Can autism be reversed? The total load framework and case reports of reversal

Chris D'Adamo, Ph.D.
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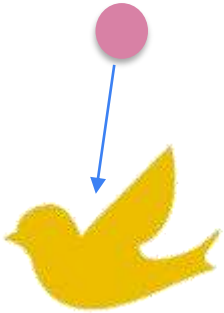
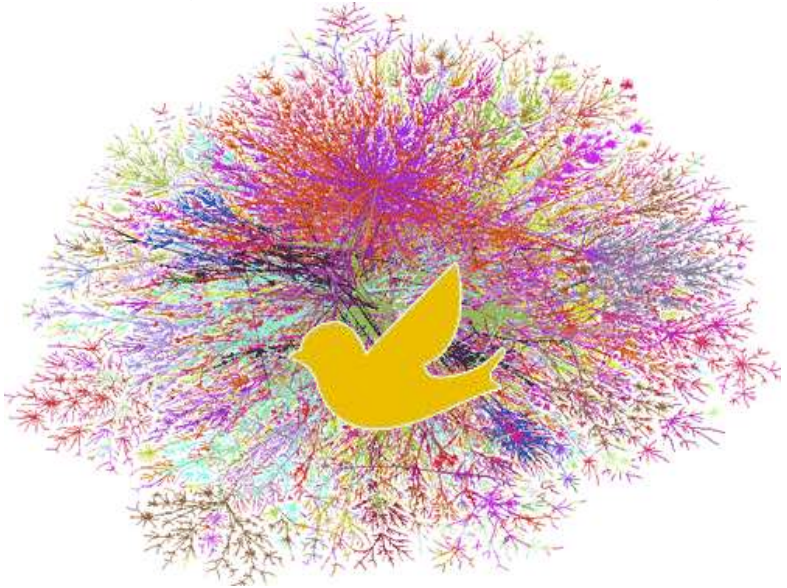
Chronic disease paradigm shift required

One dangerous molecule

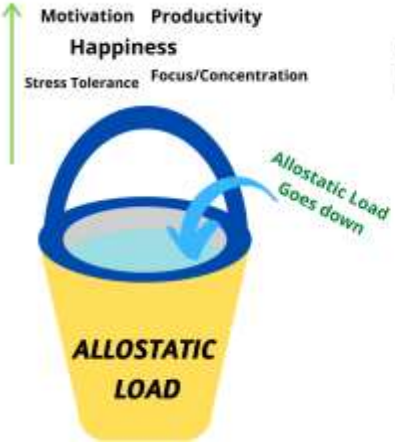


And its impact on a system

Many complex and synergistic factors impact the whole system in myriad, intertwined ways



Allostatic load, aka “total load”



Total load: manifestation & assessment

- Increasing load first reflected in “primary mediators”
  - E.g. cortisol, epinephrine, inflammatory markers
- Later stages → chronic illness
- Unresolved indefinitely → mortality
- Most often assessed using “indices”
  - Groups of stressors & health-promoting factors
  - Beese et al (2022) *Int J Environ Res Public Health*

Evidence for total load & chronic illness

- Systematic reviews revealing associations between total load and...
  - Mortality - Parker et al (2022) *Am J Prev Med*
  - Cardiovascular disease - Guidi et al (2021) *Psychother Psychosom*
  - Cancer - Mathew et al (2021) *Biol Res Nurs*
- Associated with chronic illness among children… *call for more research!*
  - Condon (2018) *Biol Res Nurs*
  - Parker et al (2022) *Am J Prev Med*
  - Li et al (2023) *Psychoneuroendocrinology*

The CHIRP Study: survey-based study evaluating Total Load hypothesis… documenting impact of modern living on children's health and development

Total Load: stressors of interest to CHIRP

- Antibiotics/microbiome disruption
- Glyphosate
- Pesticides, herbicides
- Sugar
- Proton pump inhibitors
- Medical injectables
- NSAIDS
- acetaminophen
- Birth control pills/hormones
- Asthma/steroid medications
- Processed, nutrient-depleted foods
- GMOs
- Metal and mining industrial practices
- Waste from coal/oil/utilities plants
- Nuclear radiation
- Ionizing radiation
- Synthetic cosmetics
- Preservatives in personal care products
- Synthetic antimicrobial chemicals
- Dental amalgams
- Lack of full spectrum sunlight exposure
- Chronic infections
- Household/public wireless/EMF radiation
- Artificial and blue light from devices/ screens
- Cell phone radiation
- Heavy metals found in children's toys/ products
- Chemicals used in building materials
- Flame retardants in clothing, furniture upholstery
- Industrial agriculture (pesticides, fertilizers, depleted soils)
- Diet high in Omega 6 inflammatory oils and low in Omega 3
- Plasticizers, solvents
- Formaldehyde
- Dyes, preservatives, emulsifiers
- Lack of natural movement
- Common hospital birthing practices
- Lack of nasal breathing
- Trash incineration
- Emotional or psychological stress, ACEs
- *And on and on and on and on . . .*

Stressors have cumulative, synergistic effect on children and bio-individuality leads to different health outcomes

- Antibiotics/microbiome disruption
- Glyphosate
- Pesticides, herbicides
- Sugar
- Proton pump inhibitors
- Medical iniectables
- NSAIDS
- acetaminophen
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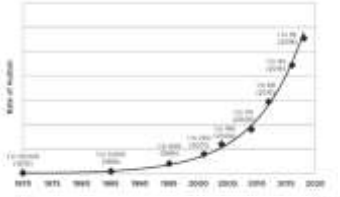
- Emotional or psychological stress, ACEs
- *And on and on and on and on . . .*

<u>Bio-individual</u> history, genetics and unique "total load" informs health outcomes

AUTISM



ASTHMA

ADHD

OBESITY/DIABETES

The CHIRP Study:
Child Health Inventory for Resilience and Prevention

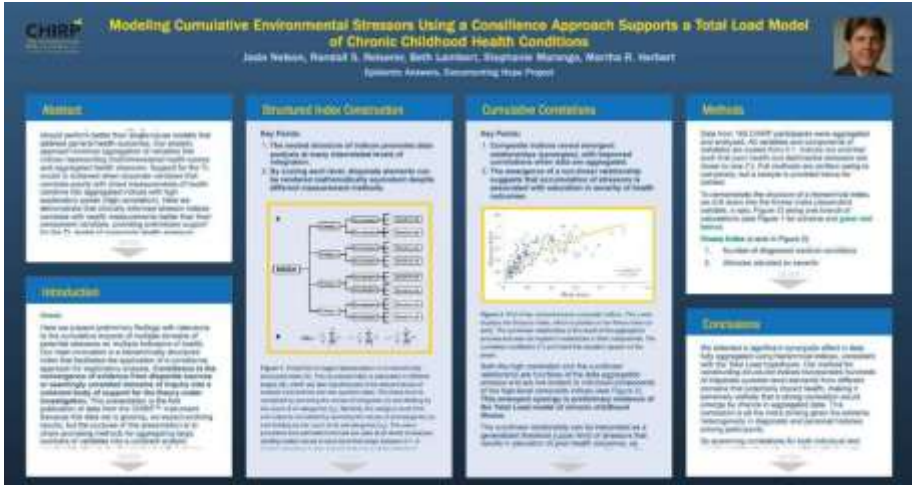
CHIRP:

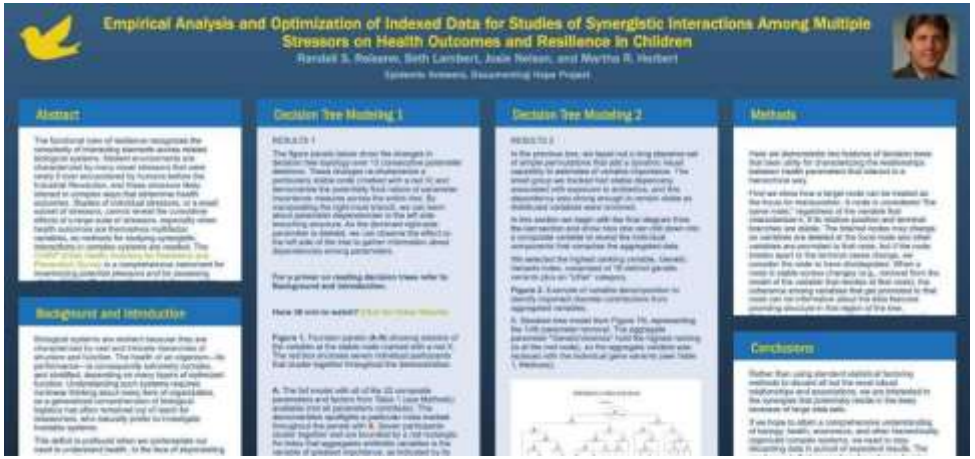
- Online HIPAA-compliant, private, secure survey for parents of children ages 1-15
- Most comprehensive assessment of modern living & childhood health
- >900 questions spanning family history, preconception, prenatal, birth, neonatal, and childhood exposures, diet, daily life practices, spirituality, mindset
- > 40 experts consulted in survey development
- Analyzing cumulative/synergistic impact & health outcomes
- ≈ 500 completed surveys
- Enrollment reopening soon (early 2025)

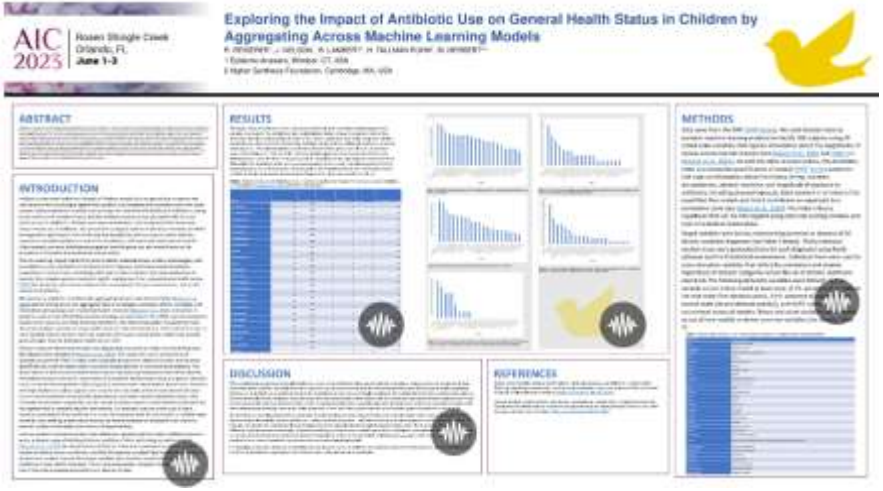
Stressor indices in CHIRP

Table 1. Sample list of 24 stressor indices used in various analyses. Many of these indices incorporate more than 50 CHIRP Survey questions and include hierarchical substructure.

Antibiotics	Prenatal Exposures
Birth Stressors	Prenatal Medications Frequency
Breastfeeding Stressors	Prenatal Medications Stressors
Chemical Exposures	Prenatal Birth Mother Health
EMF Exposures	School Environmental Exposures
Home Environmental Exposures	School Industrial Proximity
Fast Food	Screen Time Stressors
Food Quality	Significant Exposures
Genetic Variants	Sleep Stressors
Industrial Exposures	Sugar Consumption
Injectable Medications	Ultrasound exposures
OTC Medications	Vaccine Exposures







- Institute for Functional Medicine's Annual International Conference 2020 – Poster Presentation on the CHIRP™ Study
- Institute for Functional Medicine's Annual International Conference 2021 – Poster Presentation on the CHIRP™ Study
- Institute for Functional Medicine's Annual International Conference 2023– Poster Presentation on the CHIRP™ Study

https://documentinghope.com/the-chirp-study/

Stressor indices & correlation with illnesses

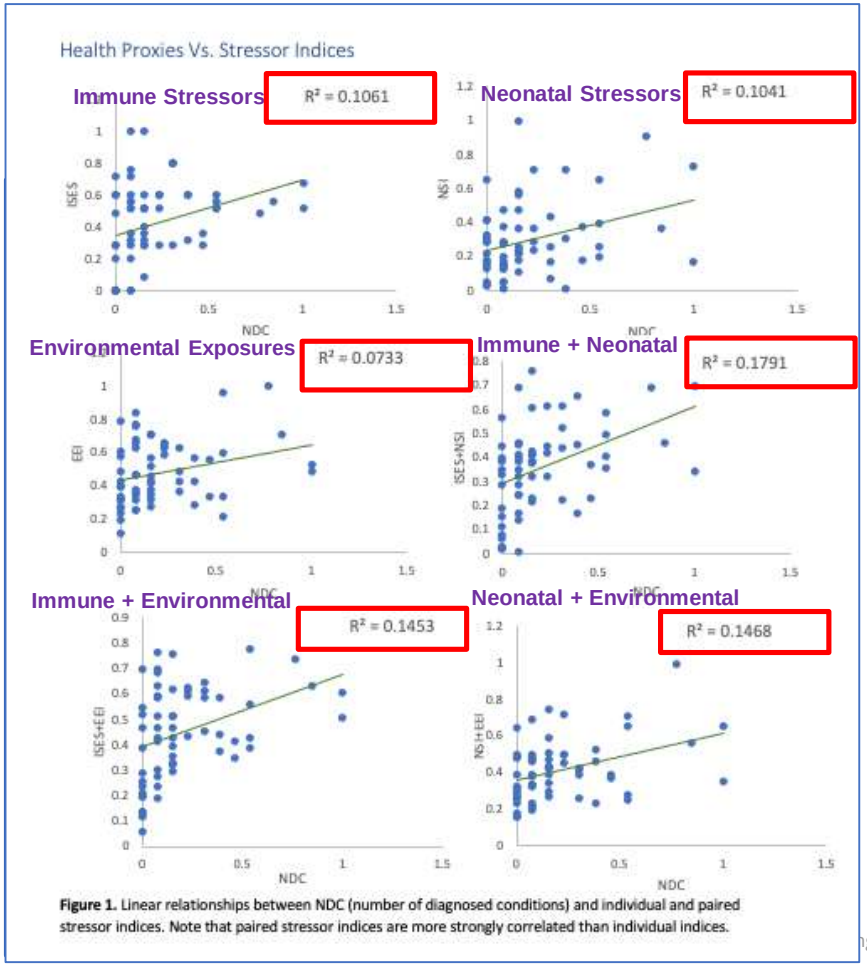
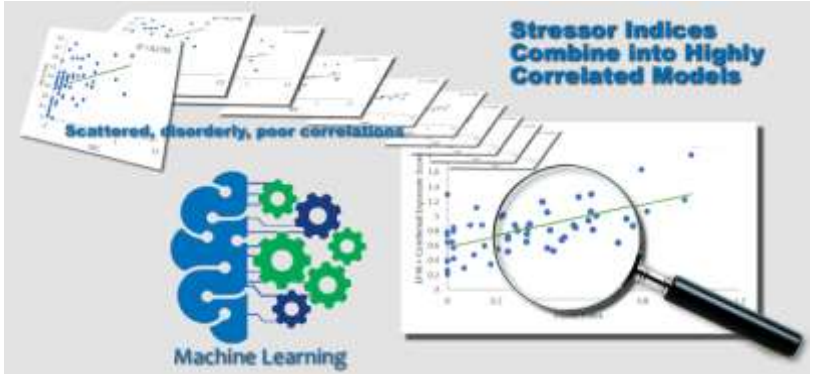


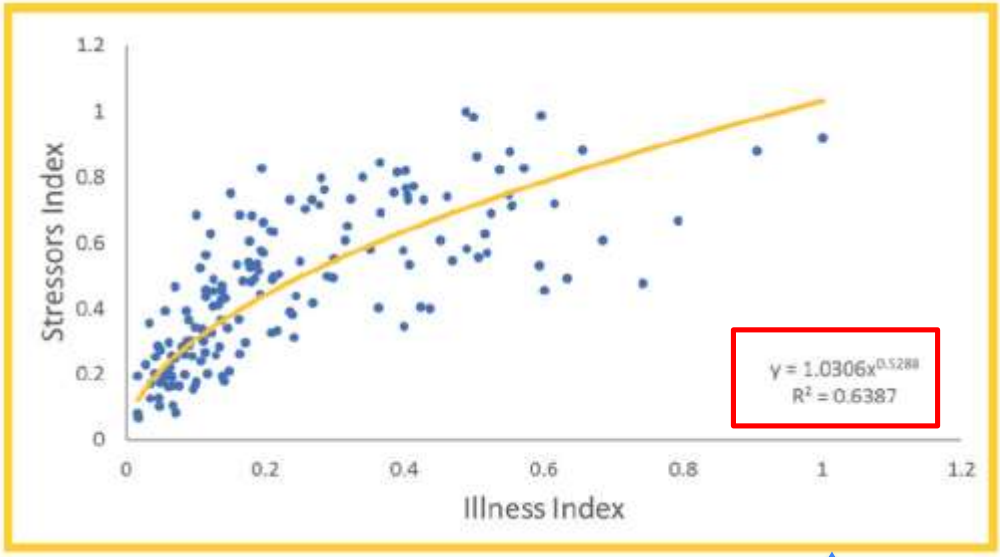
Figure 1. Linear relationships between NDC (number of diagnosed conditions) and individual and paired stressor indices. Note that paired stressor indices are more strongly correlated than individual indices.

What happens when you combine ALL health stressor indices… aka "total load"



CHIRP analysis shows highly statistically significant association between total load of health stressors & adverse health outcomes

Combined Indices
("Total Load")



Illness Index
(# of diagnosed conditions + energy and vitality score + disruptions to family's life)

1. Reversal of Autism Symptoms among Dizygotic Twins through a Personalized Lifestyle and Environmental Modification Approach: A Case Report and review of the Literature

Christopher D'Adamo, Josephine Nelson, Sara Miller, Maria Hong, Elizabeth Lambert, Heather Tallman Ruhm

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Journal of Personalized Medicine

MDPI

Case Report

Reversal of Autism Symptoms among Dizygotic Twins through a Personalized Lifestyle and Environmental Modification Approach: A Case Report and Review of the Literature

Christopher R. D'Adamo [1,2,*], Josephine L. Nelson [2], Sara N. Miller [1], Maria Rickert Hong [2], Elizabeth Lambert [2] and Heather Tallman Ruhm [2]

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Abstract: The prevalence of autism has been increasing at an alarming rate. Even accounting for the expansion of autism spectrum disorder diagnostic (ASD) criteria throughout the 1990's, there has been an over 300% increase in ASD prevalence since the year 2000. The often debilitating personal, familial, and societal sequelae of autism are generally believed to be lifelong. However, there have been several encouraging case reports demonstrating the reversal of autism diagnoses, with a therapeutic focus on addressing the environmental and modifiable lifestyle factors believed to be largely underlying the condition. This case report describes the reversal of autism symptoms among dizygotic, female twin toddlers and provides a review of related literature describing associations between modifiable lifestyle factors, environmental exposures, and various clinical approaches to treating autism. The twins were diagnosed with Level 3 severity ASD "requiring very substantial support" at approximately 20 months of age following concerns of limited verbal and non-verbal communication, repetitive behaviors, rigidity around transitions, and extensive gastrointestinal symptoms, among other common symptoms. A parent-driven, multidisciplinary, therapeutic intervention involving a variety of licensed clinicians focusing primarily on addressing environmental and modifiable lifestyle factors was personalized to each of the twin's symptoms, labs, and other outcome measures. Dramatic improvements were noted within several months in most domains of the twins' symptoms, which manifested in reductions of Autism Treatment Evaluation Checklist (ATEC) scores from 76 to 32 in one of the twins and from 43 to 4 in the other twin. The improvement in symptoms and ATEC scores has remained relatively stable for six months at last assessment. While prospective studies are required, this case offers further encouraging evidence of ASD reversal through a personalized, multidisciplinary approach focusing predominantly on addressing modifiable environmental and lifestyle risk factors.

Keywords: autism spectrum disorders (ASD); dizygotic twins; total allostatic load; functional medicine; environmental medicine; lifestyle medicine; root-cause medicine

check for updates

Citation: D'Adamo, C.R.; Nelson, J.L.; Miller, S.N.; Richert Hong, M.; Lambert, E.; Tallman Ruhm, H. Reversal of Autism Symptoms among Dizygotic Twins through a Personalized Lifestyle and Environmental Modification Approach: A Case Report and Review of the Literature. *J. Pers. Med.* **2024**, *14*, 643. https://doi.org/10.3390/jpm14060643

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Timeline of the twins' birth, symptoms, diagnosis, treatment strategy, and outcomes

Shared History:

The dizygotic female twins, named "P" and "L", were born two months premature in January 2020 via cesarean section. The father was of advanced paternal age (51 years old) and conception was achieved through in vitro fertilization utilizing an egg donor. The twins were carried through gestational surrogacy by a 35-year-old woman with no shared biology with the egg donor.

Twin "P"	2020	Twin "L"
no premature rupture	Pre-term labor	membranes ruptured 5 days before birth
birth weight 5 lbs 12 oz	Premature birth via c-section 2 mos early	birth weight 3lbs 8 oz
21 days in NICU	NICU Stay	23 days in NICU
tongue tie		sacral dimpal, hemangioma
	Breast milk first year	difficulty breast-feeding
Tylenol given	Routine vaccinations @ 3 & 6 mos	Tylenol given
	Some routine vaccines delayed due to COVID--19	
	Wore helmet @ 6 months for 12 wks	
constipation, diarrhea	GI symptoms	constipation, diarrhea
eczema	Skin symptoms	
disproprortionate response to change	Sensory symptoms	lack of eye contact

Timeline of the twins' birth, symptoms, diagnosis, treatment strategy, and outcomes

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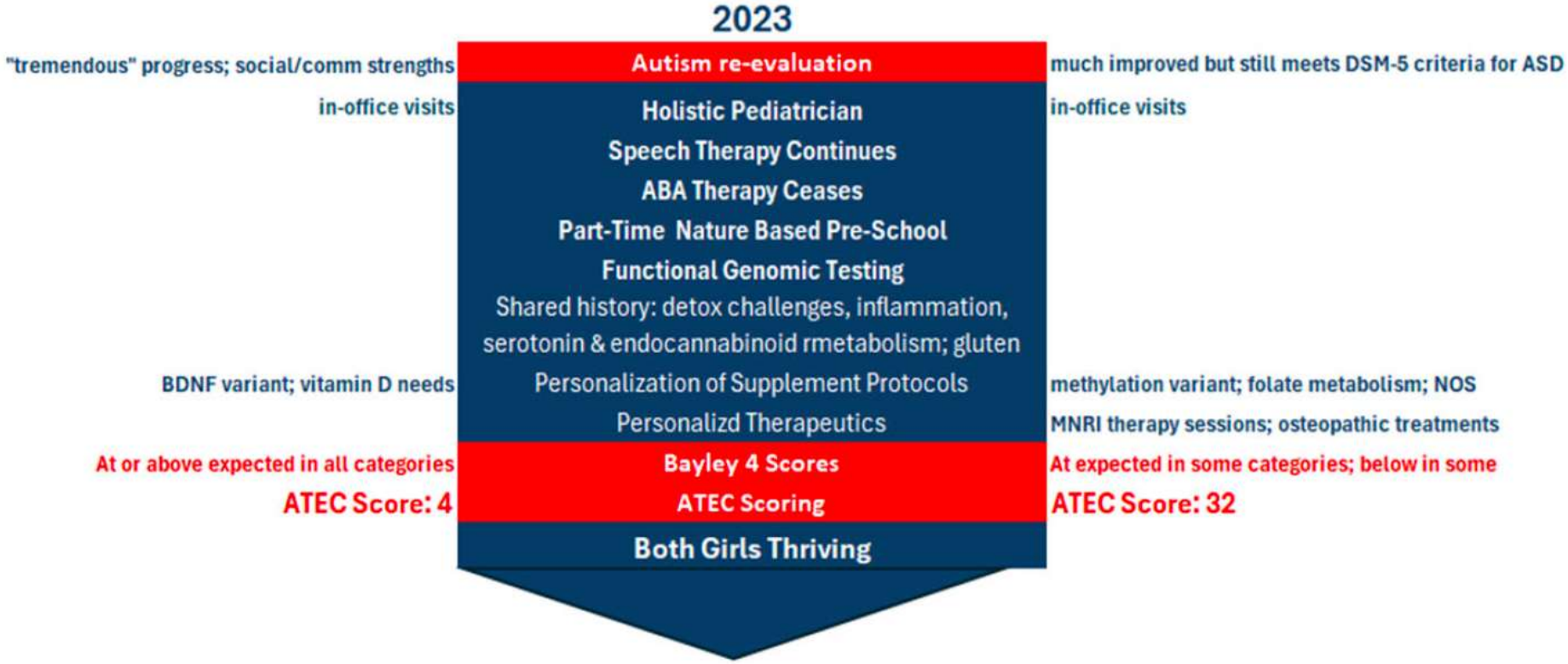

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TOXIC EXPOSURES

Twins With Autism Improved 'Dramatically' After Parents Focused on Reducing Toxic Exposures

A new case report details how twin girls with autism showed dramatic improvements following a parent-led intervention focused on addressing a wide range of modifiable lifestyle and environmental factors.

by Brenda Baletti, Ph.D.

JUNE 21, 2024

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'Autism can be reversed', scientists claim

NUEVA RIOJA 21

Epidemia de autismo: se renuevan las esperanzas

Lo más leído

ÓMO LEER TU FACTURA?

yahoo!news

Groundbreaking study claims severe autism can be reversed. Experts say it's 'deeply insulting'

2. Autism Recovery using the Specific Carbohydrate Diet: Literature Review and Case Report

Angela Taylor, Gabriel Newman, Christopher D'Adamo

Pending publication

Case report generated using CARE-writer, care-writer.com

CARE

Autism Recovery using the Specific Carbohydrate Diet: Case Report and Review of the Literature

Angela Taylor, Gabriel Newman, Christopher D'Adamo

Corresponding author: Angela Taylor, ataylor4@hu.edu

Abstract

Numerous publications have documented the effectiveness of medical nutrition therapy in alleviating many of the symptoms of autism. This case report reviews the literature and highlights the case of a 4-year-old boy with autism and his improvements following the adoption of the Specific Carbohydrate Diet (SCD). After following the SCD for 19 months, his symptoms had improved dramatically, he was considered recovered from autism, and his individualized education program (IEP) was dissolved. Long-term follow-up and subsequent diagnostic re-evaluation with the Autism Diagnostic Observation Schedule (ADOS) confirmed sustained recovery. The young man is now 18 and is studying in college. While this case and the literature to date is promising, further investigation is warranted to understand the relationship between gastrointestinal issues, intestinal permeability, nutritional interventions, and autism spectrum disorders.

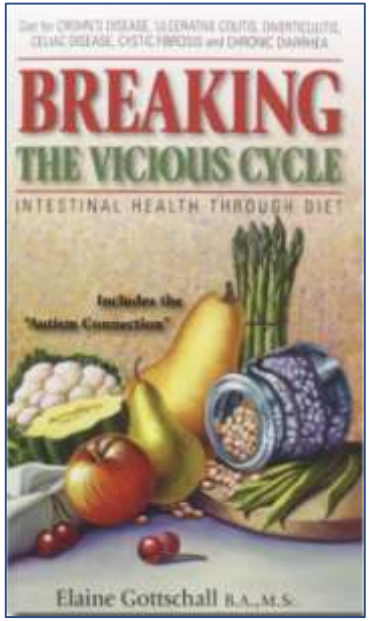
Keywords: Autism, Diet, Nutrition, Specific Carbohydrate Diet (SCD), Gut and Psychology Syndrome (GAPS), Paleo Diet, Gluten-Free, Literature Review, Case Report

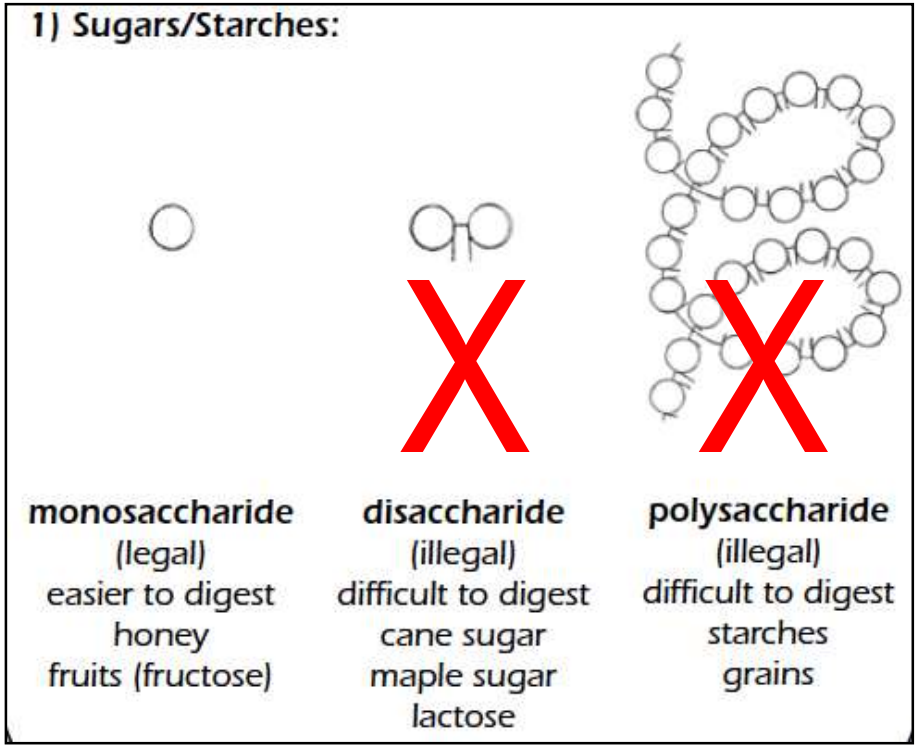
Introduction

Autism spectrum disorder (ASD) is a complex developmental disorder. ASD patients exhibit impairments in social interaction (with deficits in communication) and restricted interests with repetitive patterns of behavior (American Psychiatric Association, 2013). A large proportion of children suffering from ASD (46–84%) have gastrointestinal (GI) dysfunction including constipation, diarrhea, abdominal pain, and gastroesophageal reflux disease (Holingue et al., 2017). Underlying dysfunctional GI conditions in ASD children include low activities of disaccharidase enzymes (Williams et al., 2011), deficient sulfation of ingested phenolic amines including acetaminophen (Alberti et al. 1999), generalized reduction in GI microbiome biodiversity leading to bacterial overgrowth (Kang et al., 2013)(Wang et al., 2017), and increased intestinal permeability aka "leaky gut" (D'Eufemia et al. 1996). Severe GI symptoms in ASD children may lead to ensuing nutritional deficiencies (Hartman et al. 2009). Many ASD children are nonverbal or speech delayed for their age, therefore practitioners are encouraged to look for underlying chronic GI conditions that may contribute to ASD-associated behavioral concerns.

What is the Specific Carbohydrate Diet (SCD)?

1. Eliminates hard-to-digest complex carbohydrates

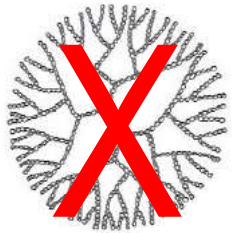




What is the Specific Carbohydrate Diet (SCD)?

2. Eliminates hard-to-digest amylopectin

Vegetables that contain more amylose than amylopectin starch are simpler to digest.



amylose (legal)	**amylopectin** (illegal)
easier to digest	difficult to digest
asparagus	black eyed peas
black beans* (soaked)	chickpeas/garbanzos
broccoli	corn
brussels sprouts	jicama
cabbage	mung beans
carrots	okra
cauliflower	potatoes
celery	seaweed
cucumber	sweet potatoes
eggplant	taro
kidney beans* (soaked)	turnips
lentils* (soaked)	unsoaked beans
lettuce	
navy beans* (soaked)	
onions	
peas	
peppers	
spinach	
squash	

*only if tolerated

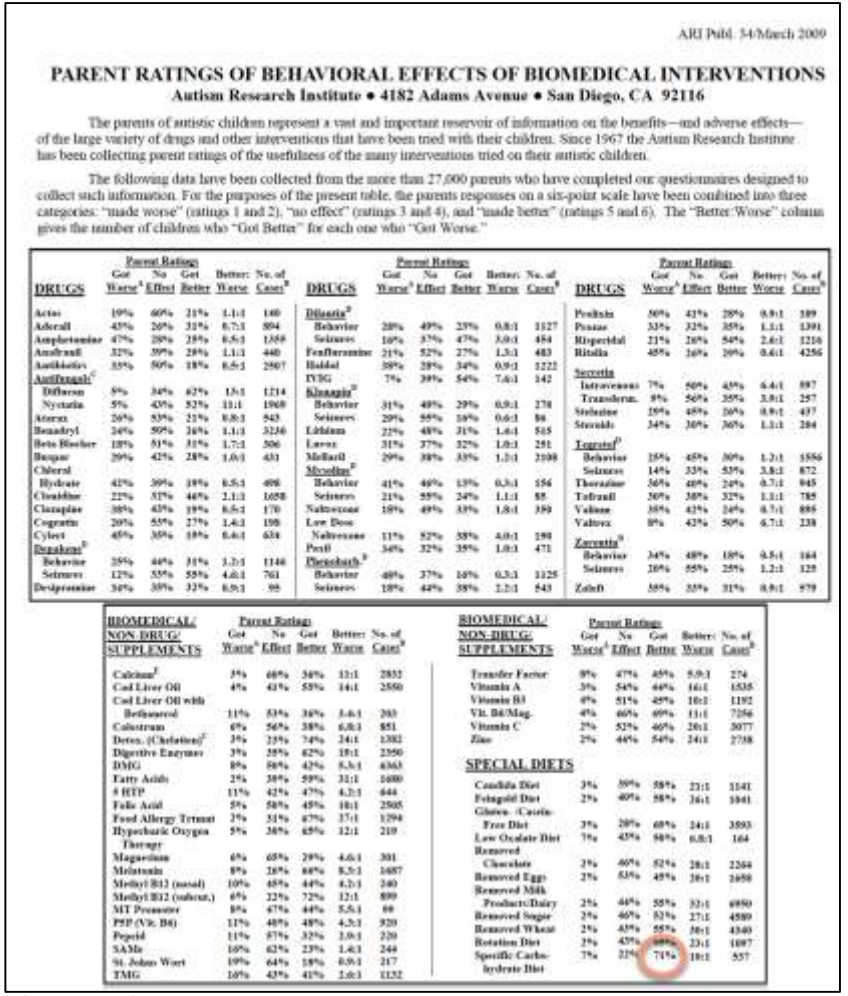
Core Principles of the Specific Carbohydrate Diet (SCD)

- **Avoidance of Certain Foods:** Limits or eliminates complex carbohydrates that are difficult for the body to digest, including grains, starches, and certain types of sugars
- **Emphasis on Simple Carbohydrates:** focuses on easily digestible monosaccharides that can be absorbed directly by the intestine
- **Whole, Unprocessed Foods:** encourages eating natural, unprocessed foods like fruits, vegetables, meats, and specific dairy products (e.g. homemade 24-hour yogurt)

History of the Specific Carbohydrate Diet (SCD) and Autism

Autism Research Institute - results of a 2009 parent survey.

Autism symptoms improved in 71% of children.



ARI Publ. 34/March 2009

PARENT RATINGS OF BEHAVIORAL EFFECTS OF BIOMEDICAL INTERVENTIONS

Autism Research Institute • 4182 Adams Avenue • San Diego, CA 92116

The parents of autistic children represent a vast and important reservoir of information on the benefits—and adverse effects—of the large variety of drugs and other interventions that have been tried with their children. Since 1967 the Autism Research Institute has been collecting parent ratings of the usefulness of the many interventions tried on their autistic children.

The following data have been collected from the more than 27,000 parents who have completed our questionnaires designed to collect such information. For the purposes of the present table, the parents responses on a six-point scale have been combined into three categories: "made worse" (ratings 1 and 2), "no effect" (ratings 3 and 4), and "made better" (ratings 5 and 6). The "Better:Worse" column gives the number of children who "Got Better" for each one who "Got Worse."

DRUGS	Parent Ratings: Got Worse[A]	No Effect	Got Better	Better: Worse	No. of Cases[B]
Actos	19%	60%	21%	1.1:1	140
Adderall	43%	26%	31%	0.7:1	894
Amphetamine	47%	28%	25%	0.5:1	1368
Antifungal	32%	39%	29%	1.1:1	440
Antibiotics	35%	50%	15%	0.5:1	2907
Antifungals[C]					
Diflucan	8%	34%	62%	13:1	1214
Nystatin	5%	43%	52%	11:1	1960
Atarax	26%	53%	21%	0.8:1	543
Benadryl	24%	50%	26%	1.1:1	3230
Beta Blocker	18%	51%	31%	1.7:1	306
Buspar	29%	42%	28%	1.0:1	431
Chloral Hydrate	42%	39%	18%	0.5:1	498
Clonidine	22%	32%	46%	2.1:1	1658
Clozapine	38%	43%	19%	0.5:1	170
Cogentin	20%	55%	27%	1.4:1	198
Cylert	45%	35%	18%	0.4:1	634
Depakote[D]					
Behavior	25%	44%	31%	1.2:1	1144
Seizures	12%	55%	55%	4.6:1	761
Desipramine	36%	35%	32%	0.9:1	98
Dilantin[D]					
Behavior	28%	49%	23%	0.8:1	1127
Seizures	16%	37%	47%	3.0:1	484
Fenfluramine	21%	52%	27%	1.3:1	483
Haldol	38%	28%	34%	0.9:1	1222
IVIG	7%	39%	54%	7.6:1	142
Klonopin[D]					
Behavior	31%	48%	29%	0.9:1	278
Seizures	29%	55%	16%	0.6:1	86
Lithium	22%	48%	31%	1.4:1	515
Luvox	31%	37%	32%	1.0:1	251
Mellaril	29%	38%	33%	1.2:1	2108
Mysoline[D]					
Behavior	41%	46%	13%	0.3:1	156
Seizures	21%	55%	24%	1.1:1	85
Naltrexone Low Dose	18%	49%	33%	1.8:1	359
Naltrexone	11%	52%	38%	4.0:1	198
Paxil	34%	32%	35%	1.0:1	471
Phenobarb.[D]					
Behavior	48%	37%	16%	0.3:1	1125
Seizures	18%	44%	38%	2.2:1	543
Prolixin	30%	41%	28%	0.9:1	389
Prozac	33%	32%	35%	1.1:1	1391
Risperidal	21%	26%	54%	2.6:1	1216
Ritalin	45%	26%	29%	0.6:1	4256
Secretin					
Intravenous	7%	50%	43%	6.4:1	887
Transderm.	8%	56%	35%	3.9:1	257
Stelazine	25%	48%	26%	0.9:1	437
Steroids	34%	30%	36%	1.1:1	284
Tegretol[D]					
Behavior	25%	45%	30%	1.2:1	1556
Seizures	14%	33%	53%	3.8:1	872
Thorazine	36%	40%	24%	0.7:1	945
Tofranil	30%	38%	32%	1.1:1	785
Valium	35%	42%	24%	0.7:1	895
Valtrex	8%	42%	50%	6.7:1	238
Zarontin[D]					
Behavior	34%	48%	18%	0.5:1	164
Seizures	20%	55%	25%	1.2:1	125
Zoloft	35%	35%	31%	0.9:1	579

BIOMEDICAL/ NON-DRUG/ SUPPLEMENTS	Parent Ratings: Got Worse[A]	No Effect	Got Better	Better: Worse	No. of Cases[B]
Calcium[E]	3%	60%	36%	12:1	2852
Cod Liver Oil	4%	41%	55%	14:1	2550
Cod Liver Oil with Beltasorol	11%	53%	36%	3.4:1	293
Colostrum	6%	56%	38%	6.8:1	851
Detox. (Chelation)[C]	3%	23%	74%	24:1	1382
Digestive Enzymes	3%	35%	62%	19:1	2350
DMG	8%	58%	42%	5.3:1	4363
Fatty Acids	2%	38%	59%	32:1	1680
5 HTP	11%	42%	47%	4.2:1	644
Folic Acid	5%	58%	45%	10:1	2505
Food Allergy Tetmnt	2%	51%	47%	17:1	1294
Hyperbaric Oxygen Therapy	5%	36%	60%	12:1	219
Magnesium	6%	65%	29%	4.6:1	301
Melatonin	8%	28%	64%	8.3:1	1687
Methyl B12 (nasal)	10%	46%	44%	4.2:1	240
Methyl B12 (subcut.)	6%	22%	72%	12:1	899
MT Promoter	8%	47%	44%	5.5:1	98
PEP (Vit. B6)	11%	48%	41%	4.2:1	920
Pepcid	11%	57%	32%	2.9:1	220
SAMe	16%	62%	23%	1.4:1	244
St. Johns Wort	19%	64%	18%	0.9:1	217
TMG	16%	43%	41%	2.6:1	1152
Transfer Factor	8%	47%	45%	5.9:1	274
Vitamin A	3%	54%	44%	14:1	1535
Vitamin B3	6%	51%	43%	10:1	1192
Vit. B6/Mag.	4%	46%	49%	13:1	7256
Vitamin C	2%	52%	46%	28:1	3077
Zinc	2%	44%	54%	24:1	2738
SPECIAL DIETS					
Candida Diet	3%	39%	58%	23:1	1141
Feingold Diet	2%	40%	58%	26:1	1841
Gluten- /Casein-Free Diet	3%	28%	69%	24:1	3593
Low Oxalate Diet	7%	43%	50%	6.8:1	164
Removed Chocolate	3%	46%	51%	20:1	2264
Removed Eggs	2%	53%	45%	20:1	1658
Removed Milk Products/Dairy	2%	44%	55%	32:1	4980
Removed Sugar	2%	46%	53%	27:1	4589
Removed Wheat	2%	45%	55%	30:1	4340
Rotation Diet	2%	43%	55%	23:1	1697
Specific Carbohydrate Diet	7%	22%	71%	10:1	557

Institutional Review Board Statement

This case report was approved by the
Institutional Review Board of Johns Hopkins University.

Approval number: HIRB00020122
Date: October 21, 2024

SCD Autism Reversal: Concise Timeline

- **Birth:** Vaginal birth, went into labor naturally. 3 days overdue.
- **23 months:** Dx: Speech Delay at University of Maryland School of Medicine (expressive speech < 25% cutoff)
- **24 months:**
  - Began Speech Therapy twice monthly for 30-minute sessions.
  - Tympanometry indicated adequate middle ear mobility and pressure.
- **26 months:** Lead blood test = negative
- **32 months**:
  - Dx: Autism at Baltimore City Infants and Toddlers Program
  - Began Gluten-free Diet: stimming behaviors (hand flapping) reduced, but autism symptoms persisted
- **35 months:**
  - Home videos show poor speech, lack of response to own name, poor eye contact.
  - Dx: Autism at Kennedy Krieger Institute
  - ADOS DSM-IV:
    - Communication Total = 7 (Autism threshold ≥ 4)
    - Social Interaction Total = 10 (Autism threshold ≥ 7)
    - Stereotyped Behaviors and Restricted Interests Total = 3
  - **Began Specific Carbohydrate Diet**

SCD Autism Reversal: Concise Timeline

- **52 months:** Symptoms of Autism Greatly Reduced
  - Home videos show excellent expressive speech, interpersonal skills, and eye contact.
  - **Individualized Education Program (IEP) for speech therapy dissolved**

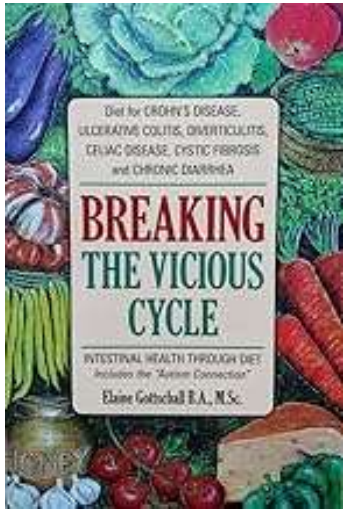
- **Age 6 - Graduated from Montessori Children's House**

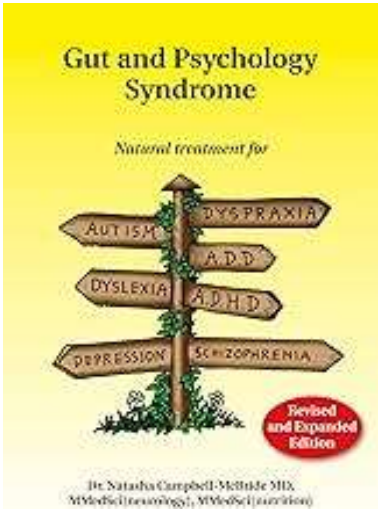
- **Age 9 - Graduated from Montessori Lower Elementary, entered a competitive private boys school**

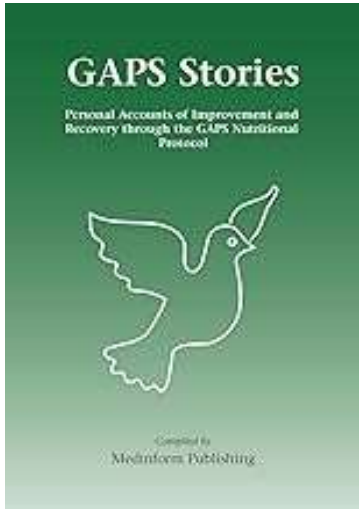
- **Age 17 - Attained Eagle Scout Ranking**

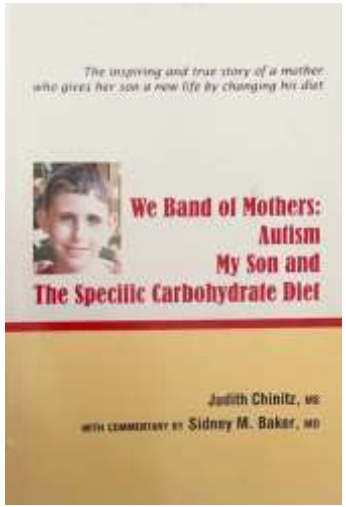
- **Age 18 - Graduated from a competitive private boys school**
  - Enrolled in a competitive Engineering College
  - ADOS re-evaluation. Score = 0

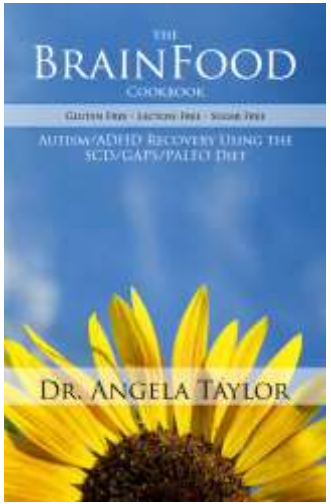
Resources:
Specific Carbohydrate Diet (SCD)











Thank you! Questions?

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