

# Autism Research Review

I N T E R N A T I O N A L

A quarterly publication of the Autism Research Institute—[www.Autism.org](http://www.Autism.org)

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

## CDC findings: Prevalence of autism spectrum disorders in the United States climbs to new highs

The prevalence of autism spectrum disorders (ASD) among 8-year-olds is now higher than at any time since monitoring began in the year 2000, according to research by the Centers for Disease Control and Prevention (CDC), and a separate study indicates that the prevalence among 4-year-olds is climbing even higher.

In the first study, Matthew Maenner and colleagues, analyzing data from 2020, found that approximately 4 percent of 8-year-old boys and 1 percent of 8-year-old girls in the United States were estimated to have autism. Among all U.S. 8-year-olds, 1 in 36 were estimated to have autism in 2020, compared to 1 in 44 two years earlier.

Results varied from area to area, with California diagnosing 45 percent more boys with autism compared to any other state in the 11-state Autism and Developmental Disabilities Monitoring (ADDM) Network. Nearly 7 percent of all 8-year-old boys in the San Diego area were identified with ASD. The researchers say disparities between sites may be due to some regions and states making a greater effort to identify children with ASD and provide services for them.

“The true rate may not be substantially different between California and other ADDM states, including New Jersey,” study coauthor Walter Zahorodny says. “What’s different is that California implemented some wide-ranging screening and intervention programs, which may have resulted in a higher estimated prevalence than elsewhere in the network.”

The researchers also say, “For the first time among children aged 8 years, the prevalence of ASD was lower among white children than among other racial and ethnic groups, reversing the direction of racial and ethnic differences in ASD prevalence observed in the past.”

In a separate study, Kelly Shaw and colleagues found that at all sites, “cumulative incidence of ASD by age 48 months among children aged 4 years was higher compared with children aged 8 years in 2020, indicating improvements in early identification of ASD.”

However, Zahorodny says that while it is a common belief that the increasing preva-

lence of ASD is due solely to better awareness and the provision of more services, this alone cannot explain the rise because the increase has occurred in all subtypes of ASD and across all demographic groups. He says, “This is not just a phenomenon of becoming more sensitive to subtly impaired kids,” adding, “Once considered a rare disorder, these figures suggest that autism may be one of the most common disabilities. The trouble is we don’t understand what the primary drivers of the increase are.”

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“Prevalence and characteristics of autism spectrum disorder among children aged 8 years—Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020,” Matthew J. Maenner et al., *CDC Morbidity and Mortality Weekly Report*, March 24, 2023 (free online).

—and—

“Early identification of autism spectrum disorder among children aged 4 years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020,” Kelly A Shaw et al., *CDC Morbidity and Mortality Weekly Report*, March 24, 2023 (free online).

—and—

“Rates of autism climb to new highs in the U.S., with California setting record numbers,” news release, Rutgers University, March 23, 2023.

—and—

“Autism now more common among Black, Hispanic kids in U.S.,” Mike Stobbe, *Medical Xpress*, March 23, 2023.

—and—

“Analysis shows shifting demographics of children identified with autism,” news release, University of Utah Health Sciences, March 24, 2023.

## Earlier intervention leads to greater benefits for kids with ASD

Children with autism spectrum disorders (ASD) who receive intensive early intervention at the age of 18 months fare significantly better than those who begin receiving this type of intervention at 27 months of age, according to a new study.

In a randomized, crossover trial, Whitney Guthrie and colleagues explored the outcomes of 82 autistic toddlers participating in an early intervention program called Early Social Interaction (ESI). Half of the

The researchers found that toddlers who received intensive individual intervention at 18 months of age had better outcomes than those who received this type of intervention at 27 months.

toddlers and their caregivers participated in an intensive, individualized version of the program (Individual-ESI) beginning at 18 months, while the other half participated in a much less intensive group intervention (Group-ESI). After nine months, the two groups crossed over to receive the other treatment for nine months.

The researchers report, “Toddlers randomized to Individual-ESI at 18 months

showed greater gains during treatment than those starting Individual-ESI at 27 months in receptive/expressive language, social communication, and daily living skills.” They add, “Importantly, these findings were specific to the intensive and individualized parent coaching model compared to group-based treatment, allowing us to rule out the possibility that these timing effects were due to children getting older rather than the treatment itself.”

They conclude, “Our results suggest that even a narrow window of 18 versus 27 months may have an impact on outcomes and underscore the importance of screening and evaluation as young as possible,” adding that research is needed to determine if there are additional benefits to initiating treatment even before 18 months of age.

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“The earlier the better: An RCT of treatment timing effects for toddlers on the autism spectrum,” Whitney Guthrie, Amy M. Wetherby, Julian Woods, Christopher Schatschneider, Renee D. Holland, Lindee Morgan, and Catherine E. Lord, *Autism*, March 15, 2023 (free online). Address: Whitney Guthrie, Center for Autism Research, Children’s Hospital of Philadelphia, 2716 South Street, Office 5241, Philadelphia, PA 19146, [guthrie@chop.edu](mailto:guthrie@chop.edu).

## Molecular signatures may point to later diagnosis of autism

Altered levels of certain molecular compounds in maternal blood collected during pregnancy and in cord blood samples taken after delivery may point to an increased likelihood of a later diagnosis of autism spectrum disorder (ASD).

Xiaoyu Che and colleagues measured levels of 1,208 different chemical compounds in blood plasma samples collected from 408 mothers at mid-pregnancy and in cord blood taken from 418 children at birth. They also identified children in the cohort who received an ASD diagnosis by three to five years of age.

The researchers found 12 chemical compounds in maternal mid-gestation (MMG) samples of girls with ASD, 3 compounds in MMG samples of boys with ASD, 8 compounds in cord blood (CB) samples of girls with ASD, and 12 compounds in CB samples of boys with ASD that were linked to autism. These included compounds associated with inflammation, disruption of membrane integrity, and impaired neurotransmission and neurotoxic-

ity. Machine learning analyses indicated that the compounds—especially those in cord blood—could be useful as biomarkers for ASD.

The researchers also detected several differences in levels of biomarkers between boys and girls, including a disruption in ether/non-ether phospholipid balance in MMG in girls but not boys. This finding, they say, may provide insight into the higher frequency of cognitive impairment in girls than in boys with ASD.

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“Metabolomic analysis of maternal mid-gestation plasma and cord blood in autism spectrum disorders,” Xiaoyu Che, Ayan Roy, Michaeline Bresnahan, Siri Mjaaland, Ted Reichborn-Kjennerud, Per Magnus, Camilla Stoltenberg, Yimeng Shang, Keming Zhang, Ezra Susser, Oliver Fiehn, and W. Ian Lipkin, *Molecular Psychiatry*, April 10, 2023 (online). Address: W. Ian Lipkin, wil2001@cumc.columbia.edu.

—and—  
“Molecular signatures in maternal and cord blood linked to autism risk,” news release, Columbia University Mailman School of Public Health, April 12, 2023.

## Meta-analysis: commonly used screening checklist can play a role in diagnosing autism, but has significant limitations

A meta-analysis of studies on the efficacy of the widely used M-CHAT-R/F (Modified Checklist for Autism in Toddlers, Revised with Follow-Up) concludes that while the test is useful, it has significant limitations

The M-CHAT-R/F is commonly used by pediatricians to screen children for autism spectrum disorders (ASD) during their 18-month and 24-month checkups. If a child receives a positive screening result, a provider usually recommends further evaluation.

Ramkumar Aishworiya and colleagues analyzed data from 15 studies involving 49,841 children from 10 different countries. Participants underwent standard testing using the M-CHAT-R/F and then received a diagnostic assessment for autism.

The researchers found that among the children as a whole, there was a 57.7 percent chance of an autism diagnosis following a “positive” screen. For children who had a higher likelihood of autism, such as those with an autistic sibling, the predictive value was 75.6 percent. For those with no increased likelihood, the predictive value was 51.2 percent.

They also found that the overall negative predictive value for the M-CHAT-R/F was 72.5 percent, meaning that about one quarter of children flagged as “negative” by the checklist received an autism diagnosis after further assessment.

Study coauthor Van Ma comments, “I think the most important takeaway from this study is that the M-CHAT-R/F is a screening tool with limitations. It has a role in screening for autism but is not meant to replace clinical judgment and comprehensive diagnostic assessment.”

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“Meta-analysis of the Modified Checklist for Autism in Toddlers, Revised/Follow-up for Screening,” Ramkumar Aishworiya, Van Kim Ma, Susan Stewart, Randi Hagerman, and Heidi M. Feldman, *Pediatrics*, May 19, 2023 (online). Address: Ramkumar Aishworiya, Khoo Teck Puat–National University Children’s Medical Institute, National University Health System, 5 Lower Kent Ridge Rd, Singapore 119074, paeram@nus.edu.sg.

—and—  
“New study finds common autism screening tool is effective but has limitations,” news release, UC Davis Mind Institute, May 22, 2023.

## Nonverbal kids with ASD may understand much more language than they produce

Nonverbal or minimally verbal children with autism spectrum disorders (ASD) may understand significantly more language than they are able to produce, according to a new study.

Yanru Chen and colleagues analyzed data collected on nearly 1,600 children with autism and low verbal skills. The researchers found that 25 percent of the children exhibited better receptive than expressive language skills.

Chen says, “We used both parent reports and standardized language measures in our study and found that parent reports were more appropriate for capturing the language variations in [these] individuals than standardized measures.”

She comments, “Our findings highlight the importance of supporting language comprehension development in [these] individuals. Clinicians and therapists should consider these skills when planning and implementing interventions, providing instructions that are simple and clear enough to understand so [the children] can get the most out of the interventions.”

The researchers also found that children with better motor and social skills had a greater likelihood of understanding what people were saying, even if they were nonverbal. Chen suggests that incorporating social and motor skills training in language interventions may be of benefit, saying, “This could potentially optimize the overall outcomes of the interventions by integrating several closely linked areas of development.”

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“Kids with nonverbal autism may still understand much spoken language,” Dennis Thompson, Medical Xpress. Chen and colleagues presented their research at the annual INSAR conference in May 2023. Address: Yanru Chen, yanru@bu.edu.

### Dealing with self-injurious behaviors?

Research points to numerous reasons for self-injurious behavior (SIB). ARI’s free online tool assists professionals and parents in identifying potential treatments that may reduce or eliminate SIB in clients or children. Responses to the survey questions may provide insight into one or more possible reasons why an individual engages in SIB. Links to published studies on causes and appropriate interventions are also offered based on each user’s responses to survey questions.

[autism.org/self-injury](https://autism.org/self-injury)

### Free newsletter from ARI

Medical professionals can opt in to subscribe to ARI’s Clinical Research Enewsletter. This newsletter, published in collaboration with the Schafer Autism Report, provides online links to up-to-date clinical research related to patient care, and is for pediatricians, nurses and obstetricians. You can subscribe to the newsletter at [autism.org](https://autism.org).

**EDITORIAL: Stephen M. Edelson, Ph.D.**

## Why an autism history museum?

Museums serve as foundations that preserve and illuminate periods in our collective past. They educate and inspire visitors, ensuring that the rich history and experiences of the people who shaped our world are not forgotten.

While museums dedicated to art, culture, and science are common, the Autism Research Institute (ARI) recently established a new museum that is the first of its kind: the National Autism History Museum, which stands as a testament to the importance of understanding autism and celebrates the diversity within the autism community.

The National Autism History Museum also seeks to bridge the gap between the autism community and the wider public through its capacity to foster empathy, promote research, and cultivate a society that embraces and supports all individuals on the autism spectrum.

### Preserving the past

The National Autism History Museum endeavors to trace the historical evolution of autism diagnosis, treatment, and eventual support, shedding light on the complex journey that has shaped our understanding of autism. By highlighting the shifting perceptions, theories, and diagnostic criteria employed over time, the museum enables visitors to appreciate the immense progress made in diagnosing and supporting individuals on the autism spectrum.

Through the displays of historical milestones, pioneering research, medical breakthroughs, and the pivotal role of advocacy organizations, visitors gain insights into the challenges faced by autistic individuals and their families throughout different historical periods. This historical perspective encourages reflection on the progress achieved thus far and highlights areas that call for further attention and development.

### Challenging stereotypes and promoting understanding

Societal misconceptions and stigmas surrounding autism continue today, resulting in many individuals on the spectrum experiencing marginalization and discrimination. The National Autism History Museum serves as an educational resource, challenging stereotypes and misconceptions about autism. Through interactive exhibits and educational displays, visitors gain a deeper understanding of the diverse strengths, talents, and challenges experienced by individuals on the autism spectrum. This increased awareness promotes acceptance and creates a more inclusive society.

The museum is a valuable resource for visitors of all ages, backgrounds, and levels of familiarity with autism. The enhanced understanding and awareness that these visitors gain will contribute to the creation of a more inclusive society that embraces neu-

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*“The future of autism is about building a more inclusive, accepting society that values diversity and recognizes the strengths and abilities of people with autism.”*

Dr. Bernard Rimland,  
National Autism Conference, 2002

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rodiversity and advocates for the rights and needs of autistic individuals.

### Conclusion

Through the preservation and documentation of autism history, the National Autism History Museum ensures that the experiences, struggles, and achievements of individuals on the autism spectrum are fully appreciated. As more artifacts arrive from researchers across the globe, the displays and information will evolve to more clearly reflect the diversity and collaboration innate to autism research and advocacy—and as more stories are told, our shared future will become more evident.

The National Autism History Museum holds immense value for society at large. It provides a comprehensive representation of the past, inspires and empowers the autism community, helps to advance research and innovation, and fosters a sense of community and support. By embracing the richness of neurodiversity, the museum helps to shape a future where individuals on the autism spectrum are valued, understood, and provided with the resources and opportunities they deserve. Visiting the museum is a remarkable journey that will enhance your admiration for historical achievements while fostering anticipation for future progress.

**Museum Hours: Monday-Thursday,  
10 a.m. to 12 noon or by appointment.**

**To schedule a visit:**

email –

**NationalAutismHistoryMuseum@**

**autism.org**

or call –

**(619) 537-9211**

Address

**4186 Adams Ave., San Diego, CA 92116**

### *Some highlights of the museum...*

At the wall describing autistic savants, visitors can watch a video of Mark Rimland, an autistic adult, as he explains his remarkable ability in calendar memory. As visitors view an original and still sealed VHS tape of the Academy Award-winning film *Rain Man*, they can learn how Dr. Rimland's input on the movie script changed Dustin Hoffman's character from an intellectually challenged individual to an individual on the autism spectrum.

Another exhibit is dedicated to movies with other popular actors and actresses linked to autism in some way, including Elvis Presley, Brooke Shields, and Leonardo DiCaprio,

In addition to QR codes and audio tours, the museum provides books to touch and read. Other interactive displays include the galley proof of Dr. Temple Grandin's most famous book, *Thinking in Pictures*, and timeline banners that map major historical events from the first description of autism by a Ukrainian clinical researcher in 1925.

Several researchers involved in landmark studies have agreed to send related artifacts to exhibit in the museum. The museum has already received a monitor from Dr. Beth Mallow's classic sleep study and will receive brain tissue slides from Drs. Thomas Kemper and Margaret Bauman's pioneering research documenting structural impairments in autism. Many more artifacts are arriving weekly from around the world!

Did you know that in 2015, *Sesame Street* introduced Julia, a four-year-old character diagnosed with autism? At the museum, you can find a display featuring a stuffed doll of Julia, along with books and early sketches related to her character. It's worth noting that Stacey Gordon, the puppeteer who brings Julia to life, is a parent of a child with autism.

Visitors to the museum can explore the original 1964 *Life Magazine* issue that featured an extensive article on Dr. Ivar Lovaas' UCLA autism clinic. This article specifically examined the use of aversives in the treatment of autism. Additionally, visitors can browse through the first two edited books of science articles on autism published during the 1970s, as well as artifacts leading up to the present date.



# Research Updates

## Mothers' exposure to airborne pollution may increase likelihood of autism in children

A new study from Sweden suggests that maternal exposure to airborne pollution during pregnancy may increase the likelihood of a child being diagnosed with classical autism or an autism spectrum disorder (ASD).

Erin Flanagan analyzed data on 40,245 births from 2000 to 2009 in Scania, Sweden, linking the mothers' locations to data on locally emitted PM<sub>2.5</sub> (small, inhalable particulate matter) from all sources as well as specifically from wood burning, tailpipe exhaust, and vehicle wear-and-tear. The researchers note that air pollution concentrations in the area they studied generally complied with current European air quality guidelines.

Investigating the association between PM<sub>2.5</sub> and either classical autism or the broader category of ASD, they report, "Exposure to local PM<sub>2.5</sub> during pregnancy from each of the investigated sources was associated with childhood autism in the fully adjusted models. For ASD, similar, but less pronounced, associations were found."

The researchers conclude, "The results add to existing evidence that exposure to air pollution during pregnancy may be associated with an increased risk of childhood autism. Further, these findings suggest that locally produced emissions from both residential wood burning and road traffic-related sources (tailpipe exhaust and vehicle wear-and-tear) contribute to this association."

"Exposure to local, source-specific ambient air pollution during pregnancy and autism in children: a cohort study from southern Sweden," Erin Flanagan, Ebba Malmqvist, Ralf Rittner, Peik Gustafsson, Karin Källén, and Anna Oudin, *Nature Scientific Reports*, March 8, 2023 (free online). Address: Erin Flanagan, Division of Occupational and Environmental Medicine, Department of Laboratory Medicine, Faculty of Medicine, Lund University, Lund, Sweden, erin.flanagan@med.lu.se.

### Need help or information?

The Autism Research Institute maintains a toll-free calling center:  
**833-281-7165**

### Moving?

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

## Research suggests an association between ASD, maternal lithium exposure

Mothers exposed during pregnancy to elevated levels of lithium in drinking water may have an increased likelihood of having a child with an autism spectrum disorder (ASD), according to a new study from researchers in Denmark, the United Kingdom, and the United States.

Zeyan Liew and colleagues analyzed data on 8,842 children diagnosed with ASD and 43,864 controls matched by age and sex from the Danish Medical Birth Registry. The researchers calculated mothers' lithium exposure by linking maternal addresses to measurements of lithium levels in 151 waterworks across Denmark, controlling for multiple factors including maternal characteristics, socioeconomic factors, and air pollution exposures.

They report that as lithium levels increased, so did the odds of an autism diagnosis. Compared to lithium levels in the lowest 25th percentile, lithium levels in the second and third quartiles were associated with a 24 to 26 percent higher likelihood of autism. In the highest quartile, the likelihood was 46 percent higher compared to the lowest quartile.

The researchers conclude, "This study suggests that naturally occurring lithium in drinking water may be a novel environmental risk factor for ASD development that requires further scrutiny." They note that while theirs appears to be the first study to explore the possible association between maternal lithium exposure and ASD, prior findings from Denmark have indicated that exposure to continual, low-dose lithium from drinking water may play a role in the occurrence of adult-onset neuropsychiatric disorders.

They also note, "In the future, anthropogenic sources of lithium in water may become more widespread because of lithium battery use and disposal in landfills with the potential for groundwater contamination."

"Association between estimated geocoded residential maternal exposure to lithium in drinking water and risk for autism spectrum disorder in offspring in Denmark," Zeyan Liew, Qi Meng, Qi Yan, Jörg Schullehner, Birgitte Hansen, Søren Munch Kristiansen, Denitza D. Vouchkova, Jørn Olsen, Annette Kjær Ersbøll, Matthias Ketzler Ole Raaschou-Nielsen, and Beate R. Ritz, *JAMA Pediatrics*, April 3, 2023 (online). Address: Zeyan Liew, Department of Environmental Health Sciences, Yale School of Public Health, New Haven, Connecticut, zeyan.liew@yale.edu.

—and—  
"Higher lithium levels in drinking water may raise autism risk," Medical Xpress, April 3, 2023.

## Constipation in infancy associated with higher likelihood of ASD diagnosis

More evidence linking autism spectrum disorders (ASD) to gastrointestinal problems comes from a study by researchers in Taiwan and the United States, who report that ASD occurs at an elevated rate in children with a history of constipation in infancy.

Using records from the National Health Insurance Research Database (NHIRD) in Taiwan, Yi-Feng Lee and colleagues retrospectively identified 12,935 children aged 3 years or younger who suffered from constipation. They compared these children to non-constipated children matched for age, gender, and underlying comorbidities.

The researchers report, "Higher risk of ASD was observed in constipated children, especially in more severely constipated children who received more laxative prescriptions." They found that the incidence rate of ASD was 12.36 per 100,000 person-months in the constipation group, which was significantly higher than the rate of 7.84 per 100,000 person-months seen in controls.

The researchers conclude, "Clinicians should look out for prodromal [early] symptoms of ASD in young children with constipation and be aware of the possibility of neurodevelopmental problems in these patients. Furthermore, pediatricians should assess the bowel condition, including the patency and gut microbiota, in children with ASD."

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"Association of early childhood constipation with the risk of autism spectrum disorder in Taiwan: real-world evidence from a nationwide population-based cohort study," Yi-Feng Lee, Meng-Che Wu, Kevin Sheng-Kai Ma, Jing-Yang Huang, and James Cheng-Chung Wei, *Frontiers in Psychiatry*, March 30, 2023 (free online). Address: James Cheng-Chung Wei, jccwei@gmail.com, or Jing-Yang Hung, wchinyang@gmail.com.

### — AUTISM.JOBS —

**A Free Resource for Job Seekers, Caregivers, Job Coaches, and Employers [www.Autism.Jobs](http://www.Autism.Jobs)**

At this site, you can discover the advantages of hiring individuals with autism, access practical information designed to help candidates with autism become "job ready," and learn how to create autism-friendly workplaces.

# Research Updates

## Preemptive therapy prior to autism diagnosis may be highly cost-effective

Preemptive therapy for infants who display early symptoms of autism may be highly cost-effective, according to a new study from Australia.

Leonie Segal and colleagues based their economic analysis on a 2021 study that found that only 6.7 percent of 89 children enrolled in a preemptive five- to six-month therapy program at 12 months of age received a diagnosis of autism at three years of age, compared to 20.5 percent of children who did not participate in the program. Using data from Australia's National Disability Insurance Scheme (NDIS), they calculated that each dollar invested in early treatment would result in a savings of more than three dollars in third-party payer costs by the time the children reached 13 years of age.

Segal says, "The modeling also predicted that savings in support costs associated with disability would balance out therapy costs shortly after the child turned five—just four years after delivery of the therapy."

The researchers conclude, "Given the high and increasing prevalence of ASD globally, identifying preemptive interventions that are efficacious and represent good value is an important input to resource allocation decisions for infants who exhibit early behavioral signs of autism."

"Estimated therapy costs and downstream cost consequences of iBASIS-Video Interaction to Promote Positive Parenting Intervention vs. usual care among children displaying early behavioral signs of autism in Australia," Leonie Segal, Jonathan Green, Asterie Twizeyemariya, Kristelle Hudry, Ming Wai Wan, Josephine Barbaro, Teresa Iacono, Kandice J. Varcin, Sarah Pillar, Matthew N. Cooper, Wesley Billingham, Gemma Upson, and Andrew J. O. Whitehouse, *JAMA Network Open*, April 5, 2023 (free online). Address: Leonie Segal, PhD, Health Economics and Social Policy Group, Allied Health and Human Performance, University of South Australia, GPO Box 2741, Adelaide SA 5001, Australia, leonie.segal@unisa.edu.au.

## Sleep problems in infancy associated with ASD, autism traits, and social attention alterations

A new study from the United Kingdom indicates that sleep problems in infancy may help to predict later social skills deficits, autism traits, and autism diagnoses in children.

Jannath Begum-Ali and colleagues studied 164 children with or without first-degree relatives with autism spectrum disorders (ASD) and/or attention-deficit/hyperactivity disorder (ADHD). The researchers evaluated the children at 5, 10, and 14 months of age, analyzing day and night sleep issues including day/night sleep duration, number of naps in the day, frequency of night awakenings, and sleep onset problems.

The researchers report, "By 14 months, infants with a first-degree relative with ASD (but not ADHD) showed lower [worse] night sleep scores than infants with no family history of ASD; lower night sleep scores in infancy were also associated with a later ASD diagnosis, decreased cognitive ability, increased ASD symptomatology at 3 years, and developing social attention (e.g., looking to faces)." They detected no associations with day sleep.

They conclude, "Sleep may be a viable target for early intervention in infants with a family history of ASD, particularly around the age of 14 months."

"Infant sleep predicts trajectories of social attention and later autism traits," Jannath Begum-Ali, Louisa K. Gossé, Luke Mason, Greg Pasco, Tony Charman, Mark H. Johnson, Emily J.H. Jones, and The STAARS Team, *Journal of Child Psychology and Psychiatry*, March 2023 (free online). Address: Jannath Begum-Ali, Centre for Brain and Cognitive Development, Birkbeck, University of London, Henry Wellcome Building, Birkbeck University of London, Malet Street, London, WC1E 7HX, UK, jannath.begum.ali@bbk.ac.uk.

### IN MEMORIAM: Ved Chauhan, Ph.D.

Ved Chauhan, Ph.D., was head of the Cellular Neurochemistry Laboratory at the New York State Institute for Basic Research in Developmental Disabilities (IBR), Staten Island, NY. He published more 100 research articles and many book chapters in the fields of Alzheimer's disease, autism, environmental risk agents, cellular signal transduction, and membrane biochemistry.

Dr. Chauhan made major contributions toward helping ARI reach its goals. He presented talks at ARI's national and regional think tanks, conducted research funded by grants from ARI, and traveled to Russia with ARI to inform families and professionals throughout eastern Europe about autism.

## Meta-analysis: benefits of probiotics unclear, multiple strains may be effective

While there is a significant association between autism spectrum disorders (ASD) and gastrointestinal problems, a new meta-analysis suggests that more study is needed to determine the effects of probiotic use on ASD symptoms.

The meta-analysis, by Xiao He and colleagues, looked at the findings of seven studies exploring the effects of probiotic use on ASD symptoms. The researchers report, "[P]ositive significant effects of probiotics were not observed in children with ASD in our meta-analysis. The studies used provided limited evidence for the efficacy of probiotics on children with ASD due to their small sample sizes, shorter intervention duration, different probiotics used, different scales used, and poor research quality."

However, they say, "Significantly, multiple-strain probiotic blend intervention exhibited a positive therapeutic effect on children with ASD and was more effective than single-strain probiotics in subgroup analyses. Moreover, subgroup analyses suggested that studies with longer intervention durations and RCT [randomized controlled trial] designs might be more likely to reveal the effects of probiotic treatment in improving ASD-related behavioral symptoms in children."

The researchers conclude that future studies should consider the different species of probiotics used, the ages of study participants, the GI symptoms of participants, and the duration of intervention in order to identify any effects of probiotic use.

"Effects of probiotics on autism spectrum disorder in children: a systematic review and meta-analysis of clinical trials," Xiao He, Wenxi Liu, Fengrao Tang, Xin Chen, and Guirong Song, *Nutrients*, March 15, 2023 (free online). Address: Guirong Song, Department of Health Statistics, School of Public Health, Dalian Medical University, No. 9 South Road, Lvshun District, Dalian 116044, China, songsara2016@dmu.edu.cn.

### New to autism?

If so, the Autism Research Institute has valuable information on seeking appropriate medical care. For a list of important questions to ask a potential medical provider, see:

<https://www.autism.org/>

## Daycare expulsion rate high for children with autism

Children with autism spectrum disorders (ASD) frequently are expelled from daycare programs due to behavioral issues, according to a new study.

Jan Blacher and Abbey Eisenhower, who collected data on 203 young autistic children, found that one out of six of the children was expelled from a preschool or child-care setting before reaching elementary school age. The average age at which the children were expelled was 3.3 years.

Blacher comments, “These little kids were asked to leave school because they demonstrated behaviors directly related to their autism. So, they were being expelled from preschool for the very problems that they needed school for.”

The researchers say that common characteristics of autism, including repetitive behaviors and difficulty with social communication, may sometimes be misinterpreted as forms of misbehavior. Additionally, they say, teachers may miss children’s non-verbal attempts to communicate their needs, making the children anxious and more prone to temper tantrums.

Blacher adds, “Many of the expelled children were not identified as having a special need. That suggests to us that it never occurred to the teachers to refer them for assessment.... Had they understood autism, they might have been inspired to deal with it, and say, ‘Maybe I should have this child assessed.’”

Children were more likely to be expelled from private than public programs, which the researchers say suggests a particular need for policies and practices supporting inclusion in private settings.

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“Preschool and child-care expulsion: Is it elevated for autistic children?,” Jan Blacher and Abbey Eisenhower, *Exceptional Children*, Vol. 89, No. 2, January 2023. Address: Jan Blacher, Graduate School of Education, University of California, Riverside, CA 92521, jan.blacher@ucr.edu.

—and—

“Study finds one of every six autistic children are expelled from daycare,” news release, David Danelski, University of California-Riverside, April 3, 2023.

## Health anxiety common among adults with ASD, autistic traits

Health anxiety—an excessive and irrational worry about having a serious health condition—is more common in adults with autism spectrum disorders (ASD) than in non-autistic adults, according to a new study from the United Kingdom.

John Galvin and Gareth Richards used a self-report questionnaire to measure health anxiety in 110 autistic and 110 non-autistic adults. They also obtained information on the participants’ sex, age, ethnicity, medical diagnoses, comorbid diagnoses, and autistic traits.

Their findings showed that health anxiety was significantly higher in autistic than non-autistic adults, with nearly one in three autistic participants reporting clinically significant levels. Health anxiety also was significantly higher in females than males in both groups. In addition, the researchers say, “Positive correlations were found between autistic traits and health anxiety in both autistic and non-autistic subsamples, and these relationships remained statistically significant after controlling for covariates.”

The researchers conclude, “The observed positive correlations between autistic

traits and health anxiety suggest that clinicians may wish to consider autistic traits in the early stages of assessment and treatment planning for patients with and without an autism diagnosis who are experiencing health anxiety/hypochondria.”

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The researchers found that health anxiety was significantly higher in autistic than non-autistic adults, with nearly one in three autistic participants reporting clinically significant levels.

They note, however, that their study has several limitations. For instance, they say, “[T]he higher rates of health anxiety reported by the autistic sample might reflect, to some extent at least, an actual increased rate of comorbid health issues within this group.” They also note that they collected their data after the COVID-19 pandemic began, which may have influenced the results.

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“Health anxiety in autistic adults,” John Galvin and Gareth Richards, *Research in Autism Spectrum Disorders*, April 3, 2023 (free online). Address: John Galvin, john.galvin@warwick.ac.uk.

## ENT problems common in kids later diagnosed with autism

A large-scale study indicates that ear and upper respiratory problems in early childhood are associated with a higher number of autistic traits or a diagnosis of autism.

Amanda Hall and colleagues analyzed data on more than 10,000 children followed throughout their first four years by the Avon Longitudinal Study of Parents and Children. The children’s mothers filled out questionnaires at three points during this period, recording the frequency of upper respiratory, ear, and hearing problems in their children.

Hall and her team report, “Early evidence of mouth breathing, snoring, pulling/poking ears, ears going red, hearing worse during a cold, and rarely listening were associated with high scores on each autism trait and with a diagnosis of autism. There was also evidence of associations of pus or sticky mucus discharge from ears, especially with autism and with poor coherent

speech.” These results remained significant after the researchers controlled for a wide range of potential cofounders.

The researchers say it is not clear whether ear, nose, and throat (ENT) conditions play a causal role in the development of autism or are related to other factors. “One possibility, for example,” they say, “could be the consequence of the increased prevalence of minor physical anomalies in individuals with autism, including anatomical differences in the structure and/or positioning of the ear, with such differences in ear morphology increasing the risk of ENT conditions.”

No matter what the relationship is, they say, “it is clear from this study of prospectively collected information that children who later develop social communication difficulties are more likely to have early middle ear disease and ENT conditions, and are therefore more at risk of communication difficulties from hearing loss, although temporary. Early detection and intervention of ENT conditions in children with autism is thus likely to be beneficial.”

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“Associations between autistic traits and early ear and upper respiratory signs: a prospective observational study of the Avon Longitudinal Study of Parents and Children (ALSPAC) geographically defined childhood population,” Amanda Hall, Richard Maw, Yasmin Iles-Cavin, Steven Gregory, Dheeraj Rai, and Jean Golding, *BMJ Open*, April 24, 2023 (free online). Address: Jean Golding, jean.golding@bristol.ac.uk.

### WOMEN IN AUTISM

While autism was once viewed as a pediatric condition that nearly always affected boys, we now understand that autism is a lifelong neurodevelopmental condition with a diverse presentation across all genders. A new article on the Autism Research Institute’s website describes the autism gender bias, explores real-world outcomes for autistic women, and discusses emerging research and new models for the future. You can read the article at:

[autism.org/women-in-autism](https://autism.org/women-in-autism)



## Meta-analysis shows some benefits of supplementation with vitamin D, but no effect on core symptoms of ASD

Supplementation with vitamin D may help to reduce stereotypical behaviors in children with autism spectrum disorders (ASD) but does not appear to affect core symptoms or coexisting conditions, according to a new meta-analysis by researchers in China.

Min Zhang and colleagues analyzed data from six randomized, controlled studies in their meta-analysis. In all, the studies involved 176 children with ASD. The researchers report that they detected no statistically significant differences between the vitamin D-supplemented groups and the placebo groups in terms of core symptoms and coexisting conditions, as measured by the Aberrant Behavior Checklist and the Social Responsiveness Scale. However, they say, “Among the studies that used the GARS-2 [Gilliam Autism Rating Scale-Second Edition], there was a significant difference in stereotyped behaviors between groups.”

The researchers say their analysis indicates that children whose levels of vitamin D were the highest at the conclusion of the studies exhibited greater improvements than those with lower levels. Thus, they suggest, clinicians or researchers should measure vitamin D levels before, during, and after supplementation. They also say that age may be a factor, as some research shows greater gains in children with ASD who start taking vitamin D supplements when they are under three years of age. “Most participants in the included trials were older than five years,” they note, “and it is possible that less neuroprotection and benefits might be obtained from vitamin D supplementation because neuronal networks in these participants were already established, suggesting that vitamin D supplementation should be initiated as early as possible.”

The researchers caution that even though this was a meta-analysis, the number of subjects was relatively small and larger studies are needed to determine the efficacy of vitamin D supplementation for individuals with ASD.

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“Effects of vitamin D supplementation on children with autism spectrum disorder: A systematic review and meta-analysis,” Min Zhang, YiRan Wu, ZhaoXu Lu, MeiYan Song, XiaoLan Huang, LaLa Mi, Jian Yang, and Xiaodai Cui, *Clinical Psychopharmacology and Neuroscience*, May 2023 (free online). Address: Min Zhang, Beijing Municipal Key Laboratory of Child Development and Nutriomics, Capital Institute of Pediatrics, No. 2 Yabao Road, Chao Yang district, Beijing 100020, China, mmisagirl@foxmail.com.

## Program for parents of kids with ASD may reduce depression

A new study by researchers in Canada suggests that caregivers of individuals with autism may benefit from an intervention to improve their own mental health and well-being.

Andrea Maughan and colleagues say, “Parents of autistic children commonly experience greater levels of stress, anxiety, and depression compared to parents of children who do not have a disability, and their levels of chronic stress have been shown to surpass levels experienced by parents of children with other developmental disabilities. Given the high stress experienced by parents of autistic children, it follows that parents would experience their own challenges that require parent-focused support.”

The researchers enlisted 54 parents of autistic children, adolescents, or adults in their study. They divided the parents into a treatment group that immediately participated in a program called Acceptance and Commitment Therapy (ACT) and a waitlist group who began the ACT program after the first group finished.

The ACT intervention consists of one three-hour and one full-day session, followed by a refresher session one month later. “The overall aim of ACT,” the researchers say, “is not to decrease psychological distress, but to increase one’s effectiveness in pursuing values that are personally mean-

ingful, even in the context of difficult symptoms or circumstances.”

Parents participating in the study filled out questionnaires before the program began and at 3, 7, and 17 weeks after baseline. The researchers report, “Compared to the group that was waiting to participate in the program, parents in the treatment group reported greater improvements in depression and family distress, and these improvements were still present four months later. Parents in the treatment group also reported short-term improvements in their positive feelings and personal goals, compared to those waiting.”

The researchers caution that their study has limitations; for instance, the treatment group was small, and not all parents in the treatment group completed all three sessions. However, they say, “Results suggest that a brief ACT group intervention is efficacious for improving some aspects of mental health for parents of autistic children.”

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“Parent, child, and family outcomes following Acceptance and Commitment Therapy for parents of autistic children: A randomized controlled trial,” Andrea L. Maughan, Yona Lunskey, Johanna Lake, Jennifer S. Mills, Kenneth Fung, Lee Steel, and Jonathan A Weiss, *Autism*, May 2023 (free online). Address: Jonathan A Weiss, Department of Psychology, York University, 4700 Keele Street, Toronto, ON M3J 1P3, Canada, jonweiss@yorku.ca.

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**SCREEN TIME AND SOCIAL ENGAGEMENT**

Karen Heffler, MD

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Dr. Rajesh Kana

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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.

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Conducting and sponsoring research on the causes of and best treatments for autism (more than \$475,000 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.

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