Glenn E. Cahn, PhD PLLC
3205 Randall Parkway, #117
Wilmington, NC 28403
910 332 4134
www.ILMpsychtesting.com

Autism Spectrum Disorders

The autism spectrum disorders (ASD) are comprised of:

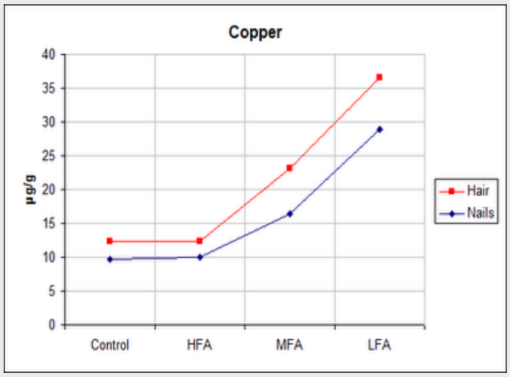
- autism
- Asperger's
- Rett's
- Childhood disintegrative disorder

However, the diagnostic labels have changed in recent years, and all of these are now referred to as 'autism spectrum disorder' (ASD).

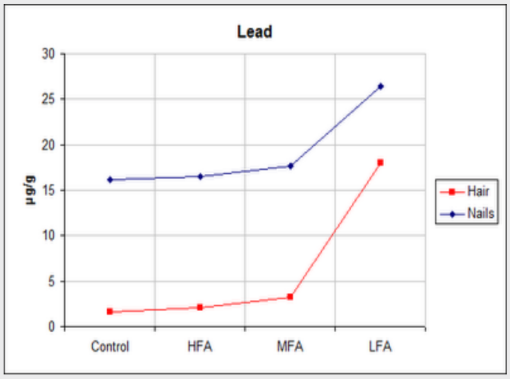
Just how common autism is as a diagnosis is open to debate. As a group of diagnoses ASD is frequently missed. In the 1960s it was 1:10,000. As of 2022 the prevalence rate was put at 1 in 54 kids, and in some places like NJ it is 1:32. However, there is no biological marker such as being able to see a flu virus under a microscope, and so such numbers are never certain.

Definitive causes of ASD are unknown. It appears to be like cancer, where multiple causes can be responsible. Genetics is one possibility. Other potential causes are thought to include:

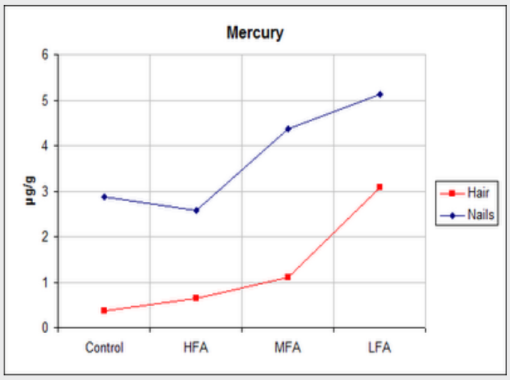
- There is some speculation that we as a society may be poisoning ourselves with water, land and air pollution, and that it is taking a toll on prenatal development of infants who end up being diagnosed with ASD after birth. e.g. Heavily industrialized areas such as parts of NJ have a higher rate of ASD. Pesticides are another suspected culprit. A Canadian study published in JAMA Pediatrics in November 2018 found that expectant mothers who were exposed to nitric oxide air pollution had children with a higher likelihood of autism. Pesticides like Roundup are also suspected of being involved.
- Other chemicals are also suspected of causing ASD including lead and methylmercury. There is some recent research that is suggesting that a primary factor involved in developing problems like autism and ADHD is 'heavy metals' like these, and mercury in particular is of concern relative to autism. Beyond fish being a well-known source of mercury, there are others too. Food coloring is one example and mercury has an 'allowable' level of up to 1 ppm. And then there is high fructose corn syrup (HFCS) which is said to make up 10% of calories that Americans consume, such as in sweetened beverages and processed foods. It can be put into it as an anti-microbial preservative. A 2009 study (Environmental Health, "Mercury from chlor-alkali plants: measured concentrations in food product sugar" Renee Dufault et al, 1/26/09) found levels of mercury in it below detectable levels up to 0.570 mcg/g of HFCS, and 9/20 samples did have detectable levels of mercury. Another study by the Institute for Agriculture & Trade Policy found mercury



***Copper Levels**. The copper levels of both the control group and the high-functioning group (HFA) are very close, where the medium-functioning (MFA) and low-functioning (LFA) group levels increase exponentially.*



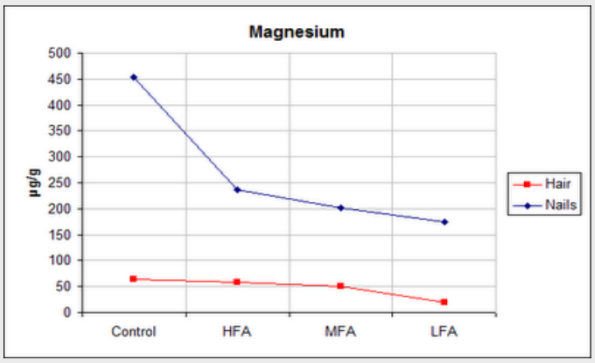
***Lead Levels**. Similar lead levels appear in both the control group and the HFA. In the MFA and LFA groups the levels of lead toxicity increase exponentially.*



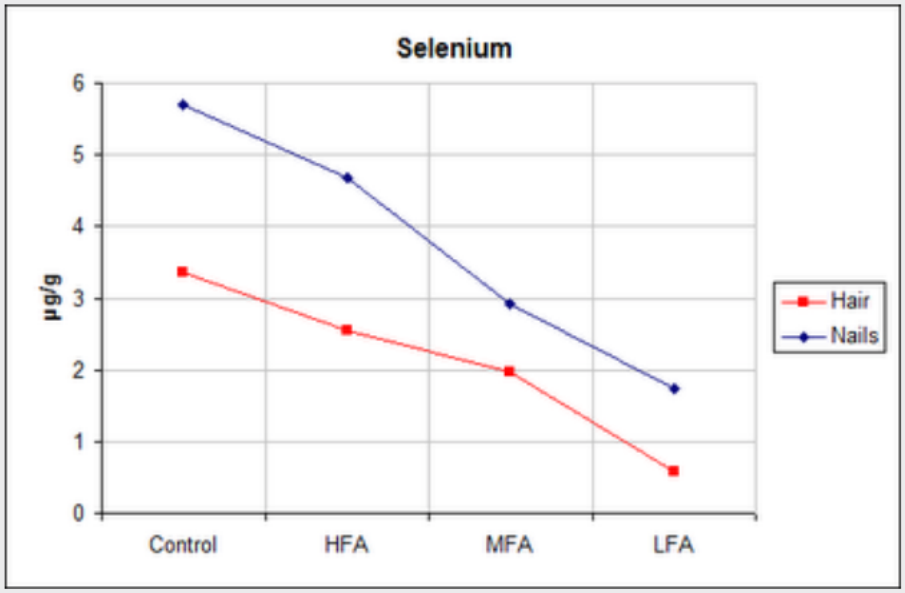
***Mercury Levels**. Lower mercury levels appear in the control group and the HFA. Once again, in the MFA and LFA groups levels of mercury toxicity increase significantly.*

in nearly a third of 55 name-brand foods, most commonly HFCS-containing dairy products, dressings, and condiments and that listed HFCS as the first or second ingredient. Mercury was found in brands such as Quaker, Hunt's, Manwich, Hershey's, Smucker's, Kraft, Nutri-Grain and Yoplait. The FDA has known about mercury contamination in HFCS since 2005 and done nothing to publicize or change it. As of 2019 the average American consumed over 21 lbs. of HFCS per year.

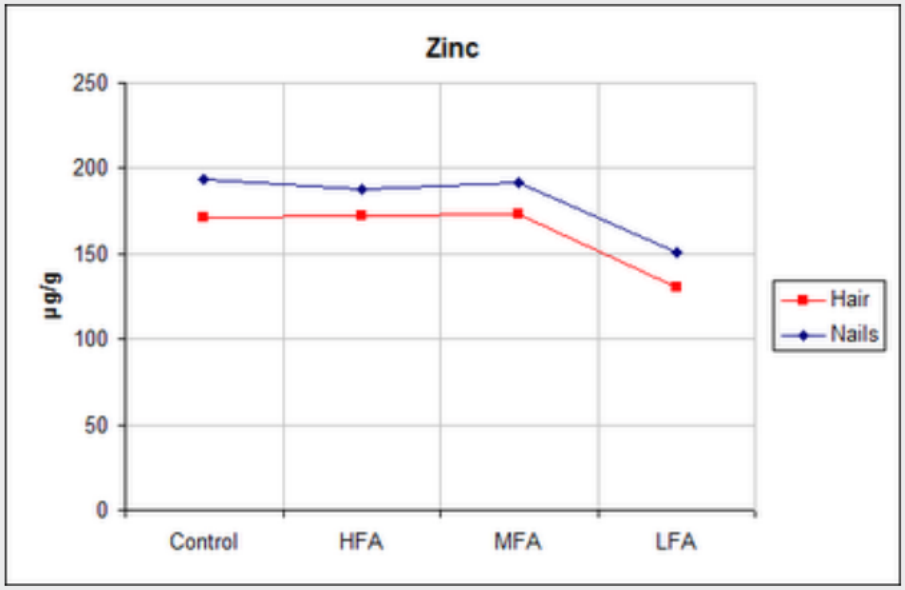
Copper, cadmium, mercury and lead show up in autistic kids. One study (Biological Trace Element Research, "Level of trace elements (copper, zinc, magnesium and selenium) and toxic elements (lead and mercury) in the hair and nail of children with autism" Malarveni Priya et al, July 2010) took 95 kids divided into four groups – a control, low-, medium- and high functioning autism (LFA, MFA, HFA). Results showed that "hair copper concentrations could be correlated with the degree of severity, with higher copper burdens the more severe the autism. Levels of lead and mercury were also found higher in the affected group and increased with severity. Children with more severe autism had lower levels of selenium and magnesium. Zinc was the exception as there wasn't a significant relationship between severity and the level measured. However, children in the LFA group did show a significant decrease in zinc when compared to the control group."



***Magnesium Levels**. In contrast to the graph curves of toxic minerals, the nutrient element magnesium levels in both the control and the HFA groups appear high. While MFA and LFA group levels have a marked decrease.*



Selenium Levels. *Selenium levels of the control and the HFA groups appear high, where in the MFA and LFA groups, selenium levels steadily decrease.*



Zinc Levels. *Zinc levels of the control, HFA and the MFA groups are higher than LFA group.*

- organophosphate pesticides (Roundup is one. It has been found in several breakfast cereals, and even in organic honey. The WHO has deemed glyphosate a probable carcinogen. It also has been found in some childhood vaccines according to some research done by Moms Across America. Glyphosate can make other chemicals like aluminum substantially more toxic.)
- organochlorine pesticides
- polycyclic aromatic hydrocarbons (PAHs)
- PCBs
- endocrine disrupting chemicals
- brominated flame retardants (such as found in furniture and textiles) which has been increasing alongside autism rates.
- perfluorinated compounds ('forever chemicals')
- Depakote, a drug that can be used as a 'mood stabilizer' as well as for other purposes such as antiseizure. For kids exposed to it before birth one study found a 8.9% rate of developing autism vs. 1% rate in the general population Developmental Medicine & Child Neurology, "Characteristics of fetal anticonvulsant syndrome associated autistic disorder" AD Rasalam et al, Feb. 2007). A Swedish study found that Depakote during the first trimester was associated with a 230% increase in the likelihood of autism being diagnosed in the offspring. Tegretol and Lamictal did not have such any perceived impact.
- aluminum, such as found as adjuvants in vaccines which is used to provoke a stronger immune response to them. Some researchers believe that aluminum can infiltrate the brain and may be a causative factor in autism (Journal of Trace Elements in Medicine and Biology, "Aluminum in brain tissue in autism" Matthew Mold et al, 2018). How much aluminum is used in vaccines varies, and how much is in a vaccine may be different than what the manufacturer states according to other research.
- BPA and its cousins (commonly referred to as 'BPA-free' but which still have some bisphenol form present such as BPS or BPF – the 'F' standing for formaldehyde). The alternatives are being discovered in early research to be as bad if not worse than BPA.

- There is some research to suggest that some people who are chemically intolerant to stuff found in the environment have what is called 'mast cell activation' which are part of the immune system and basically over respond to what is perceived as an immune system threat. Such mast cell activation can occur during pregnancy and may lead to ADHD and autism in the child. There is a free self-report checklist available online through the U. of Texas at https://tiltresearch.org/self-assessment/ along with some free 'resources' as to what might be done if a problem is seen as being present.
- There is also an elevated rate of autism spectrum in Silicon Valley. One theory, as yet unproven, is that it may be due to 'geek marrying geek.'

- Vaccinations preserved with a mercury compound were thought to be a possible cause of autism, but that was found to be based on fraudulent research. There has been the suggestion that just the vaccination such as for rubella, or pertussis (in DPT shots) could be a factor.
- A mother being exposed to rubella during the first trimester jacks up the risk of autism.
- Fetal testosterone levels may also be involved, given the prevalence of boys having it over girls. Some research has found that higher levels of testosterone in the fetus leads to less eye contact at 12 months, slower language development at 18 months, and less social skills and more 'narrow interest' at 4 years.
- maternal obesity during pregnancy and gestational diabetes can alter the gut microbiota and might be associated with autism
- being born by c-section
- not being breastfed. Breast feeding for more than six months is associated with a lower risk of developing autism.
- there is some research that has found that mothers of autistic kids had less fiber in their diet during pregnancy than moms with kids who were typical. Fiber is important to gut bacteria, and a child inherits most of their microbiome from the mother.
- being treated with antibiotics for a long period of time
- mothers who had infections during pregnancy, especially viral ones in the first trimester and bacterial ones in the second trimester
- Premature birth also increases risk of autism spectrum. A large Swedish study lasting forty years and involving over 4 million births (Pediatrics, Autism and preterm birth: clarifying risk and exploring mechanisms," Elisabeth McGowan et al, Sept. 2021) found that for babies born at
    - term (39-41 weeks), autism occurred 1.4% of the time
    - 37-38 weeks the rate was 1.6%
    - 34-36 weeks the rate was 1.9%
    - 28-33 weeks the rate was 2.6%
    - 22-27 weeks the rate was 6.1%

The theory is that oxytocin, a female hormone that spikes shortly before birth in the mother, is crossing into the fetus as well. Like any hormone, oxytocin has many purposes, but one is that it increases social and emotional bonding. So the thinking is that when the fetus is exposed to it shortly before birth it affects the brain and makes the infant more social. By being born premature the infant is not being exposed to the hormone as much, and so it does not develop that emotional attachment. In my experience, there is a continuum, with greater deficits in social skills with births that are more premature. e.g. Being born a week or two premature may only cause very mild problems. Being born a month or more premature exacts a bigger toll on social and emotional development. Other research (American Journal of Obstetrics & Gynecology, "Investigating the association between preterm delivery and autism spectrum disorder in childhood" Sapir Ellouk et al, Jan. 2024) looked at almost 140,000 pregnancies

with 1.2% delivered before 34 weeks, and 4.1% between 34-37 weeks. "There appears to be no discernible association between preterm birth and the diagnosis of ASD." Instead, the researchers thinks that multiple factors are likely to account for developing autism.

- c-section with use of a general anesthetic (epidurals do not seem to cause the problem) may be another potential cause.
- maternal use of antidepressant (SSRI) medication during pregnancy such as Prozac, especially during the first trimester, is thought to cause a mild increased risk of autism spectrum as well.
- possibly excessive amounts of vitamin B-12 or folate during pregnancy and having both in excess may have a much greater risk associated with it.
- low levels of vitamin D in the mother during pregnancy may also be a factor
- distress in the gastrointestinal system along with immune dysfunction can be involved. GI problems are four times more common in autistics than the normal population. Such symptoms can include constipation, diarrhea, bloating, abdominal pain, reflux, vomiting, gassiness, foul smelling stools, and food allergies. According to some research 'leaky gut' in autistics occur about 37% of the time vs. about 5% in normal kids. 90% of autistic kids are said to have inflamed bowels.
- maternal use of acetaminophen (Tylenol) during pregnancy may be a factor. A 2018 study involving over 132,000 mother/child pairs and followed for 3-11 years found that a 20% increased risk of autism spectrum disorder arose from "prolonged exposure to acetaminophen during pregnancy." (There was a 30% increased risk for ADHD from it as well.)
- the mother's gut microbiome during pregnancy may be involved as to inflammation being present causing problems for the fetus later on.
- research also suggests that older mothers and fathers can contribute to its presence, in that DNA mutations start to occur with age. A meta-analysis of 27 studies looking at parental age and autism found that for every 10 year increase in maternal and paternal ages, risk of autism spectrum increased by 18% and 21%, respectively. (Molecular Autism, "Environmental risk factors for autism: an evidence-based review of systematic reviews and meta-analyses", Amirhossein Modabbernia et al, March 2017).

Diagnosis & Treatment

ASD's primary feature is a lack of social skill. It may be reflected in various names and descriptors that are used with such individuals (socially inept, geeky, nerdy, socially aloof, socially indifferent, asocial). Such folks lack a lot of social awareness and have weak social skills. They have difficulty with:

- being socially indifferent, and often do not show evidence of wanting to be with other people. e.g. They are very content to stay by themselves in solitary pursuits such as playing video games for hours or days at a time, and do not feel lonely. Others, girls more commonly probably, will say they are interested in having friends, but are clueless how to go about making any. So, they are socially isolated but are not socially indifferent.

- being able to read silent body language, e.g. facial expression
- being able to understand the meaning of a person's tone of voice (e.g. 'I think you're great' might be said sarcastically, or as a compliment, with the difference being made only by tone of voice)
- similarly, problems exist with being able to differentiate between tongue in cheek humor, or getting the punch line of a joke, or understanding something said in jest, etc.
- being able to understand and live by social conventions, e.g. invading other people's 'personal space' by standing too close as an example
- dealing with parts of people, rather than people as a whole person. e.g. An adolescent, teen, or grown child may play with his mother's hair for a half hour or more, and be totally oblivious that it is upsetting to her, rude, socially maladroit, and otherwise inappropriate.
- a stilted quality to language, which lacks fluid and casual qualities (e.g. 'I am very pleased to meet your acquaintance' vs. 'Hi, nice to meet ya!'). Or, as I heard from one adult Asperger's patient, phrasing may be too intellectual, such as "an estrogen delivery device" used as a phrase to mean 'woman.'
- making friends, and if any are made, keeping them. With younger kids they tend to be ridiculed, rejected, and otherwise kept on the 'outs' in settings like schools
- difficulties with math
- ADHD-like symptoms. A high proportion of ASD have been diagnosed and/or treated for ADHD. They may have all the symptoms, or just look like ADHD, but not quite meet all the criteria.
- minimal to no eye contact being made
- not knowing the limits of what to say, and how to say it in an interesting way. e.g. They can obsess to an extreme degree on certain topics, and often may be 'experts' in odd trivia. For instance, one adolescent boy I saw had memorized the entire interstate highway system. (Look at the map of the system and try to memorize it yourself). A fascination with travel themes, and dinosaurs, are common, but is not an exclusive list of their obsessive abilities. They typically talk the ears off people who have no interest in the topic or at least lose interest very quickly, such as a kid going on ad nauseum about a particular video game. They often talk in what I refer to as being like 'a little professor.' That is, they are overly pedantic, scholarly, dry, factual, and lecture people in monologues rather than engage in dialogue/conversations.
- motor difficulties. One of the more common illustrations of this is being very late in learning how to ride a 2 wheel bike. Some never do. Others do so, with limited success, at perhaps 14. Some never want to learn. Disinterest, and lack of ability, for team sports (i.e. poor coordination) is also frequently heard. General clumsiness, such as for simple running is also a common complaint of parents.
- over sensitivity to stimuli. Common complaints are the tags in back of shirts, or seams on socks. Such individuals often fuss with such issues to an extreme degree, such as taking 45 minutes to get socks to feel right on their feet, or ripping the tags out, or wearing shirts inside out as a way to avoid having them touch their skin. Others may be overly sensitive

to sound, such as being able to hear a siren or train whistle long before others like their parents can detect such noises. Having a very narrow range of foods that will be eaten is pretty common as well.

Strengths can include their being above average in intelligence quite often. Many are relatively artistic, or they at least have decent skill and an interest in art.
One term which is not official but fairly common, is 'high functioning autism' (HFA). Some who use it think that HFA is synonymous with Asperger's. Others say they are different.

Treatment of ASD can include:

- if ADHD symptoms exist, treat them with that class of medication
- social skills can only be learned by doing. i.e. There is no pill that will make a person social. Practice, practice, practice is the reality they are faced with. Ultimately, the Asperger's individual still has to get out and make an effort to be social. What I tell parents is 'keep looking to find something they enjoy and feel interested in.' Various sports (soccer, baseball, football, lacrosse, hockey, basketball) can each be tried. Non-team sports (e.g. track, swimming, golf) may be easier for kids who have a great deal of social discomfort. Church youth groups, Boy/Girl Scouts, Mensa clubs, chess clubs, etc. are another approach. The 'Dreams' art program in downtown Wilmington works with these kids (ages 12-17) for free.
- therapy can be helpful in teaching kids to be more socially aware, and to help them deal with feelings of rejection, depression, etc. that arise from poor social skills.
- approach them by 'playing to their strength.' They tend to be very verbal, and so can be taught what to say when e.g. they first meet a new person. "Look a person in the eye, extend your right hand, and say 'Nice to meet you…'" That is, anticipate different areas of daily life the person comes up against (what to do at recess, what to do at lunch, on the school bus, on a playground, in class,…) and offer them canned means of dealing with each that they can practice over and over until it is done more fluently, comfortably and effectively.
- group therapy, such as local ones in this town like through TEACCH, or a program like Dreams, can also be helpful as a way to learn social skills. Ultimately, what someone with Asperger's has to do is mimic the behavior of others who are normal. 'Look at other people, and do as they do.'

- medication. It may be the fastest and easiest way to get behavioral change, and some peace in the family's life. If there is underlying depression, or high levels of anxiety that inhibit social functioning, meds might be used to treat those issues. However, I no longer recommend either antidepressants or anti-anxiety drugs because the research behind them shows how ineffective they are plus having numerous bad side effects. In my experience, the anti-psychotic meds are most commonly prescribed. They quiet down the extreme outbursts of yelling and other disruptive behavior that arises at home or in other settings like school. However, they are not really curing or treating anything and mostly just sedating the kid. And there are some powerful side effects, and as a result I never recommend them either. Meds for ADHD-like symptoms are also commonly given.

- medical marijuana/CBD is a hot topic these days and it is being used for all manner of problems. Some Israeli research came out in 2019 (Scientific Reports, Lihi Bar-Lev Schleider et al) that offers some early evidence that it may be helpful to autism. The study was only observational and so cannot prove that CBD caused the improvement. But after six months of using oil with an average amount of 30% CBD and 1.5% THC they found that out of 188 kids using it about 67% reported having a good quality of life vs. 31% beforehand. About 64% said they had a positive mood which was up from 42% previously. Another improvement was that 43% could dress and shower independently up from ~26%. Overall, 30% of the kids reported significant improvement, ~54% reported moderate improvement, and 15% had slight or no change. Other Israeli research (Neurology, April 2018, Adi Aran et al, using 20% CBD and 1% THC) on autistic kids done over at least 7 months found an 80% decrease in problematic behaviors, half of the kids having improved communication, and 40% having significant decreases in anxiety. Long term safety of CBD is unknown and in 2019 the FDA said CBD has the potential to damage the liver for users of any age (https://www.fda.gov/consumers/consumer-updates/what-you-need-know-and-what-were-working-find-out-about-products-containing-cannabis-or-cannabis). Long term effects of CBD used with kids is unknown and it will likely be many years before that research is in and definitive. The concentration of CBD in oil may vary between batches. One study out of the Netherlands analyzed 46 cannabis oils made by patients or sold online. Only 21 advertised the concentrations and many of those were wildly wrong, and seven contained no cannabinoids whatsoever. Pesticides, heavy metals and microbes can be in the plant and whether those are making it into the oil is unknown. Side effects can arise and may interact with meds a child is on.
- autistic kids frequently have very selective food preferences such as eating only 'red food.' Such selectivity may easily lead to nutritional deficiency including an absence of fruits, vegetables and proteins from their diet. Why such selectivity exists is not understood, but once present it can lead to a vicious downward spiral of eating few foods leading to fewer bacteria and enzymes in the GI tract to digest much variety leading to less…. Autistic kids have been found to have a much higher rate of chronic diarrhea and/or constipation compared to others (one study had 63% of autistics vs. 2% of controls with such difficulties).
- there is some research which suggests that dietary changes and nutritional supplements may be helpful and in particular that milk and gluten products may not be properly metabolized. It has been suggested avoiding milk (casein) and gluten rich foods may reduce autism symptoms, but the evidence has suggested that it is just a placebo effect being involved in perceived benefits. It is also a difficult diet to stick with, may lead to stigmatization, and could cause nutritional difficulties such as having low calcium intake.
    - There was a double-blind study done in 2006 (Journal of Autism Developmental Disorders, "The gluten-free, casein-free diet in autism: results of a preliminary double blind clinical trial" Jennifer Elder, et al, April 2006) on 15 kids ages 2-16 over the course of 12 weeks. No one knew who was getting the casein- and gluten-free diets, and parents guessed right to the accuracy of a flip of a coin (half guessing right, half guessing wrong). There was no statistically significant results, meaning the dietary restrictions did not help. Some parents still claimed their kid's language improved, along with being less hyperactive and having fewer tantrums, and they

wanted to keep their kids on a gluten- and casein-free diet anyway. Re-evaluating videotapes of the kids showed no such improvement.

- Probiotic foods have been suggested. There was one Finnish study ("A possible link between early probiotic intervention and the risk of neuropsychiatric disorders later in childhood – a randomized trial" by Anna Pärtty et al in Pediatric Research, Nature, 3/11/2015) that took 75 infants and gave them lactobacillus rhamnosus or placebo for the first six months of life and then followed them for 13 years. At age 13 17% of kids were diagnosed with ADHD or autism in the placebo group vs. 0% in the probiotic kids.
  - There is also an elevated rate of GI disturbances in autistic kids such as "leaky gut" which means their GI tract allows toxins and bacteria into the bloodstream which can then lead to impaired brain function. Some studies have found a correlation between the severity of GI problems and the core symptoms of autism such as in social skill deficits. It is thought that the gut bacteria (microbiome) may be contributing to this problem because of good and bad bacteria becoming out of balance. e.g. There is a short chain fatty acid called butyrate which has anti-inflammatory properties in humans and these are reduced in autistic individuals. Another, propionate which could act as an endotoxin (a chemical that can cause inflammation) is increased. Animal studies have shown that exposure to propionate may cause behavioral problems like autism ("Alteration of gut microbiota in autism spectrum disorder: an overview" Journal of Korean Academic Child and Adolescent Psychiatry, July 2020, Donghun Oh et al). There is some early research that has found that changing the diet such as use of prebiotics and probiotics can have a positive effect on autism symptoms ("Treating autism by targeting the gut" Science News, 6/19/2017).
  - However, there is also a 'chicken or egg' question as to which comes first: the gut bacteria causing the autism, or the other way around. What is known is that autistics have lower bacterial diversity in their gut, and there is a decreased Bacteroidetes to Firmicutes ratio. Some say that autistics are missing 200-400 species of bacteria from their gut, and that such lack of bacteria may be at the root of the condition. One research study gave a probiotics supplement containing Lactobacillus, Bifidobacterium, and Streptococcus three times/day for four months and shifted this ratio more toward the Bacteroidetes (International Journal of Molecular Science, "The possible role of the microbiota-gut-brain-axis in autism spectrum disorder" Piranavie Srikantha et al, May 2019). There is also a known elevation of a bacteria species named Clostridium which is correlated with the severity of autistic behavior. Reducing clostridium has been found to yield significant improvements in autistics. It is offered by such research that "although the cause-effect relationship between autism and gut microbiota is not yet well established, the consumption of specific probiotics may represent a side-effect free tool to re-establish gut homeostasis and promote gut health."

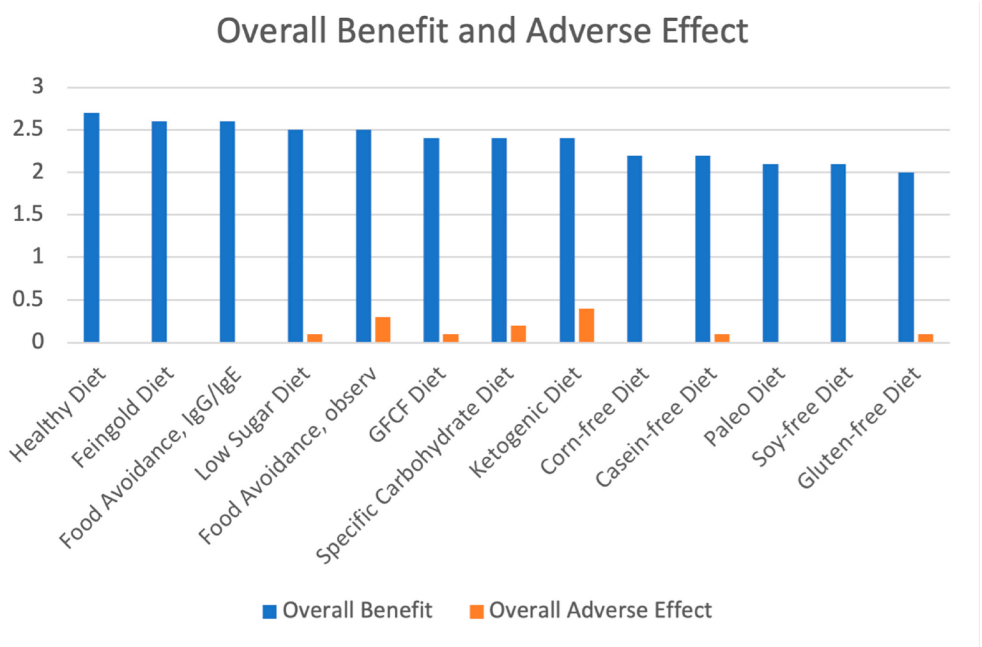
    Other steps to consider taking to improve gut health include removing

    - wheat and gluten containing foods; dairy, sugar, corn and soy
    - genetically modified foods (GMO)

- coffee, alcohol, sodas, and carbonated drinks
- processed and refined foods

and instead focusing on healthy foods such as fresh whole foods (e.g. veggies, greens, fruits, nuts & seeds)

- Another study that was randomized, controlled, single-blind and lasting 12 months took 67 kids and adults (age 3-58) and 50 controls of similar age and gender. Treatment was with a vitamin/mineral supplementation including omega-3 fatty acid, Epsom salt baths, digestive enzymes, and a gluten-, casein- and soy free diet. The treatment group was significantly improved in autism symptoms, with the vitamin/mineral supplementation and omega 3's appearing to have the most clinical benefit ("Comprehensive nutritional and dietary intervention for autism spectrum disorder – a randomized controlled 12-month trial" Nutrients, 2018, James Adams et al). However, other research has found omega-3 not to be effective.
- another study (Journal of Personalized Medicine, "Ratings of the effectiveness of 13 therapeutic diets for autism spectrum disorder: results of a national survey" Julie Matthews et al, Sept. 2023) looked at 13 different diets on 818 participants. Using a 0-4 scale (no benefit to great benefit) their overall benefit was ranked at 2.36, which was better than nutraceuticals (ranked at 1.59), and medications (1.39 ranking). Adverse effects were significantly lower than meds and similar to nutraceuticals.

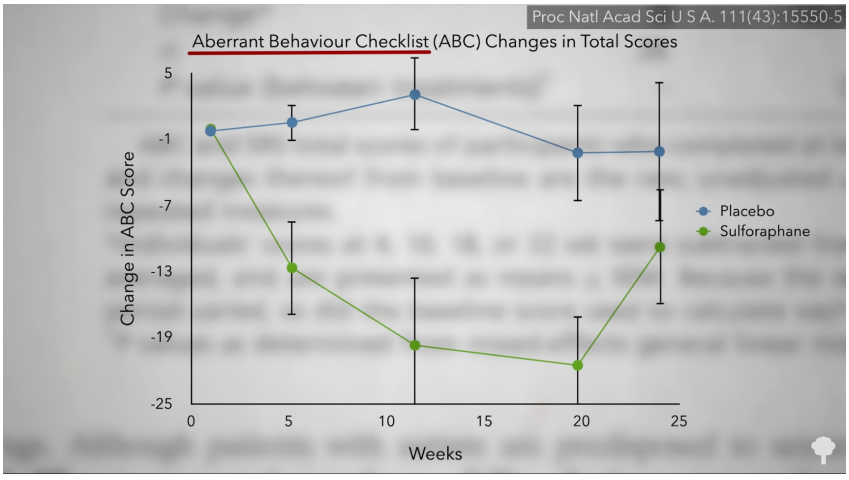


Abbreviations: Healthy diet (higher fruits, veggies, protein, low intake of junk food)
GFCF gluten free, casein free

Symptoms that improved the most in descending order included attention, cognition, irritability, health, hyperactivity, aggression & agitation, anxiety, constipation/diarrhea, language/communication. Conclusions included that "therapeutic diets are generally safe and often effective for individuals with

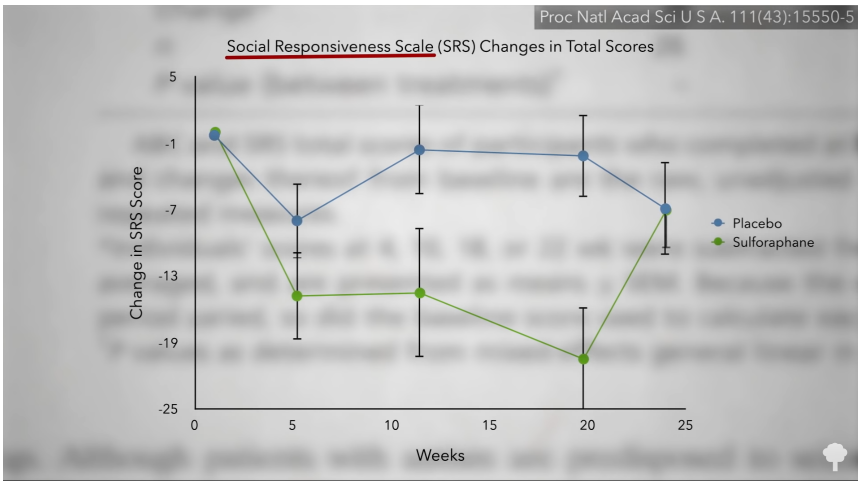
[autism]. Individuals that used therapeutic diets had significant improvement in autism severity compared with those that did not use diet."

- there was also the MARBLES study (markers or autism risk in babies-learning early signs) done through UC-Irvine. What was found is that mothers consuming more omega-3 during the second half of pregnancy were 40% less likely to have autistic children. But in the third trimester no statistical significance was found.
- There was a placebo controlled, double blind, randomized trial involving increasing broccoli and its sprout consumption done on young males (ages 13-27) with moderate to severe ASD ("Sulforaphane treatment of autism spectrum disorder" Proceedings of the National Academy of Sciences, K Singh et al, 10/28/2014). Improvement was found in social interaction, abnormal behavior, and verbal communication in the research group but not the control getting a placebo. When the treatment was stopped they rose toward pre-treatment level of functioning. Cruciferous veggies are said to be helpful in removing BPA. Other foods that are said to be good for at least BPA-related issues include mung and adzuki beans, oranges, spinach, apples, Brussel and alfalfa sprouts, grapefruit, grapes, peaches, plums, lemons, and apricots. Strawberries and a high fiber diet can also help by report.



These two graphs are from the study referenced above as to broccoli sprouts, showing the loss of improvement for measures of 'aberrant behavior' and 'social responsiveness' when the study ended at week 18. Moreover, such benefits were visible to observation by others such as physicians, according to the researchers.

https://nutritionfacts.org/video/best-foods-for-autism/



- Another study (PLoS 1, "Bisphenol-A and phthalate metabolism in children with neurodevelopmental disorders" T. Peter Stein et al, 9/13/23) on 66 autistic kids found they had 11% less ability to detoxify BPA. The authors concluded that impaired detoxification is a plausible mechanism for autism (as well as for ADHD, which had a 17% reduction in ability to detoxify BPA).
- Other research involving a randomized, double blind, placebo-controlled trial (Journal of Child Psychology & Psychiatry, "Randomized controlled trial of vitamin D supplementation in children with autism spectrum disorder" Khaled Saad, et al, 2016) found that vitamin D3 supplementation did result in improvement in ASD kids such as for core symptoms like irritability, hyperactivity, social withdrawal, stereotypic behavior, and inappropriate speech. Another study found that biotin, a B-vitamin, was deficient in autistic kids compared to controls and with supplementation their symptoms improved. Vitamin B-12 may be deficient in autistic kids too and it is thought that this may be another factor that can contribute to their symptoms.
- Mice research ("A single species of gut bacteria can reverse autism-related social behavior in mice" Science Daily, June 2016) found that the absence of one gut bacteria, lactobacillus reuteri, caused social deficits in mice. When it was added back to their guts some of the behavioral deficits which were autism-like in humans were reversed. This is a human bacteria and it promotes oxytocin levels and improves social behaviors in deficient mice, and so it leads to the obvious idea of trying this out on human kids. This bacteria is found in breast milk, as well as some meat and dairy products.
- given that autistic kids often eat fewer fruits, vegetables, and proteins they are found to have a significantly lower intake of potassium, copper, folate and calcium, and that can impact gut health. So again, there is the opinion that improving diet and nutritional intake can be a beneficial approach to take.
- detox from toxic metals needs to be done with a tailored protocol to the individual's need so that they are not released and then re-deposited back into the tissues. The

general advice offered by some is "with repeated, modest treatments, using multiple agents."

- various behavioral approaches (ABA – applied behavior analysis), TEACCH's model (working on improving communication, social and coping skills) so that fewer negative behaviors are made, such as screaming, and more positive ones are done (such as saying, 'Please don't touch me'). Art therapy can help express feelings in means beyond words. Music therapy may help, such as by teaching language through songs.
- there is some experimental research which suggests that autism can be due to an auto immune disorder, meaning that the body is attacking itself, and the brain in particular. There has been some work done where a harmless parasitic egg is introduced into the person's body, and the immune system attacks it for awhile rather than the brain, and so the theory goes the ASD symptoms are reduced. The egg is passed out of the body eventually, and another has to be ingested.
- there also has been some experimental research done on injecting oxytocin into autistic individuals to increase social and emotional bonding. Results are not clear at this time, and risks are thought to include an increased risk of seizures.
- use of neurofeedback (EEG biofeedback is another name for it) has been found to be helpful in treatment of ASD. One study involved 24 autistic kids who were divided into two groups (receiving vs not receiving neurofeedback). Using the Autism Treatment Evaluation Checklists (ATEC) neurofeedback resulted in a 26% reduction in the total score vs. 3% for the control group. Parental assessments showed improvement in all behavioral categories: socialization, vocalization, anxiety, schoolwork, tantrums, and sleep compared to minimal changes in the control group. Skills that improved included attention, executive functions, language, social, verbal inhibition, and visual-spatial. Another study found that autistic kids treated with 40 sessions of neurofeedback maintained their improvement for twelve months after the treatment ended.
- another experimental approach which has a little research to suggest it might help is hyperbaric oxygen therapy (HBOT) which is a scaled down version of decompression chambers that scuba divers use when they get 'the bends.' One study (BMC Pediatrics, "Hyperbaric treatment for children with autism: a multicenter, randomized, double-blind, controlled trial" Daniel Rossignol et al, March 2009) had 62 autistic kids (52 being boys) ranging from 2-7 years old who were either given HBOT at 1.3 atmospheres or slightly pressurized room air (1.03 atmosphere) that were a control group. After 40 hourly sessions the HBOT group had significant improvements in overall functioning, receptive language, social interaction, eye contact, and sensory/cognitive awareness compared to the control group. Another study had 18 autistic kids ranging in age from 3-16 years old who received 40 HBOT sessions at either 1.3 atmosphere and 24% oxygen, or 1.5 atmosphere at 100% oxygen. There was no control group so there is the possibility of a placebo effect. Some autistic kids are known to have neuro- and gastric inflammation and HBOT is known to be anti-inflammatory. Results of the study included a significant improvement on inflammation (measured through c-reactive protein), along with improvements in irritability, social withdrawal, hyperactivity, motivation, speech, and sensory/cognitive awareness. The researchers thought these findings might be explained by the fact that many autistic kids have cerebral hypoperfusion and HBOT can provide more oxygen to the brain

and cause increased blood vessel formation over time. A third study had 33 autistic kids treated with HBOT twice a day, five days/week for four weeks, and a control group of 29 autistic kids treated with slightly pressurized room air. The HBOT group did significantly better in overall functioning, receptive language, social interaction, eye contact, and sensory/cognitive awareness However, the amount of research in this field is tiny, and results are far from conclusive and definitive.

Overall, no one has come up with a sure fire, insto presto, cure all treatment for autism. This leads me back to my general advice that older kids like teens simply need to put themselves out there socially on their own and make more effort to interact. And younger kids need to do so too with their parents help, as a way to learn social skills simply by exposure and practice.

One good book I've found on Asperger's is "Asperger's Syndrome: a guide for parents and professionals" by Tony Attwood. Another is "The Asperger's Answer Book: professional answers to 275 of the top questions parents ask" by Susan Ashley.

Teaching Friendship Skills

Some basic rules of how to make and keep friends can be taught to kids. These include:

- Your friend goes first. Let your friend go first in everything. Avoid saying 'Me first.'
- Talk about your friend. The best topic of conversation is about your friend. People like to talk about themselves, and there is no safer topic to enter a conversation with. Say something about what your friend is doing, or wearing. 'That's a really pretty dress you have on' would be one example.
- Your friend chooses. Let your friend be the one who decides what you will do together, such as which toy to play with. If you want to do something else, let your friend make the first decision, and then you can switch to something else later on.
- Talk about your friend's topics. If your friend likes baseball, asking a question or say something nice about that. Avoid forcing your friend to talk about stuff they aren't interested in.
- Take turns. Even if you didn't do well on your turn, or if you want to continue, stop and let your friend have a turn. Don't 'hog the ball' when playing a sport like basketball. Pass the ball to teammates so they can take some shots too. Say something like, 'Now it's your turn.'
- Show that you care. If your friend is happy, show that you're happy about it. If your friend is sad, show some concern. "I'm sorry you're having problems today…"
- Let your friend control half. If you're doing something like playing a board game, let your friend choose which token or marker they use, along with inviting them to go first. Don't try to be the boss.
- Be a friendly host. Make sure your friend is comfortable, such as offering water if they're thirsty, or offering them a chair. Ask them if they need anything.
- Use the magic words. 'Please' and 'Thank you' get friends to like you more. Use them as you ask or receive from a friend.

- Have kitchen fun. Friends like being offered food. If you are hosting friends at your home, ask for your parents' permission and offer a snack. Be sure to clean up afterward. Say something like, 'Would you like a cookie.'
- Share. Nobody likes people who are selfish. Share what you have with a friend, such as if you have candy, or a toy to play with.
- Your friend says when. Don't continue to play a game if your friend is tired of it. Let your friend decide when to stop. Let your friend decide when it's time to leave for home.
- Do small favors. Fetch something your friends needs, or do an errand so your friend can remain comfortable and not have to get up to do it. 'I can do that for you!'

Support for families

You can go to my web site (www.ILMpsychtesting.com) and click on the Resource link for the Autism Society for NC, and go to the page which offers 'advocates.' There are also summer camps, near Asheville and Chapel Hill, which are available on a sliding-fee scale. The Autism Society web page has links to this as well.

The local TEACCH in Wilmington also has a free lending library of books available, as well as offering therapy. They also do diagnoses of autism, but the waiting list is often 6-9 months long.