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COVID-19 epidemic's effects on infant development studied

A new meta-analysis indicates that infants born or raised during the COVID-19 pandemic do not exhibit impaired neurodevelopment overall. However, the study suggests that infants who experienced their first year of life during the pandemic have an elevated risk of communication impairment, regardless of gestational exposure to SARS-CoV-2, and that children of mothers infected with the virus may have an elevated risk of fine motor problems.

Kamran Hessami and colleagues analyzed data from eight studies involving a total of 21,419 infants who were screened using the Ages and Stages Questionnaires (ASQ-3).

The researchers' meta-analysis showed that the pandemic cohort was more likely to exhibit communication impairments, but detected no significant differences in gross motor, fine motor, personal-social, and problem-solving skills. Children of mothers infected during pregnancy showed no differences other than an increased risk of fine motor problems.

Of the infants, 11,438 were screened during the pandemic period, and 9,981 prior to the pandemic. The researchers say that the pandemic cohort was more likely to exhibit communication impairments, but showed no significant differences in gross motor, fine motor, personal-social, and problem-solving skills. In addition, they say, maternal infection "was not associated with significant differences in any neurodevelopment domain in offspring, except for increasing the odds of fine motor impairment."

The findings suggest, they say, "that overall neurodevelopment in the first year of life was not changed by either being born or raised during the SARS-CoV-2 pandemic or by gestational exposure to SARS-CoV-2."

They add, "Interestingly, the first year of life during the COVID-19 pandemic, regardless of maternal infection, was significantly associated with the risk of communication delay among the offspring." They speculate that this may have stemmed from a reduction in parents' communication with infants due to parental stress caused by the pandemic, or from reduced opportunities for infants to associate with others outside the home during lockdowns.

The researchers conclude, "Clearly, although our observations raise potential concerns regarding the early developmental trajectory of children born during the COVID-19 pandemic, long-term follow-up behavioral assessments would be necessary to see whether this is borne out during early childhood or indeed whether catch-up occurring after the follow-up period is limited to the first year of life, and to extrapolate further into early childhood."

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"COVID-19 pandemic and infant neurodevelopmental impairment: a systematic review and meta-analysis," Kamran Hessami, Amir Hossein Norooznezhad, Sonia Monteiro, Enrico R. Barrozo, Abolfazl Shirdel Abdolmaleki, Sara E. Arian, Nikan Zargarzadeh, Lara S. Shekerdemian, Kjersti M. Aagaard, and Alireza A. Shamshirsaz, *JAMA Network Open*, October 2022 (free online). Address: Alireza Shamshirsaz, Maternal Fetal Care Center, Boston Children's Hospital, Harvard Medical School, 300 Longwood Ave, Boston, MA 02115, alireza.shamshirsaz@childrens.harvard.edu.

Study offers clues about eye contact avoidance in ASD

Adults with autism spectrum disorders (ASD) exhibit less activity in a specific brain region during eye contact than neurotypical adults do, according to a new study.

Joy Hirsch and colleagues used a non-invasive neuroimaging method called functional near-infrared spectroscopy to analyze the brain activity of pairs of adults, each including one participant with ASD and one neurotypical participant, during brief social interactions involving eye-to-eye contact. Overall, 17 adults and 19 neurotypical controls participated in the study.

The researchers found that when making eye contact, participants with ASD exhibited significantly reduced activity in a brain region called the dorsal parietal cortex compared to neurotypical controls. The more pronounced the overall social symptoms of ASD were, the less activity was seen in this brain region. Neural activity in this region was synchronous between neurotypical participants during eye-to-eye contact; however,

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Widespread changes detected in the cerebral cortex in ASD

New research indicates that in autism spectrum disorders (ASD), changes at the molecular level are present throughout the cerebral cortex rather than solely in cortical regions associated with language and social cognition.

Using post-mortem brain tissue samples from 112 individuals with or without ASD, Michael Gandal and colleagues analyzed gene expression in 11 cortical regions by sequencing RNA from each of the four main cortical lobes. They report that in samples from individuals with ASD, they saw changes across the cerebral cortex, "affecting many neural cell types and specific biological processes." They also found evidence that RNA changes in the brain are a cause of ASD, rather than a result of the disorder.

Previous research by the same team had focused on the temporal and frontal lobes, which are involved in language and social cognition. This time, however, they were surprised to find that "the most profound gene-expression changes in ASD were observed in the primary visual cortex." They note, "It is interesting to speculate that the substantial changes observed in primary sensory regions may relate to the widespread sensory processing differences in ASD, which are so pervasive that they have been included in the DSM-5 diagnostic criteria."

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"Broad transcriptomic dysregulation occurs across the cerebral cortex in ASD," Michael J. Gandal, Jillian R. Haney, Brie Wamsley, Chloe X. Yap, Sepideh Parhami, Prashant S. Emani, Nathan Chang, George T. Chen, Gil D. Hoftman, Diego de Alba, Gokul Ramaswami, Christopher L. Hartl, Arjun Bhattacharya, Chongyuan Luo, Ting Jin, Daifeng Wang, Riki Kawaguchi, Diana Quintero, Jing Ou, Ye Emily Wu, Neelroop N. Parikshak, Vivek Swarup, T. Grant Belgard, Mark Gerstein, Bogdan Pasaniuc, and Daniel H. Geschwind, *Nature*, November 2, 2022 (free online). Address: Michael Gandal, michael.gandal@pennmedicine.upenn.edu.

—and—

"Brain changes in autism are far more sweeping than previously known, study finds," news release, University of California, Los Angeles, November 2, 2022.

Early exposure to pollutants may alter brain's development

A new study suggests that exposure to air pollutants before birth and during childhood may lead to alterations in white matter microstructure in the brain. Abnormal white matter microstructure has been linked to autism spectrum disorders (ASD) as well as depression and anxiety.

In their research, Anne-Claire Binter and colleagues studied the air pollution exposure of more than 3,500 children enrolled in a study in the Netherlands. To determine each child's exposure to air pollution during the study period, the researchers estimated the daily levels of nitrogen dioxide and particulate matter in the children's homes on a month-by-month basis during the mother's pregnancy and throughout childhood, until the children reached 8.5 years of age. When participants were between 9 and 12 years of age, the researchers performed magnetic resonance imaging to examine the structural connectivity of their white matter and to measure the volumes of several brain structures.

The researchers found an association between greater exposure to pollutants before 5 years of age and more significant alterations in brain structure at 9 to 12 years of age. In addition, they detected a link between exposure to fine particulate matter—especially during the first two years of life—and an increased volume of the putamen during preadolescence. The putamen is a brain structure involved in motor function, learning processes, and many other functions, and Binter notes that a larger putamen has been associated with ASD, schizophrenia, and obsessive-compulsive spectrum disorders.

She comments, "The novel aspect of the present study is that it identified periods of susceptibility to air pollution. We measured exposure using a finer time scale by analyzing the data on a month-by-month basis, unlike previous studies in which data was analyzed for trimesters of pregnancy or childhood years." She also notes that the levels of air pollution to which the children were exposed met European Union (EU) standards, suggesting that brain development can be affected by exposure to levels of pollution currently considered acceptable.

She adds, "One of the important conclusions of this study is that the... brain is particularly susceptible to the effects of air pollution not only during pregnancy, as has been shown in earlier studies, but also during childhood."

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"Air pollution, white matter microstructure, and brain volumes: periods of susceptibility from pregnancy to preadolescence," Anne-Claire Binter, Michelle S.W. Kusters, Michiel A. van den Dries, Lucia Alonso, Małgorzata J. Lubczyńska, Gerard Hoek, Tonya White, Carmen Iñiguez, Henning Tiemeier, and Mònica Guxens, *Environmental Pollution*, September 2022 (online). Address: Mònica Guxens, Barcelona Institute for Global Health–Campus Mar, Doctor Aiguader, 88, 08003 Barcelona, Spain, monica.guxens@isglobal.org.

—and—

"Possible association between air pollution exposure, especially at young age, and alterations in brain structure," news release, Barcelona Institute for Global Health, September 22, 2022.

Parent Training Study

Dr. Lauren Moskowitz is seeking participants in a research study on the effectiveness of an online parent training program for parents of children with autism spectrum disorder (ASD) and co-occurring intellectual disability. The purpose of the program is to teach children to help overcome or cope with their fears or phobias. She is currently seeking parents to volunteer to participate in this program. English fluency is required. For more information on this study or to request a screening packet, please contact Dr. Moskowitz at St. John's University via email at moskowil@stjohns.edu.

IN MEMORIAM

Dan Torisky, a powerful advocate for children and adults with autism, passed away on November 10, 2022.

When his oldest son, Edward, was diagnosed with autism, Mr. Torisky left a successful career in advertising to devote his life to autism advocacy. He served as president of the Autism Society from 1990 to 1994, and later became president of the Autism Society of Pittsburgh (now Autism-Pittsburgh).

Mr. Torisky was instrumental in establishing residential and educational programs for individuals with autism throughout the Pittsburgh area. He co-founded the Spectrum Charter School for Autistic and Developmentally Disabled Adolescents, the first autism-specific charter school in the United States. In addition, he helped found the Pittsburgh Vintage Grand Prix, which raises funds for autism services. His decades of service have improved the lives of autistic individuals in Pittsburgh and around the world.

Link between maternal infection, autism in children questioned

While maternal infections during pregnancy are associated with an increased risk of autism spectrum disorders (ASD) in children, a new study suggests that this may not be due to the effects of the infections themselves.

Martin Brynge and colleagues analyzed data from nearly 550,000 children in Stockholm, Sweden. Approximately 34,000 of the children's mothers had documented evidence of an infection during pregnancy requiring specialized health care.

Consistent with earlier studies, the researchers found that children exposed to infections *in utero* had a higher likelihood of receiving an autism diagnosis, as well as an increased risk of being diagnosed with intellectual disability. However, they found that maternal infections occurring in the year prior to pregnancy were associated with autism as well—a finding that casts doubt on the theory that the infections that occurred during pregnancy were the cause of autism.

In addition, the researchers analyzed data from nearly 400,000 children in the study group who had full siblings. They found that siblings exposed to maternal infections were not at higher risk for autism compared to their unexposed siblings.

The researchers conclude, "Although infections in pregnant women are associated with both autism and intellectual disability in their children, the association with autism does not appear to reflect a causal relationship, but is more likely to be explained by factors shared between family members such as genetic variation or aspects of the shared environment. Thus, infection prevention is not expected to reduce autism incidence."

The researchers note, however, that their findings apply only to infections in general, and not to specific viruses—for example, rubella and cytomegalovirus—that are firmly linked to an increased risk for autism and other developmental disabilities. They also note that their data could not rule out a causal link between maternal infection during pregnancy and intellectual disability.

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"Maternal infection during pregnancy and likelihood of autism and intellectual disability in children in Sweden: a negative control and sibling comparison," Martin Brynge, Hugo Sjöqvist, Renee M. Gardner, Brian K. Lee, Christina Dalman, and Håkan Karlsson, *The Lancet Psychiatry*, Vol. 9, No. 10, pp. 782-791, October 1, 2022. Address: Martin Brynge, m.brynge@ki.se.

—and—

"Registry review casts doubt on causal link between maternal infection and autism," Charles Q. Choi, Spectrum News, September 23, 2022.

—and—

"New knowledge about the link between infection during pregnancy and autism," news release, Karolinska Institutet, September 7, 2022.

EDITORIAL: Stephen M. Edelson, Ph.D.

Treating autism with contingent electric shock: Are all possible options really considered?

The use of punishment to treat severe behavioral challenges in autistic children was first introduced nearly 60 years ago. Although most people in the autism community strongly disagree with using any form of punishment as a therapeutic approach, aversives continue to be a source of discussion and controversy. Recently, the Association for Behavior Analysis International, a renowned professional organization established in 1974, asked their members to vote on whether contingent electric shock should be entirely ruled out or be appropriate in some cases. Given the recent renewed interest in aversives, I thought it would be timely to share my thoughts on this topic.

Over the past 50+ years, much has been written about using aversive interventions to treat those on the autism spectrum. Aversives involve mild to severe degrees of discomfort or pain, from saying the word "no" or making a loud noise to more extreme forms such as forced ammonia inhalation, blindfolding, and electric shock [1-3].

Although aversives can be moderately effective in reducing challenging behaviors, such as self-injurious behavior (SIB) and aggression toward others, critics often use the words "cruel" and "torture" to describe extreme forms of aversives. However, some forms of aversives are currently accepted by the general professional community. For instance, aversives including contingent electric shock (CES) are sometimes employed to treat addictions in the general population including alcoholism, gambling, and smoking [4-6].

In this editorial, I will address CES given a legal decision rendered last year (July 2021) [7]. Basically, a judge allowed the utilization of CES for clients who engaged in severe challenging behaviors potentially leading to harm to others or to themselves. This ruling applies only to clients at the Judge Rotenberg Educational Center in Canton, Massachusetts. The ruling affects about one-fifth of the approximately 300 clients at the center. However, this decision can now be referred to in other legal cases involving similar situations.

CES should not be confused with electroconvulsive therapy (ECT). The former is applied immediately, usually within seconds, after a challenging behavior, such as self-harming behavior or aggression. The latter, ECT, involves administering electric current into the brain to induce a brief seizure. ECT has been given to some individuals on the spectrum to treat severe self-injurious behavior [8] and catatonia [9].

Research on CES started in the mid-1960s, soon after autism was recognized as a biological condition as opposed to a condition caused by emotional neglect by parents. Early studies typically involved single-subject controlled experiments. Over the years, few studies have been reported in the literature.

Today, CES is, for the most part, not considered a viable form of intervention within the autism community. In addition, the Food and Drug Administration banned CES in the United States [10], and the United Nations has stated that CES is dehumanizing and abusive [11].

The use of CES over the decades was never widespread; however, it was sometimes employed as a last resort since SIB can lead to severe self-inflicted harm, such as lacerations, bone fractures, and concussions. There are also reports of individuals blinding themselves in addition to biting off their fingers or part of their tongue. One rationale people have used when condoning CES is to avoid other "less desirable" options including long-term sedation or restraint.

Several methods have been used to deliver CES including (1) an electrical prod, (2) an electrical grid embedded in the floor, (3) a remote-controlled device activated by a therapist, and (4) an automated movement sensor. Regarding the latter, the Self-Injurious Behavior Inhibiting System (SIBIS) was created to control head-banging by placing a sensor on the child's head that would deliver a signal to activate a shock to the arm or leg [12].

How should we approach the treatment of severe challenging behaviors?

Edward Carr, one of the leading experts in treating challenging behaviors, would often tell a heart-wrenching story about the time he attempted to treat a young man on the spectrum who engaged in severe SIB [13]. Dr. Carr's team developed a behavioral strategy that involved giving CES immediately after the man engaged in head-hitting. The intervention was moderately successful in that the frequency of head-hitting decreased but was not entirely eliminated. Later, the team learned that the man suffered from migraine headaches. One could imagine how an individual would feel when experiencing both a severe head pain and electric shock.

In a recent interview in the *Boston Globe*, a father described his son who had blinded himself in one eye and exhibited numerous challenging behaviors (August 1, 2021) [14]. After receiving CES, he stopped poking his other eye. Other benefits seen in the child were also attributed to the CES, including improvements in communication and self-help skills.

However, it is important to mention that one research study demonstrated a dramatic reduction in eye-poking behavior in a group of autistic children after receiving liquid calcium [15]. This is because some-to-many individuals who exhibit this type of behavior suffer from hypocalcemia. One possible explanation for eye-poking is that low calcium levels are associated with dry eye syndrome, which may lead to inflammation on the surface of the eyes and/or the eyelids as well as cause a burning sensation [16, 17]. Thus, giving an individual a simple nutritional supplement may be beneficial when treating behavior directed toward the eyes. Unfortunately, this treatment is not well-known among clinicians.

Given the limited amount of research and the lack of widespread knowledge about the biology of challenging behaviors, one can easily question whether the decision to administer electric shock is truly reasonable and thorough.

The use of CES, as almost always argued, is considered after attempting all other possible options for intervention. Although this may sound convincing and commendable, the term "all" can be considered a misnomer because this really depends on the knowledge-base as well as the training of the members of the clinical team as well as outside consultants. Given the limited amount of research and the lack of widespread knowledge about the biology of challenging behaviors, one can easily question whether the decision to administer electric shock is truly reasonable and thorough.

There is mounting evidence indicating that internal discomfort or pain may be associated with SIB. Unfortunately, many individuals on the autism spectrum have impaired communication skills. As a result, they often cannot express their feelings of discomfort and pain. Comorbidities associated SIB include gastrointestinal problems [18], immune system issues [19], metabolic problems [20], seizures [21], abnormal sensory processing [22], nutritional issues [23], anxiety [24], and sleep problems [25].

Obviously, it can be a daunting task to assess all possibilities when determining the underlying reasons for a severe behavior, but it is crucial that an all-out effort be made.

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Research Updates

More findings point to high rate of vitamin D deficiency in children with autism

A new study from the Netherlands adds to evidence that vitamin D deficiency is common in children with autism spectrum disorders (ASD).

Jet Muskens and colleagues measured the body mass index (BMI) and vitamin D3 levels of 93 children between six and 18 years of age. Of the group, 54 had ASD and 39 had internalizing disorders such as mood disorders or anxiety. Children with eating disorders and those already being supplemented with vitamin D were excluded.

The researchers report that 75.9 percent of the children with ASD and 79.5 percent with internalizing disorders exhibited vitamin D3 deficiency. Vitamin D deficiency was especially common in boys with both ASD and obesity.

They conclude, "Vitamin D3 deficiency is common in children and adolescents with psychiatric disorders and it is vital to increase clinicians' awareness of this common and remediable risk factor."

The researchers' findings are consistent with previous research indicating that vitamin D levels are low in many children with ASD. For example, a 2020 study from Turkey by Esma Şengenç and colleagues found that approximately 95 percent of individuals with ASD had low vitamin D levels, with 13 percent exhibiting severe deficiency (see ARRI 2020, No. 3).

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"Vitamin D status in children with a psychiatric diagnosis, autism spectrum disorders, or internalizing disorders," Jet Muskens, Helen Klip, Janneke R. Zinkstok, Martine van Dongen-Boomsma, and Wouter G. Staal, *Frontiers in Psychiatry*, September 14, 2022 (free online). Address: Jet Muskens, Karakter Child and Adolescent Psychiatry University Centre, Nijmegen, Netherlands, j.muskens@karakter.com.

Exercise may help to lower levels of anxiety in ASD

Anxiety is a very common issue for individuals with autism spectrum disorders (ASD), and a new study from China suggests that vigorous exercise may help to reduce this problem.

Hailin Li and colleagues used accelerometers to obtain data on the activity levels over a seven-day period of 78 children with ASD, ranging from six to nine years of age. The researchers analyzed the amount of time spent in sedentary behavior or in light, moderate, moderate-to-vigorous, or vigorous physical activity.

They report that somatic symptoms, panic, and generalized anxiety, as measured by the Screen for Child Anxiety Related Emotional Disorders, were inversely associated with the average daily minutes spent in vigorous exercise, and total anxiety scores on this measure were inversely associated with daily duration of moderate-to-vigorous exercise. In addition, emotional symptoms, as measured by the Strengths and Difficulties Questionnaire, were inversely associated with average daily time spent in vigorous or moderate-to-vigorous exercise.

The researchers also found that symptoms associated with ASD, such as social problems, repetitive behavior, or motor problems, were not related to levels of physical activity. This suggests that differences in ASD symptoms do not play a significant role in the the amount of physical activity engaged in by children with ASD.

The researchers conclude, "Our findings offer [a] potentially fruitful avenue for ASD children and their parents who are interested in improving emotional symptoms… and may provide policy makers with an extra motivation to implement physical activity [programs] with varying intensities."

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"Associations of emotional/behavioral problems with accelerometer-measured sedentary behavior, physical activity and step counts in children with autism spectrum disorder," Hailin Li, Bijun Shi, Xin Wang, Muqing Cao, Jiajie Chen, Siyu Liu, Xiaoling Zhan, Chengkai Jin, Zhaohuan Gui, Jin Jing, and Yanna Zhu, *Frontiers in Public Health*, October 2022 (free online). Address: Jin Jing, Department of Maternal and Child Health, School of Public Health, Sun Yat-sen University, Guangzhou, China, jingjin_sysu@163.com.

Differences detected in ASD in gene variations linked to insomnia, circadian rhythm

Children with autism spectrum disorders (ASD) may have an increased genetic risk for sleep problems, according to a new study.

Rackeb Tesfaye and colleagues analyzed data from two large databases including 5,860 children with ASD and 2,092 unaffected siblings. In addition, they analyzed data on 7,509 individuals from the general population.

The researchers focused on copy number variants (CNVs)—which are deletions or duplications of large sections of DNA—that are associated with circadian rhythm and insomnia. They report, "Deletions and duplications with circadian genes were overrepresented in ASD probands compared to siblings and unselected controls." For insomnia-risk genes, deletions but not duplications were associated with ASD. These results remained significant after the researchers adjusted for cognitive ability.

Interestingly, the researchers determined from parent reports that circadian genes did not appear to influence sleep problems in the children with ASD. They speculate that the databases they used may have lacked the detailed information needed to identify the full range of sleep problems frequently seen in these children. Another possibility, they say, is that circadian and insomnia genes contribute to ASD in ways that do not involve sleep—for instance, by affecting cognition or hormone secretion.

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"Investigating the contributions of circadian pathway and insomnia risk genes to autism and sleep disturbances," Rackeb Tesfaye, Guillaume Huguet, Zoe Schmilovich, Thomas Renne, Mor Absa Loum, Elise Douard, Zohra Saci, Martineau Jean-Louis, Jean Luc Martineau, Rob Whelan, Sylvane Desrivieres, Andreas Heinz, Gunter Schumann, Caroline Hayward, Mayada Elsabbagh, and Sebastien Jacquemont, *Translational Psychiatry*, October 3, 2022 (free online). Address: Rackeb Tesfaye, McGill University, Neurology and Neurosurgery, Montreal Neurological Institute, Azrieli Center for Autism Research, Montreal, Canada, rackeb.tesfaye@mail.mcgill.ca.

—and—

"Autistic people at increased genetic risk of sleep problems," Holly Baker, Spectrum News, October 18, 2022.

Moving?
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Research Updates

Body movement patterns at four months may help to predict ASD risk

Researchers in Japan report that it may be possible to identify infants with autism spectrum disorders (ASD) as early as four months after birth by analyzing their body movements.

Hirokazu Doi and colleagues enrolled mother-child pairs from the general population in their study. When the children were four months old, the researchers made video recordings of their spontaneous movements. Once the children reached the age of 18 months, the researchers asked their mothers to fill out the Modified Checklist for Autism in Toddlerhood (M-CHAT) questionnaire, which is designed to identify symptoms of ASD. A total of 41 infants were included in the final analysis.

The researchers report, "Infants at high risk for ASD at 18 months of age exhibited less rhythmic and weaker bodily movement patterns at four months of age than low-risk infants." When the researchers conducted a machine learning-based analysis of their data, they found that they were able to predict ASD-like behavior at 18 months of age with an accuracy "at the level acceptable for practical use."

The researchers caution, however, that their study has several limitations. For example, they say, they relied solely on the M-CHAT—which has been criticized for its low sensitivity and positive predictive value in diagnosing ASD—to categorize children at high or low risk for ASD at 18 months. In addition, they were not able to follow up to see if any of the children actually received a later diagnosis of ASD.

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"Prediction of autistic tendencies at 18 months of age via markerless video analysis of spontaneous body movements in 4-month-old infants," Hirokazu Doi, Naoya Iijima, Akira Furui, Zu Soh, Rikuya Yonei, Kazuyuki Shinohara, Mayuko Iriguchi, Koji Shimatani, and Toshio Tsuji, *Nature Scientific Reports*, October 27, 2022 (free online). Address: Toshio Tsuji, Graduate School of Advanced Science and Engineering, Hiroshima University, Higashihiroshima, Japan. tsuji-c@bsys.hiroshima-u.ac.jp.

Individuals with ASD excel at reading emotions in the eyes in cartoon drawings

Adults with autism spectrum disorders (ASD) appear to be better at reading emotions in cartoons than neurotypical people are, according to a recent study.

Liam Cross and colleagues asked 98 individuals with ASD and 98 age-matched controls to view 36 photographs or cartoon drawings of eyes and to select, from four possible options, which emotion the eyes portrayed. The researchers found that individuals with ASD did as well as neurotypical participants when viewing the photos, and did better when looking at the cartoons. While neurotypical participants were better at identifying emotions in photos than in identifying emotions in cartoons, the performance of participants with ASD did not differ significantly between the two tasks.

Study coauthor Gray Atherton comments, "The fact neurotypicals did worse than autistic people on cartoon eyes raises important questions. Research suggests that this could be an area of social-cognitive strength in autistic people who seem better [than neurotypical people] at identifying with anthropomorphic and non-human agents like animals, robots, dolls, or cartoons." He and his colleagues say their findings support the concept of socio-cognitive *differences* rather than *deficits* in autistic people.

In addition, Cross says, the findings suggest new avenues for helping individuals with ASD respond to real faces. "One idea we are exploring," he says, "is using augmented reality to develop filters that can apply anthropomorphic faces over the top of real-life faces. Over time, the augmented reality can be stripped away, allowing the user to apply the same techniques to human faces."

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"Autistic people outperform neurotypicals in a cartoon version of the Reading the Mind in the Eyes," Liam Cross, Andrea Piovesan, and Gray Atherton, *Autism Research*, August 2022 (free online). Address: Gray Atherton, Department of Psychology, Edge Hill University, Liverpool L39 4QP, UK, gray.s.atherton@vanderbilt.edu.

—and—

"New research shows that autistic people are better at reading emotions in cartoons," news release, Edge Hill University, August 4, 2022.

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Vision problems common in children with ASD

A study from Spain indicates that children with autism spectrum disorders (ASD) have a high rate of vision problems.

Carlota Gutiérrez and colleagues collected data on 344 children with ASD seen over a period of 8.5 years. They divided the children into four subcategories based on their diagnoses: autism, Asperger syndrome, pervasive developmental disorders not otherwise specified (PDD-NOS), and other diagnoses related to autism.

The researchers found that 48.4 percent of the children had refractive problems, most commonly hyperopia (farsightedness) and astigmatism (distorted vision due to alterations in the shape of the cornea or lens). Myopia (nearsightedness) was more common in children with Asperger syndrome, with nearly 18 percent of them exhibiting this problem. More than 15 percent of patients with autism or autism-related disorders exhibited strabismus, a type of eye movement disorder in which the eyes do not align properly; exotropia, or an outward turning of one or both eyes, was the most common form of strabismus seen. Optic nerve abnormalities were detected in four percent of the children, while nystagmus (rapid and uncontrolled eye movement) was seen in fewer than one percent of them.

The researchers say their findings are limited by the fact that children frequently refused to cooperate with the testing. However, they note that new testing technologies have been developed since they began collecting their data, and they say, "The fact that children do not have social interaction, are not able to follow objects, and present limitations in language does not mean in any way that they cannot be examined."

They conclude, "Ophthalmologic manifestations occur more frequently in patients with ASD than in the general child population…. Therefore, we consider it necessary to perform an ophthalmological evaluation in patients with ASDs."

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"Ophthalmologic manifestations in autism spectrum disorder," Carlota Gutiérrez, Jorge Luis Marquez Santoni, Pilar Merino, and Pilar Gómez de Liaño, *Turkish Journal of Ophthalmology*, August 2022 (free online). Address: Carlota Gutiérrez, Hospital General Universitario Gregorio Marañón, Department of Ophthalmology, Madrid, Spain, carloenmad@gmail.com.

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

Are researchers screening out too many females with ASD?

Most studies on autism spectrum disorders (ASD) include very few female subjects—an issue that could significantly affect the validity of research findings for women with ASD—and a new paper suggests that this dearth of female subjects stems in large part from the use of one specific screening test.

While enrolling participants in their own research, Anila D'Mello and colleagues observed that the Autism Diagnostic Observation Schedule (ADOS) appeared to have unequal effects on male and female participation. Analyzing an MIT database of adults with ASD who had expressed interest in participating in research studies, they found that approximately half of the females in the database met the ADOS cutoff scores typically required for inclusion in autism studies, compared to 80 percent of the males.

D'Mello says, "We realized then that there's a discrepancy and that the ADOS is essentially screening out who eventually participated in research. We were really surprised at how many males we retained and how many females we lost to the ADOS."

To investigate this issue further, the researchers examined six other datasets including more than 40,000 adults diagnosed with ASD. They found that in datasets that required ADOS screening for eligibility, the ratio of male to female participants was around 8:1. In datasets that required only a community diagnosis, the ratios ranged from around 2:1 to 1:1. "These results," the researchers say, "provide evidence for a 'leaky' recruitment-to-research pipeline for females in autism research."

D'Mello notes that the ADOS was originally developed using a largely male sample, which may explain why it excludes many women. She says, "[It] might be that it's not great at picking up the female phenotype, which may differ in certain ways—primarily in domains like social communication."

She concludes, "If the research is saying that there aren't females with autism, or that the brain basis of autism only looks like the patterns established in males, then you're not really helping females as much as you could be, and you're not really getting at the truth of what the disorder might be."

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"Exclusion of females in autism research: empirical evidence for a 'leaky' recruitment-to-research pipeline," Anila M. D'Mello, Isabelle R. Frosch, Cindy E. Li, Annie L. Cardinaux, and John D.E. Gabrieli, *Autism Research*, August 22, 2022 (free online). Address: Anila M. D'Mello, McGovern Institute for Brain Research, Massachusetts Institute of Technology, 43 Vassar Street, Cambridge, MA 02139, admello@mit.edu.

—and—

"Studies of autism tend to exclude women, researchers find," news release, Anne Trafton, Massachusetts Institute of Technology, September 8, 2022.

(see related story below)

Study questions the necessity for ADOS in diagnosing ASD

A new study suggests that administering the Autism Diagnostic Observation Schedule (ADOS) may not be necessary in order for clinicians to accurately diagnose autism spectrum disorders (ASD). Developed for use in research studies, the ADOS is currently considered to be part of the "gold standard" diagnosis of ASD.

The study, involving 349 children between 18 months and five years of age who did not have a prior ASD diagnosis, took place at eight sites—seven in the United States and one in Europe—that provided subspecialty assessments for children suspected to have ASD. William Barbaresi and colleagues asked developmental-behavioral pediatricians at each site to make an initial diagnosis based on clinical assessment. The ADOS was then administered, after which the pediatricians made a second diagnosis. The researchers also asked the pediatricians to describe their level of diagnostic certainty at the times of the first and second diagnoses.

The researchers found that there was 90 percent agreement between clinical diagnoses alone and diagnoses including information from ADOS. In addition, they say that the clinicians' diagnostic certainty was the best predictor of consistency between the two diagnoses.

Noting that the ADOS adds to the time and expense of diagnosing ASD, the researchers conclude, "This study suggests that the ADOS is generally not required for diagnosis of ASD in young children by developmental-behavioral pediatricians and that [these clinicians] can identify children for whom the ADOS may be needed."

—

"Clinician diagnostic certainty and the role of the Autism Diagnostic Observation Schedule in autism spectrum disorder diagnosis in young children," William Barbaresi, Jaclyn Cacia, Sandra Friedman, Jill Fussell, Robin Hansen, Johannes Hofer, Nancy Roizen, Ruth E. K. Stein, Douglas Vanderbilt, and Georgios Sideridis, *JAMA Pediatrics*, October 17, 2022 (online prior to print publication). Address: William Barbaresi, Division of Developmental Medicine, Boston Children's Hospital, Harvard Medical School, Brookline, MA 02445, william.barbaresi@childrens.harvard.edu.

—and—

"Clinical diagnoses of autism spectrum disorder mostly consistent with, without Autism Diagnostic Observation Schedule," Medical Xpress, October 21, 2022.

Autism raises risk for depression in mothers, but maternal depression does not worsen kids' behavior

A new study reports that mothers of children with autism spectrum disorders (ASD) have high rates of depression, but depression in these mothers does not lead to increased behavioral problems in their children.

Danielle Roubinov and colleagues studied data collected from 86 mother-child pairs. Half of the mothers had children with ASD, and half had neurotypical children. The children were between two years and 16 years of age at the beginning of the study, although most were elementary-school age or younger.

Collecting data from the pairs three times over a period of two years, the researchers found that about 50 percent of mothers of children with ASD had elevated levels of depressive symptoms at each interval. In contrast, only 5.9 percent, 13.6 percent, or 9.5 percent of mothers with neurotypical children (depending on the time frame) exhibited depression.

The researchers found that regardless of ASD status, child behavior problems predicted higher levels of maternal depression later on. However, maternal depression did not predict later increases in child behavior problems. They conclude, "Parents who seek support for their children's behavior problems are often referred to programs to improve parenting (and parenting stress), with limited attention to caregivers' own mental health problems. Given the burden of depression, we contend that support for mothers is important even when children are the 'target patients.'"

Roubinov comments, "The finding that maternal depression does not lead to worsened child symptoms is especially important for mothers of children with ASD to help alleviate guilt many mothers feel about their children's diagnosis and behavior problems. We hope these findings will reassure mothers both that it's common to struggle with some depression in this high-stress situation of chronic caregiving, and that their depression likely isn't making their child's behavioral issues worse."

—

"Is it me or my child? The association between maternal depression and children's behavior problems in mothers and their children with or without autism," Danielle Roubinov, Brian Don, Robin Blades, and Elissa Epel, *Family Process*, August 26, 2022 (free online). Address: Danielle Roubinov, Department of Psychiatry and Behavioral Sciences, University of California, San Francisco, CA, 94143, Danielle.roubinov@ucsf.edu.

—and—

"Half of moms of kids with autism have high depressive symptoms," news release, University of California, San Francisco, August 26, 2022.

Simple intervention reduces sleep problems in kids with ASD

The implementation of simple behavioral strategies may help to improve the sleep of many children with autism spectrum disorders (ASD), according to a new study from researchers in Australia and the United Kingdom.

The study, by Nicole Papadopoulos and colleagues, involved 123 children who participated in an intervention called Sleeping Sound ASD and 122 children who did not participate. All of the children were between 5 and 13 years of age and had moderate to severe sleep problems. Children with medical conditions known to impact sleep were excluded.

The researchers asked the children and parents in the intervention group to attend two 50-minute in-person sessions. It was important to involve the children in selecting and implementing sleep strategies, they say, in order to optimize results and encourage cooperation with the program.

The first session focused on assessing the children's sleep problems, providing information about sleep, and setting goals. Parents and children then worked together to choose from a variety of sleep strategies in order to create individualized sleep management plans. The second session focused on reinforcing sleep strategies, monitoring sleep patterns by reviewing a sleep diary, and addressing any issues reported by parents or children. Parents and children also participated in a phone call two weeks after the second session.

The sleep intervention involved behavioral techniques such as these:

- **Bedtime fading**—scheduling the initial bedtime at the time when the child normally fell asleep, and then moving the bedtime earlier in 15-minute increments.
- **Graduated extinction**—weaning the child from the need to have a parent in the room by having the parent visit fewer and fewer times.
- **Offering a "bedtime pass"**—granting the child one "free pass" to leave the bedroom each night.

Using the Children's Sleep Habits Questionnaire (CSHQ) to assess the children's sleep problems three months after the start of the intervention, the researchers detected significant improvements. Areas of improvement included bedtime resistance, sleep onset delay, sleep duration, and total CSHQ score. Smaller but still significant effects were seen for sleep anxiety, night waking, and parasomnias. There was some reduction in benefit by the six-month mark, leading the researchers to suggest a "booster session" at six months to reinforce the use of the strategies. Some improvements were seen in secondary behaviors such as internalizing symptoms, emotional behavioral disturbances, and quality of life, but these were not statistically significant.

The researchers conclude, "The sleeping sound ASD intervention is an efficacious and practical way to reduce sleep problems for autistic children."

Editor's note: The causes of sleep problems in children and adults with ASD are multifactorial. Autistic individuals and caregivers who are struggling with this problem can find additional information in the new book Understanding and Treating Sleep Disturbances in Autism*, edited by Jane Johnson and myself.*

—

"Sleeping Sound Autism Spectrum Disorder (ASD): a randomised controlled trial of a brief behavioural sleep intervention in primary school-aged autistic children," Nicole Papadopoulos, Emma Sciberras, Harriet Hiscock, Katrina Williams, Jane McGillivray, Cathrine Mihalopoulos, Lidia Engel, Matthew Fuller-Tyszkiewicz, Susannah T. Bellows, Deborah Marks, Patricia Howlin, and Nicole Rinehart, *Journal of Child Psychology and Psychiatry*, October 2022 (free online). Address: Nicole Rinehart, School of Educational Psychology and Counselling, Faculty of Education, Monash University, 19 Ancora Imparo Way, Clayton VIC 3800, Australia, nicole.rinehart@monash.edu.

—and—

"Bedtime routines and sleep strategies help autistic kids sleep, study reveals," news release, Monash University, October 28, 2022.

Study offers clues about eye contact avoidance in ASD

(continued from page 1)

this increase in neural coupling was not observed in ASD.

The researchers conclude, "The findings indicate that as categorized social ability decreases, neural responses to real eye-contact in the right dorsal parietal region also decrease consistent with a neural correlate for social characteristics in ASD."

—

"Neural correlates of eye contact and social function in autism spectrum disorder," Joy Hirsch, Xian Zhang, J. Adam Noah, Swethasri Dravida, Adam Naples, Mark Tiede, and Julie M. Wolf, *PLOS ONE*, November 9, 2022 (free online). Address. Joy Hirsch, joy.hirsch@yale.edu.

—and—

"Autism research: understanding reluctance to make eye contact with others," news release, Yale University, November 9, 2022.

Treating autism with contingent electric shock: Are all possible options really considered?

(continued from page 3)

The Autism Research Institute recently launched a new webpage, www.Self-InjuriousBehavior.com, designed to assist professionals and parents in identifying treatments that may reduce or eliminate self-injurious behavior. After answering questions regarding the location of the injury as well as related factors, users are directed to a description of possible underlying causes for the behavior. In addition, online links are presented with respect to understanding and treating the behavior.

A large parent survey that collected data on almost 40,000 individuals with ASD indicated that 9% engaged in SIB, 19% engaged in aggression, and 19% engaged in both behaviors (data collected by the Autism Research Institute between 1964 and 2006). Given that nearly half of individuals on the spectrum exhibit one or both of these challenging behaviors, we urge the autism community to work collaboratively to establish a consensus report on treating challenging behaviors. The goal of such an effort would be to recommend a number of behavioral, sensory, medical, and biomedical approaches that could help to identify the underlying reasons for the behaviors of interest, pointing to the most appropriate treatments. We hope that the autism community will welcome such a challenge and support such an endeavor.

References are available at www.ARRIReferences.org.

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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 (more than $300,000 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 one or two major think tanks a year, involving researchers and experienced clinicians.

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