

ECD-ECE- ECHO series on AUTISM

iECHO partner - USA

The Satya SAI Institute Of Educare-USA

Partnering with NM ECHO Institute

And iECHO India

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TOT

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SODBP

What IS New In ASD

1. Terminology
2. Diagnostic Criteria Considerations
3. Neurobiology
4. Cellular
5. Molecular
6. Genetic
7. Neuroimaging data
8. Chemical and Neurotransmitters
9. All of the above are now looked from Neurobiological Architecture and functional dysregulation

New Recommendations For Early Detection

Younger than 12 months by using parent administered questionnaires

1. Communication and Symbolic Behavior Scales Development Profile and the Infant and Toddler Checklist – ASQ-SE From Infancy
2. M-CHAT from 16 months
3. A definitive diagnosis is not necessary to institute services for documented delays for ECI and PPCD through School

Essential components to be tested or available on ASQ-SE

Cognitive Testing, Language, Adaptive Function Testing, Motor Assessment, Sensory assessment
Hearing, Sensory Assessment Vision, Sensory Assessment Hearing and Sensory Processing

Chromosomal Micro Array – (CMA).

MECP2 for Rett Syndrome, PTEN gene Fragile X chromosome- CMA does not diagnose. Diagnosed by
WES technology for Exosome disorder

Neuroimaging

EEG - ASD higher incidence of Seizure disorder

Genetic mutations account for 1% or less specific for ASD

DETECT EARLY FOR NDD . CAN IT BE BEFORE 12 MONTHS ?

HOW CAN WE DETECT EARLY ? _Role of Early Brain Wiring and SSNP

What did we understand from knowing how the brain connects

How brain connectivity is influenced by Life STYLE before Pregnancy and during Pregnancy ?

What are the 4 domains of early development?

Why did we focus on SEL, LL and then CD with STEAM skills ?

How do we identify Red Flags and what resources I had sent?

What are the main features iteratively that came upon to make infant learn and extract powers that they have ?

Why did we pay attention repetitiously to ADULT CARE GIVERS Component and Child's aspect of behaviors?

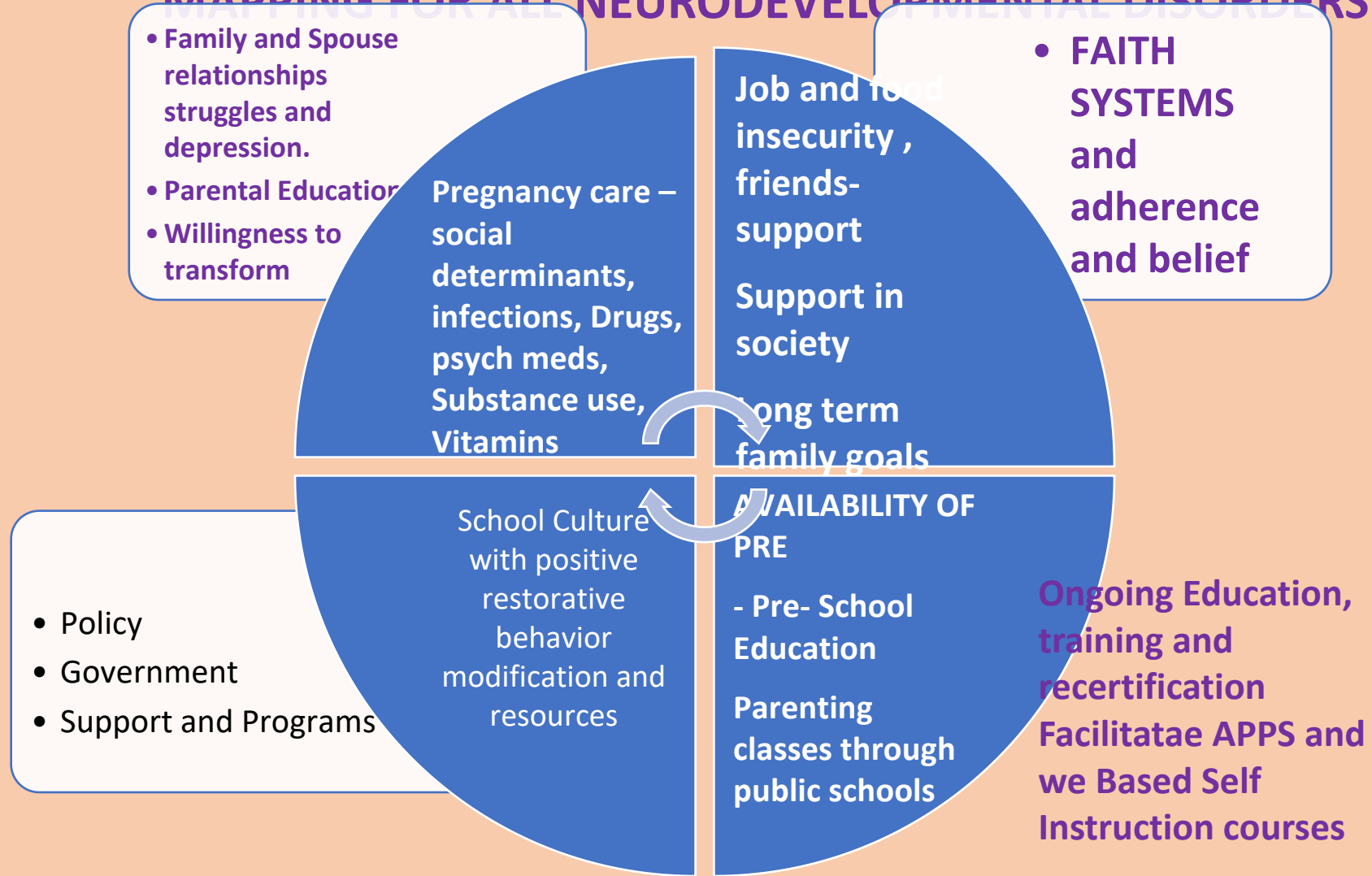
If you can answer for yourself these questions then you know the answer for can we detect Learning disorders early /Dyspraxia – movement and FMC disorder

Letter reversals are accepted till 6-7 years but when caught OT is given to recorrect

Screening and Final NP Testing

1. CARS-2
2. Gold Standard ADOS -2
3. Behavioral Assessment System for Children BASC-3
4. Wechsler Intelligence Scale for Children – WISC – V
5. Child Sensory Profile
6. Adaptive Sensory Profile
 - A. Interview about Pregnancy, Milestones, Early Experiences, Maternal and Paternal Mental Health
 - B. FAMILY History Of Mental Health Disorders
 - C. Parenting Skills and How Nurture is Fostered
 - D. Emotional Screening like ASQ- SE, ITYSEA , BITSEA
 - E. History Of processing
 - F. Peer Interaction, Adaptation , Sharing , Conduct issues

MAPPING FOR ALL NEURODEVELOPMENTAL DISORDERS



Using Restorative Communication as a Classroom Management Tool

By avoiding communication blockers, teachers can help students talk through disruptive behavior in the classroom.

Avoid Communication Blockers by students 6 years and up, as they fracture relationships and promotes more power struggle to win. Self care for educator and overcome opinions is very important

- 1. Judgment : Not judge but understand through communication the student's perspective.*
- 2. Comparisons looks like an educator expecting a student to have the same perspectives or feelings as other students.*
- 3. Demand can be seen when an educator demands that students treat them a certain way in a situation.*
- 4. Denial of responsibility occurs when a teacher lacks the ability to take personal responsibility for how their own actions may have affected a situation.*

RESTORATIVE BEHAVIOR MANAGEMENT

WATCH- Words, Actions, Thoughts, Character and Heart (Hands)

Failed or Poor Social Emotional Learning 0-5 years causes problems in relational attachment, bonding, power struggle for identity, poor emotional intelligence, Behavior management problems from poor self - regulation, and developing problem solving through pro-social behaviors.

Restoring this emotional and social bonding and sub domains of Social Emotional learning is the underlying principle for Restorative Behavior management .

Chicago Public Schools seem to be successfully implementing the Restorative techniques

- 1. SEL: Being in the “Present” moment with mindfulness with Self- Care and Self - Awareness as a teacher or educator**
- 2. Attachment, Safety, Relaxation :** *A School, Pre- School is an extension of the family and Infant should feel relaxed , happy and bond ideally with educators*
- 3. Responsibility and Accountability :** *When one knows that reasons for struggle is our own inner judgement, or thoughts, words and actions that are not pro –social and learn the consequences of actions , the adverse actions will be mitigated and effort for amicable communication will be undertaken.*
- 4. What sets the Reflection- A consequence:** *This redirection is done by sitting at eye level, with a stern but clear message and recorrect the behavior by making the child understand how other person is hurting.*
- 5. Joint Attention:** *In play and activities with Children , Infants and Toddlers; avoids adverse behaviors .*
- 6. Problem solving is a collaborative effort with some reasonable accountability and consequences that are not punitive but corrigible.**
- 7. FIND THE ROOTS:** *Try not to fix or repair a problem but find the root cause for any behavior or misconduct. Address the needs and resources. Get the systems in place through reflecting , expressing and repairing .*
- 8. Encourage Growth Mind Set :** *No shaming or humiliating in a group and make a child feel inadequate and give up on their effort.*
- 9. A POSITIVE school climate:** *To fix fractured relationships, power struggles to enhance collaborative effort for care with self-respect, mutual respect, ability to express feeling and repair the damages. Positive, Motivational and active learning principles are applied shaping every child to be a community leader with good character.*
- 10. Responsibility for Thoughts , Words and Actions:** *In school culture de-escalates aggression, violence, enhances the sub domains of Social Emotional Learning with personal responsibility .*

Watch your Words, Actions, Thoughts, Character, Heart (WATCH)

SEL: RESTORATIVE HEALING: Respectful communication, identify problem, aggressor takes responsibility to repair the harm and approach is a collaborative effort . **CUES and Respond.**

Language Principles : Empathetic , “I “ care and “I” do want to know what was the thinking and cause for aggression (facial gestures, non verbal body language , communication, Serve and Return cycle , cuddle, solve #)
Let the child come up with what could have been an ideal handling of the aggression and harm .

Let the aggressor explain how this can be avoided in the future and what could be done .

Restorative Language : Empathetic listening and mutual conversation- discourse, seeking the thinking and action and the cause that precipitated the incident. Find the root cause for conflict. Harming person takes responsibility and apologizes and affirms reflecting on thoughts words and actions for the next adverse thought process. Tries to repair a relationship.

Circles for expression of emotions and **Peace circles** for restoring amicable atmosphere in the community and in relationships through peaceful communication.

Example : Explosive temper discussion and peaceful resolution and practices that can offer peaceful resolutions as in Self Care practices

Class - Room practices implementing the above three methods and mindfulness. Talking Circle, Peace Circle building strategies and Action or Practices Circle to repair.

RESTORATIVE MIND SET

A restorative mindset describes how a person understands community and one's role in the community. The values and concepts that underlie a restorative mindset include:

1. Relationships and trust are at the center of community.
2. All members of the community are responsible to and for each other.
3. Multiple perspectives are received with warmth, and all voices are equally important and heard.
4. Healing is a process essential to restoring community.
5. Harm-doers should be held accountable for and take an active role in repairing harm.
6. Conflict is resolved through honest dialogue and collaborative problem-solving that addresses the root cause and the needs of those involved

Availability of data and materials

Datasets are available through the corresponding author upon reasonable request.

Abbreviations

ASD:

Autism spectrum disorder

WoS:

Web of Science

DSM-IV:

The Diagnostic and Statistical Manual of Mental Disorders, 4th edition

ICD-9:

International Classification of Disease, 9th revision

DSM-IV TR:

Diagnostic and Statistical Manual of Mental Disorder text revision, 4th edition

ICD-10:

International Classification of Diseases, 10th revision

DSM-5:

Diagnostic and Statistical Manual-5

ADI-R:

Autism Diagnostic Interview Revised

ADOS:

Autism Diagnostic Observation Schedule

ABC:

Autism Behavior Checklist

CABS:

Clancy Autism Behavior Scale

CAST:

Children Autism Spectrum Test

CHAT:

Checklist for Autism in Toddlers

ASSQ:

Autism Spectrum Screening Questionnaire

SCDC:

Social Communication Disorder Checklist

M-CHAT:

Modified Checklist for Autism in Toddlers

SCQ:

Social Communication Questionnaire

ISAA:

Indian Scale for Assessment of Autism

AQ-10:

Autism Quotient-10

RQC:

Reporting Questionnaire for Children

STROBE:

Strengthening the Reporting of Observational Studies
in Epidemiology

PRISMA:

Preferred Reporting Items for Systematic Reviews
and Meta-Analysis

SARAH DOOLEY CENTER FOR AUTISM

Autism In The Classroom: How To Handle Behavior Challenges

Posted on February 27, 2020 by SDCA - admin

Children with autism typically use behaviors to communicate their wants, needs, anxieties, and frustrations. These behaviors fall into the classification for ASD criteria we discussed before .

These behaviors can include: Sensori - Motor /Restricted /Rigid Behaviors /Poor communication and poor Social relationships.

- Fidgeting
- Stimming
- Rocking
- Tapping
- Repeating words or phrases
- Mimicking
- Self-injurious actions
- Aggression
- Biting
- Ignoring peers
- Refusing to follow directives
- Eloping

1. Each Child is Unique in their behaviors and needs and Customized Individual plan, knowing their overall medical back ground

Medicines they take

H/O Seizures

Sensitivities

Verbal and Non verbal Communication skills and capabilities

- 1. Safety , Attachment security and trust need to be developed between care giver and ASD child-**
- 2. Challenging in the beginning.**
- 3. Security comes with Structured , consistent routines and visual cards if they see boards and Pictures.**
- 4. Set up a Behavior Plan based upon Behavior Analysis.**
- 5. Have a Copy of the Behavior Analysis as a part of Individual Education Plan**
- 6. Behavior Intervention Specialist writes a Behavior Intervention Plan based upon the Behavior Analysis Report .**
- 7. The Nuances of needs , sensitivities, objects of Interest, communication ability, activities to seek attention , a Maladaptive behavior as they cannot express their needs and emotions.**
- 8. Find Strengths and Interests – we discussed follow the child’s interest and teach what they can learn.**
- 9. After close observation of following Child’s interest, develop Behavior modification and structure encompassing the interests, activities to sustain attention, and use them for positive reward system.**
- 10. These Interests or strengths becomes a part of the exclusive curriculum ot work with**

ENVIRONMENT and STRUCTURED ACTIVITIES

- 1. Consistency and Routines give security and removes anxiety of what comes next.**
- 2. Set Physical Boundaries.**
- 3. Set up routine as soon as child enters the center.**
- 4. Have a Visual cuing in Board that gives visual representation and timings one after the other lined up for the day and explain a visual log on the board with pictures of activities.**
- 5. Have a cupboard or a sack that is exclusive for each child , with ASD child's picture to identify his /her own space and sack or cupboard. Also write the name**
- 6. All belongings and "LOVIES" can be placed there to cuddle when needed .**
- 7. Give explanation of physical boundaries, show the boundaries.**
- 8. Never raise voice or use any punitive measures , but use sensory materials child likes to calm down.**
- 9. Have a quiet corner if they are agitated. The teacher takes the child to the calming room, dark or bright , with colors and music helps.**
- 10. Have a CUSH ball to squeeze or there are metal spinners now to calm down.**
- 11. Have accessibility to books, objects, toys and flexibility to move and get objects and praise for calmly getting them**

EXPECTATIONS

1. *Let the child know rules and what is expected of them.*
2. *The ASD children do have concrete thinking and understanding about what is required of them.*
3. *Use ASSISTIVE Augmented Technology for communication but using PECOS- Picture system and visual cues and explanation is well understood.*
4. *This explanation of expectations prevents maladaptive behaviors from confusion about duties. Praise them for adherence immediately.*
5. *The expectations have to be appropriate for age and the capability.(REALISTIC).*
6. *Foster and scaffold from here they are to next stage with praise.*

TRANSITION: *Switching form activity to the next is a challenge as it throws off routine .*

Have a notice Board, Visual representation and show the visual information for next activity .

Usually they are slow to move and give enough time to readjust between activities

SENSORY ISSUES:

Loud noises, humming, music , too many colors, too much of light does bother ASD children.

Dim the lights, have a calm quiet place.

ENHANCE COMMUNICATION :

PECOS, ASSISTIVE AUGMENTED COMMUNICATION TECH Devices where communication can be shown through pictures

Have a Center based Speech Therapists and ABA therapists . OT also is important.

Bring in a Board Certified Behavioral analyst

Have a video set up on issues that are repetitious

FAMILY ENGAGEMENT IS SO IMPORTANT and ACCEPTANCE TO READJUST HOME CULTURE AND ROUTINE

BEHAVIOR MANAGEMENT

Aggressive behavior

- 1. Use calming techniques and be CALM*
- 2. Breathing Techniques*
- 3. Music and counting*
- 4. Calm room helps where noise is low and bright lights and over stimulation does not occur*
- 5. Cuddle and hug if not aversive to touch*
- 6. Push against the wall, count to 10, Breathing, blowing bubbles.*

Behavioral Services : Restorative BMT that uses SEL, LL and CD tools and skills

Children with autism may use aggression, self-injury, or other maladaptive behaviors to communicate or manage emotions. However, the school staff can implement a data-based behavior plan that teaches your child to replace challenging behaviors with functional and adaptive living skills.

Social Training: Essential part of 0-3 learning to prevent future problems

Social interactions can confuse children with autism who often struggle to make and sustain conversations or show compassion. Social training and guided interactions with peers and adults provide your child with opportunities to learn, practice, and integrate social skills.

Reflection Space : Avoid Sensory Overload and give Green Space time , Flex time, Relaxation tools

Sensory, social, or academic overload may cause a child with autism to feel frustrated, stressed, and agitated.

A school environment that understands children with autism will offer frequent breaks, **Integrated Communication and Speech Tools** and safe space for reflection. Here, your child ~~when they~~ your child is step back, rather than on the cusp between reactivity and engagement ~~and help~~ to communicate at school and in other environments.

Speech therapy and various communication tools, such as sign language, a Picture Exchange System (PES), and/or assistive technology, can help your child express his or her words, thoughts, emotions, and needs. These same tools may also decrease problem behaviors, increase social interactions, and allow your child to understand teachers and staff.

Skill Transference : Play, Games, Sports, Field trips

In addition to learning skills that promote school success, your child must practice academic, behavioral, and social skills outside the classroom.

Skills transference can occur through appealing, interesting, and engaging instructional, social, and leisure activities.

Transition Services

Success as an adult depends in part on your child's ability to live, work, and play independently.

In addition to academic training, your child with autism could receive transition services.

These services teach your child communication, social, adaptive, and self-management skills.

Transition services may even include partnerships with community, education, and professional organizations where students can receive job training, complete internships, and hone skills.

ABA THERAPY SERVICES IDEALLY THROUGH SCHOOL - REGULAR WORKING HOURS

Applied Behavior Analysis -

1. *Therapists pick up through observation individual child's interests , needs, strengths, sensitivities , and create or develop a positive Behavior modification curriculum, with Positive Reinforcement to succeed socially, in the community and academically to their capacity.*
2. *ABA therapy is individualized for each child.*
3. *Enhances Communication, Language , Social Skills , Academic advancement.*
4. *Because of the positive approach and results the problematic maladaptive behaviors, aggression, self – Injury and violence are mitigated or improve.*
5. *Enhances Coping with their basic problem of ASD and move into mainstream classroom inclusion.*

What are the three aspects or ABC of ABA therapy ;

Therapists work with concept development through

ANTECEDENT: *A command or request that occurs before an expected targeted behavior – asking Object, Writing, Toy , Puzzle, Activity, Light, Sound, Music , Sport . The behavior is described and then requested.*

BEHAVIOR : *Child's response to the request or Command; Verbal, nonverbal and no response at all.*

CONSEQUENCES: *Sticker, Verbal praise, High Five, pick what interest the child and smiling face with energy in praise of activity immediately. Abnormal Behavior gets ignored and not noted .*

A BOARD CERTIFIED BEHAVIORAL ANALYST will develop a customized program after several observations.

Individual examples of ABA Therapy

1. **Discrete 1:1 Training and trials** : *Clear small , straight instructions are given . Demonstrate*

Example: This is lunch time.

Let us wash hands.

Dry hands. Small simple instructions and each one well done get a praise immediately.

1. **Incidental Training: Discrete Developmental Training** : 1:1 at home or school by therapist

3. **Pivotal Response Training**

This happens in natural settings, such as your child's school, playground, or home. Less structured, pivotal response training focuses more on your child's interests and relies on your child's motivation, self-initiation, self-management, and responsiveness. With this approach, your child learns how to implement behaviors in numerous real-world situations.

1. *Not preplanned and the situation is availed to transfer learning.*

These are the 7 most effective ABA techniques used with children with autism.

- Positive and Negative Reinforcement.
- Video Modeling.
- Prompting and Fading - with letters, numbers incidents
- Natural Environment Teaching - Green Space education
- Behavior Chain - Demonstration
- Generalization.
- Behavior Contracts a little older verbal or non verbal ASD

1. Discrete Trial Learning (Training) is based on the understanding that practice helps a child master a skill. It is a structured therapy that uses a one-to-one teaching method and involves intensive learning of specific behaviors. This intensive learning of a specific behavior is called a “drill.” Drills help learning because they involve repetition. The child completes a task many times in the same manner (usually 5 or more). This repetition is especially important for children who may need a great deal of practice to master a skill. Repetition also helps to strengthen long-term memory. Specific behaviors (eye contact, focused attention and facial expression learning) are broken down into its simplest forms, and then systematically prompted or guided. Children receive positive reinforcement (for example: high-fives, verbal praise, and tokens that can be exchanged for toys) for producing these behaviors. For example, a therapist and a child are seated at a table and the therapist prompts the child to pay attention to her by saying “look at me.” The child looks up at the therapist and the therapist rewards the child with a high-five.

2. Incidental Teaching (or Natural Environment Training) is based on the understanding that it is important to give real-life meaning to skills a child is learning. It includes a focus on teaching skills in settings where your child will naturally use them. Using a child’s natural everyday environment in therapy can help increase the transfer of skills to everyday situations and helps generalization. In Incidental Teaching, the teacher or therapist utilizes naturally occurring opportunities in order to help the child learn language. **The activity or situation is chosen by the child, and the caregiver or teacher follows the child's lead or interest.** These teaching strategies were developed to facilitate generalization and maximize reinforcement. Once naturally occurring situations in which a child expresses interest are identified, the instructor then uses graduated prompts to encourage responses from the child. For example, a child is playing on the swings and needs the therapist to push him so that he can swing higher. The therapist waits on the child to ask for a push. Only after the child asks does the therapist push the swing. The therapist waits for the child to ask each time before he/she pushes the child again.

3. Verbal Behavior is similar to discrete trial training in that it is a structured, intensive one-to-one therapy. It differs from discrete trial training in that it is designed to motivate a child to learn language by developing a connection between a word and its meaning. For some children, teaching a word or label needs to include a deliberate focus on teaching them how to use their words functionally (E.g. What is this? A cup. What do you use a cup for? Drinking. What do you drink out of? A cup.)

4. Pivotal Response Training is a naturalistic, loosely structured, intervention that relies on naturally occurring teaching opportunities and consequences. The focus of PRT is to increase motivation by adding components such as **turn-taking, reinforcing attempts, child-choice, and interspersing maintenance (pre-learned) tasks**. It takes the focus off of areas of deficits and redirects attention to certain pivotal areas that are viewed as key for a wide range of functioning in children. Four pivotal areas have been identified: **(a) motivation, (b) child self-initiations, (c) self management, and (d) responsiveness to multiple cues**. It is believed that when these areas are promoted, they produce improvements in many of the non-targeted behaviors. The “Early Start Denver Model” is an early behavioral intervention model appropriate for children as young as 18 months of age. This model has a strong emphasis on Pivotal Response Training.

5. Natural Language Paradigm (NLP) *is based on the understanding that learning can be helped by deliberate arrangement of the environment in order to increase opportunities to use language. NLP emphasizes the child's initiative. It uses natural reinforcers that are consequences related directly to the behavior, and it encourages skill generalization. For example, a child who is allowed to leave after being prompted to say "goodbye" has a greater likelihood of using and generalizing this word when compared with a child who receives a tangible item for repeating this word. NLP transfers instruction from the therapy room to the child's everyday environment with the interest of the child serving as the starting point for interventions.*

Altered immune responses and neuroinflammation are well documented in autism [\[34\]](#) and there are reports of specific associations between immune parameters and deficits in social interactions and communication in autistic individuals [\[14\]](#).

Autism susceptibility is currently estimated to be 40–80% genetic. Environmental factors – likely acting through epigenetic regulation as the major mechanism – presumably compromise the remainder of the risk. Hundreds of potential environmental factors have been suggested to contribute to risk, such as increased parental age (especially paternal), maternal complications or infections during pregnancy, or prenatal exposure to anticonvulsants ([Rasalam et al., 2005](#); [Kong et al., 2012](#); [O’Roak et al., 2012](#); [Ohkawara et al., 2015](#)).

Nirsevimab: A Potential Treatment for Autism

In the search for effective treatments for autism spectrum disorder (ASD), a new drug called Nirsevimab has emerged as a potential breakthrough. This drug offers a unique mechanism of action that sets it apart from existing treatments, providing hope for individuals with autism and their families.

Unique Mechanism of Action

Nirsevimab interacts with a specific protein, influencing gene expression and cell division in specialized brain cells. This novel approach offers a fresh perspective on addressing the core features of autism. By modulating the concentration of cell division proteins in brain cells, Nirsevimab holds promise in improving social communication and cognitive skills in individuals with autism.

Meal Planning with Immune and Brain boosters. Prevent Leaky Gut with Probiotics. Colored fruits and vegetables

Avoid OMEGA -6 and too much Calcium. Magnesium is important.

Promote Omega -3 in many vegetarian meals- Sesame, Flax (AVISA), Avocado, Olive Oil, AVAcado Oil, Peanut and Mustard oil combination. Safflower oil , Grape seed.

Vegetarianism is anti inflammatory to prevent GUT leakage.

Heavy white carbs , Sugar , Milk and Wheat are inflammatory.

Casein Free and Gluten Free diets having QUINOA, Millets helps . In some cases Ketogenic diets help

Exercise is very important

Pranayama increases Oxygen to brain and so does exercise . That is Why HATHA yoga helps

Pressure Chamber Therapy: Enhancing Social Skills and Brain Function

One of the breakthrough treatments for autism is pressure chamber therapy, which has shown promising results in enhancing social skills and improving brain function. This therapy involves the use of hyperbaric medicine and oxygen enrichment to create a pressurized environment that delivers high levels of oxygen to the body and brain.

Hyperbaric Medicine and Oxygen Enrichment

Hyperbaric medicine, used in pressure chamber therapy, involves treatment in high-pressure chambers with 100% oxygen. This treatment has been found to enhance blood and oxygen supply to the brain, resulting in increased brain function. By exposing individuals to increased atmospheric pressure, the body absorbs more oxygen, leading to improved oxygenation of tissues and enhanced cellular function.

Reduction in Neuroinflammation and Improved Brain Function

Treatment in oxygen-enriched pressure chambers has been observed to reduce neuroinflammation and boost the expression of substances responsible for enhancing blood and oxygen supply to the brain. This, in turn, improves brain function. Neuroinflammation, often associated with autism, can impair brain activity and contribute to the characteristic challenges faced by individuals on the autism spectrum.



Mixedage Typical and Atypical

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PRENATAL ORIGINS OF ASD: THE WHEN, WHAT AND HOW OF ASD DEVELOPMENT

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3. Neurons detect cognitive boundaries to structure episodic memories in humans

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Burden of neurodevelopmental disorders in low and middle-income countries: A systematic review and meta-analysis

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<https://www.crossrivertherapy.com/autism/crispr-autism/>

[2]: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4163956/>

[3]: <https://pubmed.ncbi.nlm.nih.gov/37883758/>

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[5]: <https://scitechdaily.com/autism-breakthrough-new-treatment-significantly-improves-social-skills-and-brain-function/>

[6]: <https://www.cdc.gov/ncbddd/autism/treatment.html>

RESOURCES

www.aane.org

www.texasautismsociety.org/support

www.autismspeaks.org

www.dfwasd.com

Read

1. Uniquely Human: A different way of Seeing Autism by Barry Priznat Ph.D
2. Ten Things Every Child with Autism Wishes You Knew By Ellen Notbohm
3. A Parent's Guide to Autism Charles Hart
4. Thriving with Autism by Katie Cook - 90 activities for communication and Engagement