completed the Anxiety Scale for Children with ASD (ASC-ASD) and the Social Communication Questionnaire (SCQ).

The researchers found that approximately 30% of the children exhibited significant symptoms of anxiety. The highest scores were seen on the "uncertainty" subscale of the ASC-ASD, which the researchers say reflects "heightened anxiety in response to novel or stressful situations and sensory overload." There was a significant correlation between stereotypical behaviors reported on the SCQ and elevated levels of anxiety.

While the researchers detected a high rate of anxiety in their study population, they note that this was lower than the rates reported in older children with ASD. "This aligns with previous research suggesting that anxiety symptoms in children with ASD may intensify with age," they say.

The researchers suggest that expanding current interventions for anxiety in ASD to include younger children could significantly enhance their quality of life. In particular, they say, "Early implementation of strategies to manage uncertainty may reduce anxiety levels and foster greater emotional resilience in young children with ASD."

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"Early detection of anxiety symptoms in autism spectrum disorder: An exploratory study in a Spanish sample of 3- 6-year-old children," Montserrat Durán-Bouza, Silvia Gómez-Ríos, Margarita Cañadas-Pérez, and Juan-Carlos Brenlla-Blanco, *PLOS One*, January 31, 2025 (free online). Address: Juan-Carlos Brenlla-Blanco, juan.brenlla@udc.es.

Probiotic supplements may improve GI health, behavior

A study by researchers in India adds to evidence that probiotic supplements can improve the gastrointestinal (GI) health and behavioral symptoms of children with autism spectrum disorders (ASD).

In a single-blind study, Himani Narula Khanna and colleagues evaluated the effects of probiotic supplements on autistic children between two and nine years of age. Ninety of the children received the supplements, while 90 received a placebo. Caregivers unaware of the children's treatment status completed the Social Responsiveness Scale-2 (SRS-2), Aberrant Behavior Checklist-2 (ABC-2), and GI Severity Index (GS) before and after the intervention.

The researchers report that on the SRS-2, the probiotic group exhibited marked improvements in behavioral symptoms compared with the placebo group. Improvements included "significant reductions in severe symptoms, including social withdrawal/lethargy (40%), stereotypic behavior (37.77%), hyperactivity (34.44%) and inappropriate speech (32.22%) post-intervention," they say. In addition, children in the probiotic group exhibited significant improvements in constipation and diarrhea. In both groups, the researchers detected a statistically significant correlation between behavioral and GI symptoms.

The researchers conclude, "The observed improvements in both behavioral and GI symptoms on probiotic supplementation imply a correlation between these symptoms in children with ASD. This significant correlation emphasizes the importance of addressing GI concerns in managing ASD-related behavioral issues to improve the quality of life in these children. It also highlights the potential of probiotics to restore gut microbiota balance, alleviate GI issues, and positively impact neurobehavioral outcomes."

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"Impact of probiotic supplements on behavioural and gastrointestinal symptoms in children with autism spectrum disorder: a randomised controlled trial," Himani Narula Khanna, Sushovan Roy, Aqsa Shaikh, Rajiv Chhabra, and Azhar Uddin, *BMJ Paediatrics Open*, February 2025 (free online). Address: Himani Narula Khanna, Department of Community Medicine, Hamdard Institute of Medical Science and Research, New Delhi, India, himanikhanna203@gmail.com.

Atypical sensory response to skin softness seen in ASD

Individuals with autism spectrum disorders (ASD) appear to exhibit atypical sensory responses to objects that are similar in softness to human skin, according to researchers in Japan.

Kai Makita and colleagues asked 36 adults with ASD and 36 neurotypical adults to estimate the perceived pleasantness and softness of objects made of urethane rubber while pressing the objects with an index finger. They found that while ratings of pleasantness increased as a function of compliance (a measure of softness), this increase was significantly smaller for individuals with ASD, "particularly at compliance levels including human body parts." In contrast, both groups estimated the softness of the objects similarly.

The researchers say, "Our findings support the idea that among individuals with ASD, tactile preferences for textures are less adapted to the characteristics of the human body. It is possible that individuals with ASD may not easily tolerate being touched by others because they do not favor the compliance of objects lightly touching their skin. According to the social motivation hypothesis, such atypical tactile preferences in individuals with ASD might make positive tactile interactions with peers less rewarding, thereby reducing the motivation for social communication and interactions. This aligns with the notion that atypical responses to touch may pose a risk of difficulties in the development of age-appropriate social and self-regulatory behaviors."

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"Atypical tactile preferences in autism spectrum disorder: Reduced pleasantness responses to soft objects resembling human body parts," Kai Makita, Ryo Kitada, Takuya Makino, Nodoka Sakakihara, Ayaka Fukuoka, and Hirotaka Kosaka, *Psychiatry and Clinical Neurosciences*, March 12, 2025 (free online). Address: Ryo Kitada, Graduate School of Intercultural Studies, Kobe University, Kobe, Japan, ryokitada@port.kobe-u.ac.jp.

Study shows no extra risk for decline of spacial working memory skills in adults with ASD

Researchers investigating the risk of dementia for individuals with autism spectrum disorders (ASD) have reported differing findings, with some studies indicating an increased risk compared to the general population and others indicating a comparable or even reduced risk (see editorial in ARRI 2025, volume 39, No. 1). A new large-scale study from the United Kingdom adds to this body of research, suggesting that people with ASD have no elevated risk of decline in one key form of memory.

Saloni Ghai and colleagues analyzed data on more than 13,000 individuals who were 50 years of age or older. The researchers divided participants into three groups—those with high ASD traits or an actual ASD diagnosis, those with intermediate ASD traits, and those with no ASD traits—to see how their spatial working memory changed over a seven-year period. Spatial working memory is the ability to remember and use information about where an object is located or an event occurred, and declines in this skill are often associated with dementia.

The researchers found no significant differences in spatial working memory among the three groups at the beginning of the study, and the groups experienced similar trajectories in spatial working memory skills over time. Study coauthor Joshua Stott comments, "Our work provides no support for any difference between autistic people and neurotypical people in terms of increased risk of age-related cognitive decline."

The researchers caution, however, that their study had limitations. For example, participants needed to be able to use a computer and access the Internet and were not ethnically diverse, and the test used to identify autistic traits focused on social and communication issues rather than including other autism-related traits. However, senior study author Gavin Stewart comments, "This study provides some reassuring evidence that some aspects of cognition change similarly in autistic and non-autistic populations."

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"The association between autism spectrum traits and age-related spatial working memory decline: a large-scale longitudinal study," Saloni Ghai, Aphrodite Eshetu, Anne Corbett, Clive Ballard, Dag Aarsland, Adam Hampshire, Elizabeth O'Nions, William Mandy, Joshua Stott, Gavin R. Stewart, and Amber John, *The Gerontologist*, May 2025 (free online). Address: Joshua Stott, Research Department of Clinical, Educational and Health Psychology, University College London, 1-19 Torrington Place, London WC1E 7HB, j.stott@ucl.ac.uk.

—and—

"Autism not linked with increased age-related cognitive decline, finds study," news release, University College London, April 24, 2025.

Oral microbiome may reveal increased likelihood of autism

The oral microbiomes of young children with autism spectrum disorders (ASD) differ significantly from those of neurotypical children, according to a study by researchers in Hong Kong—a finding that they say could eventually lead to a quick and noninvasive test for ASD.

Jacqueline Wai-yan Tang and colleagues analyzed oral bacterial samples collected from 25 children with ASD and 30 neurotypical children. All of the children were between three and six years of age.

The researchers report, "The results showed lower bacterial diversity in children with ASD compared to controls, with distinct microbial compositions in the ASD and TD groups." In particular, 11 specific bacterial species appeared to differentiate the two groups from each other. The researchers found that by examining the overall composition of oral bacteria, as well as these 11 bacterial species, they could identify children with ASD with 81% accuracy.

The researchers conclude, "Our results underscore the potential clinical relevance of using oral microbiome analysis for the early detection of ASD." If their findings are confirmed by larger studies, they say, it could eventually be possible for dentists to use a simple oral swab test to identify children at elevated likelihood for autism.

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"Alterations of oral microbiota in young children with autism: Unraveling potential biomarkers for early detection," Jacqueline Wai-yan Tang, Charles Cheuk-fung Hau, Wai-man Tong, Rory Munro Watt, Cynthia Kar Yung Yiu, and Kathy Kar-man Shum, *Journal of Dentistry*, January 2025 (online). Address: Jacqueline Wai-yan Tang, Department of Psychology, The University of Hong Kong, Hong Kong SAR, PR China, jacqtang@connect.hku.hk.

—and—

"Cross-disciplinary research reveals oral microbiota as promising screen for autism spectrum disorder," news release, University of Hong Kong, April 8, 2025.

Free Webinars

ARI offers free webinars for caregivers, professionals, and individuals with autism. Free Certificates of Participation are available upon passing an online quiz for most webinars. Some events offer Continuing Education Units and/or Continuing Medical Education credits.

You can sign up for webinars or view previous webinars at https://autism.org/webinars. Space is limited—watch your email, or visit us on Facebook and X for updates and registration links.

—Wednesday, September 10, 1 p.m. Eastern time—
ASSESSING AND TREATING SEVERE BEHAVIORS
Nathan Call, PhD, BCBA-D

—Wednesday, September 17, 1 p.m. Eastern time—
AUDITORY SENSITIVITIES IN AUTISM
Adam Naples, PhD

We are grateful to our friends at the Johnson Center for Child Health & Development for working in partnership to offer presentations.

Seeking parents for online autism and anxiety study

Dr. Lauren Moskowitz, a frequent presenter for the Autism Research Institute on challenging behaviors and anxiety, is conducting a research study on the effectiveness of an online parent training program.

The study is designed for parents of children ages three to 12 with autism spectrum disorder (ASD) and co-occurring intellectual disability. The goal of the training program is to teach parents strategies to help their children overcome or cope with fears and phobias.

Dr. Moskowitz is currently seeking U.S.-based parents to participate in this study. Participants must be fluent in English in order to take part in the study.

To participate in this or other studies, visit autism.org, click under the "Research" heading, and go to "Participate in studies."

Females with severe self-injury may have undiagnosed ASD

Females admitted to psychiatric hospitals as a result of serious self-harm may have undiagnosed autism spectrum disorders (ASD), according to a study from Norway.

Arvid Nikolai Kildahl and colleagues note, "Cognitively able autistic individuals appear to be at risk of being misdiagnosed with other disorders prior to receiving an autism diagnosis. In particular, personality disorder appears to be a common misdiagnosis in adult autistic females, a diagnosis which is often seen as the primary hypothesis in cases involving severe self-harm."

The researchers analyzed data on 42 patients (40 females and two males) who had undergone frequent or extensive stays at psychiatric hospitals due to self-harming behaviors. They note that "[t]he majority of the participants met the criteria for personality disorders," and all were diagnosed with an anxiety disorder.

Of the patients, only four females had been diagnosed with ASD. However, using the Ritvo Autism and Asperger Diagnostic Scale-Revised (RAADS-R) to screen the patients, the researchers found that a much larger number qualified for an autism diagnosis. Because studies use different cut-off points for an ASD diagnosis on the RAADS-R, the researchers calculated their results by applying four separate cut-off points. They report, "The mean RAADS-R score in the sample was 86.67, with more than half the sample (24 participants, 57.1%, all female) scoring over the original cut-off of >65. Applying the different cut-offs, 21 participants (50.0%, all female) scored >72, 17 (40.5%, all female) scored >98, and 11 (26.2%, all female) scored >120." They add, "Participants with higher scores on the RAADS-R reported more anxiety, depressive, and trauma-related symptoms, as well as poorer functioning across measures of personality, close relationships, emotion regulation and alexithymia [difficulties in recognizing and expressing emotions]."

The researchers conclude, "These findings highlight the importance of actively screening for and assessing autism in patients with severe self-harm. Undiagnosed autism may involve a risk that unhelpful interactions with the mental health care system exacerbate these patients' difficulties over time."

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"Screening for autism in psychiatric inpatients with severe self-harm—results from the Extreme Challenges research project," Arvid Nikolai Kildahl, Tuva Langjord, Geir Pedersen, Oddbjørn Hove, Øyvind Urnes, Terje Torgersen, Ingeborg Helene Ulltveit-Moe Eikenæs, and Elfrida Hartveit Kvarstein, *Nordic Journal of Psychiatry*, April 2025 (free online). Address: Arvid Nikolai Kildahl, Division of Mental Health and Addiction, Oslo University Hospital, Norway, uxarvk@ous-hf.no.

More evidence found for increased risk of Parkinson's in ASD

A study by researchers in Sweden, Israel, and the U.S. adds to evidence linking autism spectrum disorders (ASD) to an elevated risk for Parkinson's disease (PD).

Using Swedish national registers, Weiyao Yin and colleagues analyzed data on more than two million adults. They report, "After adjusting for sex, depression and antidepressant use, antipsychotic exposure, socioeconomic status, and parental mental illness or PD, ASD remained consistently associated with increased risk of PD." They conclude, "These findings suggest a potential shared etiology between neurodevelopmental disorders and PD, warranting increased awareness of long-term neurological conditions in individuals with ASD."

In earlier research (see ARRI Vol. 38, No. 3, 2024), Gregory Wallace and colleagues reviewed medical records for more than 247,000 people who were 45 years of age or older and had ASD, intellectual disability, or both. Their analysis showed that approximately 6% of individuals with either ASD or intellectual disability, and more than 7% of those with both conditions, exhibited symptoms of parkinsonism. In the general population, only 0.11% to 1.85% of individuals in the same age range have Parkinson's-like symptoms.

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"Risk of Parkinson disease in individuals with autism spectrum disorder," Weiyao Yin, Abraham Reichenberg, Michal Schnaider Beeri, Stephen Z. Levine, Jonas F. Ludvigsson, Martijn Figee, and Sven Sandin, *JAMA Neurology*, May 7 (online). Address: Weiyao Yin, Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden, weiyao.yin.2@ki.se.

Editorial: Why evidence-based autism research still matters

(continued from page 3)

These approaches are important for identifying distinct support needs across autistic people and tailoring interventions more effectively. Subtyping based on reliable biomarkers could facilitate more personalized, effective interventions (Jin & Wang, 2024). Such approaches acknowledge the complexity of autism and respect the diverse experiences of autistic people, ensuring interventions are both meaningful and acceptable.

Furthermore, future autism research should emphasize understanding and alleviating discomfort and pain associated with prevalent medical and sensory issues (Ortiz Rubio et al., 2023). Conditions such as gastrointestinal distress, allergies, and sound sensitivity can profoundly affect daily living, mood, and overall quality of life for autistic individuals. Research into interoception—the body's internal sensing of discomfort and pain—is also crucial, as some people report heightened sensitivity or atypical experiences of pain that may dominate emotional and cognitive states (Edelson, 2022; Mahler, 2015). By comprehensively investigating how discomfort and pain are experienced and expressed, researchers can inform better medical and psychological interventions, significantly enhancing autistic individuals' quality of life.

Dismissing autism research outright is neither productive nor safe. Instead, a balanced approach that values rigorous, evidence-based research alongside meaningful, respectful engagement with the autistic community is critical.

It is essential to respect and incorporate the views of autistic individuals advocating for self-acceptance and autonomy. Dismissing autism research outright is neither productive nor safe. Instead, a balanced approach that values rigorous, evidence-based research alongside meaningful, respectful engagement with the autistic community is critical. By aligning research objectives closely with the lived experiences of autistic people, addressing genuine medical and communicative challenges, and focusing on personalized, supportive interventions, we can foster a future where autism research is both respected and profoundly beneficial.

References available at www.ARRIReferences.org.

Editor's note: Capitalizing the "A" in "Autistic" when referring to a person is gaining traction and may eventually become the preferred usage.

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The Autism Research Institute (ARI) is the oldest autism research organization in the world, founded by Dr. Bernard Rimland in 1967.

ARI'S WORK INCLUDES:

Conducting and sponsoring research on the causes of and best treatments for autism ($733,000 in research grants awarded last year), with a focus on research that can translate rapidly into help for today's autistic children and adults and their families.

•

Networking researchers, physicians, and parents to speed the development and dissemination of safe and effective treatment methods.

•

Hosting webinars and one of the largest informational websites on autism in the world.

•

Sponsoring think tanks where researchers and experienced clinicians can share their knowledge.

ARI's work relies on charitable contributions from individuals and organizations. All donations are tax deductible. We are proud to have earned Charity Navigator's highly respected "Four Star Award" for fiscal management, accountability, and transparency.

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