Nutrition and Psychiatry Research-Based Prevention and Treatment Approaches
The Typical American Diet
Three food groups - sweets and desserts, soft drinks and alcoholic beverages - comprise almost 25 percent of all calories consumed by Americans.
Salty snacks and fruit-flavored drinks make up another five percent
bringing the total energy contributed by nutrient-poor foods to at least 30 percent of the total calorie intake
37% of Energy is From Fat
Too many calories, too little exercise = Obesity
Obesity and Psychiatry
Obesity

A BMI (Body Mass Index) over the 95th percentile for age and sex.
More than 15% of youth aged 6-19 are obese
More than 10% of children age 2-5 are obese
More than 23% of non-Hispanic black and Mexican American adolescents are obese
The prevalence of obesity has doubled to tripled in the last twenty years in the child and adolescent population.
Prevalence of Overweight Among Children and Adolescents

![Bar chart showing the prevalence of overweight among children and adolescents from 1963-65 to 1999-2000. The x-axis represents age groups (6-11 years and 12-19 years), and the y-axis represents percent. The chart indicates an increase in the prevalence of overweight over the years.]
As many as 94% suffer from a sleep abnormality, most often sleep apnea.
Sleep apnea can lead to daytime sleepiness, altered mood and cognitive difficulties.
Adjustment Disorder from Prejudice, Taunting, Discrimination
The cultural bias against obesity has been described as “the last socially acceptable form of prejudice”
Depression precedes obesity in adolescents and obesity precedes depression in older adults.
Psychopathology is most common in the chronic obese group first, suggesting that obesity increases the risk of developing a mental health disorder.
Obese pediatric patients have higher rates of anxiety, depression and eating disorders than the general population.
58% had at least one diagnosis. 32% had anxiety disorders, 12% had mood disorders, and 16% had disruptive behavior disorders.
Chronic obesity is associated with psychiatric disorder: oppositional defiant disorder in boys and girls and depressive disorders in boys.
Major depression among adolescents predicted a greater body mass index (BMI = kg/m(2)) in adult life than for persons who had not been depressed.
Obesity Caused By Psychiatric Medication
Antidepressants- especially tricyclics and MAO inhibitors. Of the SSRIs, paroxetine (Paxil) has been implicated in weight gain.
Mood Stabilizers-
Lithium, Depakote, gabapentin, carbemazepine
Antipsychotics, especially clozapine, olanzapine, risperidone, ziprazadone
The prevalence of overweight among hospitalized children and adolescents with exposure to atypical antipsychotics is triple that of national norms.
Dyslipidemia is also common
The psychiatric effects of obesity can be prevented by preventing obesity in the first place.
Obesity that results from psychiatric disorders (e.g., overeating in depression) can be prevented by treating the underlying disorder.
Things that Make You Worse
Toxins in the Environment and Their Effect on Psychopathology
Body Burden - The Pollution in Newborns

A benchmark investigation of industrial chemicals, pollutants and pesticides in umbilical cord blood

Environmental Working Group, July 14, 2005
Researchers at two major laboratories found an average of 200 industrial chemicals and pollutants in umbilical cord blood from 10 babies born in August and September of 2004 in U.S. hospitals.
Tests revealed a total of 287 chemicals in the group
The umbilical cord blood of these 10 children, collected by Red Cross after the cord was cut, harbored pesticides, consumer product ingredients, and wastes from burning coal, gasoline, and garbage
Of the 287 chemicals we detected in umbilical cord blood, we know that 180 cause cancer in humans or animals, 217 are toxic to the brain and nervous system, and 208 cause birth defects or abnormal development in animal tests.
Mercury (Hg) - tested for 1, found 1

Polyaromatic hydrocarbons (PAHs) - tested for 18, found 9

Polybrominated dibenzodioxins and furans (PBDD/F) - tested for 12, found 7

Perfluorinated chemicals (PFCs) - tested for 12, found 9

Polychlorinated dibenzodioxins and furans (PBCD/F) - tested for 17, found 11

Organochlorine pesticides (OCs) - tested for 28, found 21

Polybrominated diphenyl ethers (PBDEs) - tested for 46, found 32

Polychlorinated Naphthalenes (PCNs) - tested for 70, found 50

Polychlorinated biphenyls (PCBs) - tested for 209, found 147
Of more than 80,000 registered chemicals and more than 900 pesticides, only 12 have been tested for toxicity to the developing brain, using EPA’s only validated test for such effects.
Bisphenol A has been used in plastic baby bottles. It has been linked to damage in developing brain tissue.
http://www.newshttp://www.news--
medical.net/?
id=14790medical.net
/?id=14790
Pesticides
A major finding of the NAS report "Pesticides in the Diets of Infants and Children" is that children have proportionately greater dietary exposures to pesticides than adults.
In addition to being proportionately more heavily exposed to pesticides than adults, infants and children are biologically more vulnerable to them.
Children's metabolic pathways, especially in the first months after birth, are immature compared to those of adults.
Fetuses, infants, and children are less able to detoxify chemicals such as organophosphate pesticides and thus are more vulnerable to them.
Infants and children are growing and developing, and their delicate developmental processes are easily disrupted.
The concordance of young children's disproportionately heavy exposure to pesticides, coupled with their developmental vulnerabilities, places them at seriously increased risk for neurologic, endocrine, and other developmental disabilities
<table>
<thead>
<tr>
<th>Condition</th>
<th>Increase</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autism</td>
<td>10X</td>
<td>early 80's - 1996</td>
</tr>
<tr>
<td>Male Birth Defects</td>
<td>2X</td>
<td>increase hypospadias, 1970 - 1993</td>
</tr>
<tr>
<td>Childhood Asthma</td>
<td>2X</td>
<td>increase 1982 - 1993</td>
</tr>
<tr>
<td>Acute Lymphocytic Leukemia</td>
<td>62%</td>
<td>increase in children, 1973 - 1999</td>
</tr>
<tr>
<td>Childhood Brain Cancer</td>
<td>40%</td>
<td>increase 1973 - 1994</td>
</tr>
<tr>
<td>Preterm Birth</td>
<td>23%</td>
<td>increase mid 80's - 2002</td>
</tr>
<tr>
<td>Infertility</td>
<td>5 - 10%</td>
<td>of couples</td>
</tr>
<tr>
<td>Birth Defects</td>
<td>3 - 5%</td>
<td>of all babies</td>
</tr>
<tr>
<td>Sperm Counts</td>
<td>1%</td>
<td>decrease yearly 1934 - 1996</td>
</tr>
</tbody>
</table>
Mercury
In the United States, exposure to organic mercury is primarily through ingestion of contaminated fish
Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.
The effects on infants born to mothers with mild exposure to methylmercury are mainly neurological, including delayed developmental milestones (first step, first word, etc.), altered muscle tone and tendon reflexes, and depressed intelligence.
Those who consume large amounts of seafood from contaminated waters have an increased risk of toxicity.
Surveys indicate that public awareness of the risks of mercury-contaminated fish is limited.
Low level methylmercury exposure affects neuropsychological function in adults
A study of 129 residents of fishing villages in Brazil reported that higher hair mercury levels were associated in a dose-dependent manner.
with reduced response inhibition and manual dexterity
Emissions from burning fossil fuels containing trace amounts of mercury;
Emissions from the disposal, use, or manufacture of mercury-containing products or industrial wastes; and
Incidental emissions from processing mineral resources containing mercury (e.g., lead, talc, or copper ores, and lime-stone).
For:
- Pregnant women
- Women who might become pregnant
- Children under age 15:
Fish caught in Minnesota:

Sunfish, crappie, yellow perch, bullheads

1 meal a week (see exceptions)*

Walleyes shorter than 20 inches, northern pike shorter than 30 inches, smallmouth bass, largemouth bass, channel catfish, flathead catfish, white sucker, drum, burbot, sauger, carp, lake trout, white bass, rock bass, whitefish, other species

1 meal a month (see exceptions)*

Walleyes larger than 20 inches
northern pike longer than 30 inches, muskellunge

Do not eat
Commercial Fish:

Salmon, cod, pollock, canned "light" tuna (6 oz.),
catfish, tilapia, herring, sardines, shrimp, crab,
scallops, oysters

2 meals a week

Canned "white" tuna (6 oz.), tuna steak, halibut,
lobster

2 meals a month

Shark, swordfish, tile fish, king mackerel  Do not eat
*Fish from some Minnesota Lakes and rivers have been found to have higher levels of mercury or PCBs. If you eat certain fish from these waters, you should eat it less often than these guidelines.
Food Coloring
Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial
Lancet.
2007:370(9598):
1560–1567
In a double-blind, placebo-controlled study, artificial food colors and a benzoate preservative appear to increase hyperactivity in children, including those without attention-deficit/hyperactivity disorder.
Nearly 300 children were involved in the study.

- 153 3-year-olds
- 144 children ages 8 and 9
Three groups of food dyes were part of the study.

**Group One**

- Sunset yellow
- Carmoisine
- Tartrazine
- Ponceau
- Sodium benzoate (a preservative)
Group Two

• Sodium benzoate
• Sunset yellow
• Carmoisine
• Quinoline yellow
• Allura red.
Group Three

• Placebo
Older children showed a "significantly adverse effect" from Group One and Group Two. Younger children seemed significantly affected by Group One, only
Many of the juices children are given to drink as a healthy snack are filled with food colorings. Unless a fruit juice is 100% natural, it is likely to be filled with sugar and dyes.
Chips and cereals are filled with dyes. Look at all the colorful boxes in the cereal section next time you go shopping. The use of dyes is quite evident
Dietary replacement in preschool-aged hyperactive boys
A combination of the antigen- and additive-free (AAF) diet is sometimes advised in suspected additive-reactive and allergy-prone children.
At the Alberta Children’s Hospital and Learning Center, Calgary, Canada, a 4-week trial of an AAF elimination diet in 24 hyperactive pre-school boys, aged 3.5 to 6 years.
was associated with significant improvements in behavior in 42% and lesser improvements in 12%, when compared to baseline and placebo-control periods of observation.
The diet eliminated artificial colors and flavors, chocolate, monosodium glutamate, preservatives, and caffeine; it was low in sucrose. It was dairy-free if an allergy to milk was suspected.
Sugar
Sucrose molecule (sugar)

Hydrogen
Carbon
Oxygen

Glucose
Fructose
Effects of sugar (sucrose) on children’s behavior
Journal of Consulting Clinical Psychology, 56:583-9, 1988
On measures of cognitive function, girls made significantly less errors on a learning task performed 30 minutes following the low-sugar content breakfast when compared to the high-sugar meal.
On an Abbreviated Conners Teacher Rating Scale completed before lunch, both boys and girls were more active in behavior after the high-sugar meal compared to a low-sugar intake.
Effects of sugar on aggressive and inattentive behavior in children with attention deficit disorder with hyperactivity and normal children
At Schneider Children’s Hospital, inattention, measured by a continuous performance task, was increased following a sucrose drink given with a breakfast high in carbohydrate.
Sugar and a high-carbohydrate breakfast, but not sugar and a high-protein breakfast, increased deviant behavior in normal children.
Things You Need Enough Of
Deficiency States
Vitamins
An organic compound required as a nutrient in tiny amounts by an organism
A compound is called a vitamin when it cannot be synthesized in sufficient quantities by an organism, and must be obtained from the diet.
Nutritional Side Effects of Excessive Dieting and Anorexia Nervosa
Vitamin B1 - Thiamine
Prevalence of thiamin deficiency in anorexia nervosa
Vitamin B1, (Thiamine), releases energy from carbohydrate, alcohol and fat. It is an anti-neuritic factor, the absence of which from the diet of animal leads to the disease beri-beri, the most fundamental symptoms of which is general nervous atrophy.
Symptoms: Weight loss, emotional disturbance, impaired sensory perception, weakness and pain in the limbs
Good sources of sources Vitamin B1 are yeast eggs and germ of cereals. It is not present in polished rice and other highly purified cereal products.
Investigated the prevalence of thiamin deficiency in 37 16-60 yr old patients with anorexia nervosa.
14 patients (38%) had results in the deficient range; 7 (19%) met the most stringent published criterion for deficiency
Deficiency was not related to duration of eating restraint, frequency of vomiting, or alcohol consumption.
It was concluded that thiamin deficiency may account for some of the neuropsychiatric symptoms of AN and routine screening or supplementation may be indicated.
Vitamin B6
PYRIDOXINE
Dietary sources: Pork, organ meats, meat, poultry, fish, corn, legumes, seeds, grains, wheat, potatoes, bananas, green leafy vegetables, green beans, brewer's yeast, avocados, wheat germ, wheat bran, soybeans, walnuts, blackstrap molasses, cantaloupe, cabbage, milk, egg yolks, green peppers, carrots, peanuts and pecans
Vitamin B₆ is needed for more than 100 enzymes involved in protein metabolism. It is also essential for red blood cell metabolism. The nervous and immune systems need vitamin B₆ to function efficiently, and it is also needed for the conversion of tryptophan (an amino acid) to niacin (a vitamin).
Reduced by Theophylline (used to treat asthma), also may be reduced in alcoholics and individuals who have poor diets.
Vitamin B₆ is needed for the synthesis of neurotransmitters such as serotonin and dopamine.
Lower levels of serotonin have been found in individuals suffering from depression and migraine headaches. So far, however, vitamin B$_6$ supplements have not proved effective for relieving these symptoms.
Vitamin B6 nutritional status of a psychiatric outpatient population
Assessed the vitamin B6 status of 232 7-83 yr old psychiatric outpatients and a control group using an assay method.
Results show that the mean deficiency was 17.7%
B6 deficiency was more prominent in young adults and in the aged
Cooking and food processing destroys vitamin B6
Analysis of our food supply indicates that many of us are consuming less than the RDA amount
This is due to practices of milling that remove up to 90% of vitamin B6. As of yet, there are no laws requiring the enrichment of milled grains with pyridoxine
Probably the biggest cause of deficiency (or an increased requirement) is the addition of antagonists in the environment over the last 50 years.
Antagonists include:

Hydrazine compounds: tartrazine (yellow dye #5), peroxides and free radicals, birth control pills, PCBs, environmental toxins, alcohol, and caramel coloring.
The symptoms of B6 deficiency may include depression and irritability.
Vitamin B3 (Niacin)
Niacin
Food sources: grains, vegetables, meat, poultry, fish; also synthesized by tryptophan
Niacin Deficiency - Pellagra
Psychiatric symptoms include aggression, insomnia, mental confusion and dementia.
Vitamin D
Persistent, non-specific musculoskeletal pain: high prevalence of severe hypovitaminosis D. Mayo Clinic Proceedings. 2003;78:1463-1470
150 patients presented consecutively between February 2000 and June 2002 with persistent, nonspecific musculoskeletal pain to the Community University Health Care Center.
93% (140/150) had deficient levels of vitamin D
Chronic muscle pain affects one's mental health
Low Iron Levels are More Common in Patients who have Autism Spectrum Disorders
Malnutrition
Malnutrition at age 3 years and externalizing behavior problems at ages 8, 11, and 17 years
Malnutrition predisposes to neurocognitive deficits, which in turn predispose to persistent externalizing behavior problems throughout childhood and adolescence.
Reducing early malnutrition may help reduce later antisocial and aggressive behavior.
Fatty Acids
Essential fatty acids, or EFAs, are fatty acids that cannot be constructed within an organism from other components by any known chemical pathways.
and therefore must be obtained from the diet
There are two families of EFAs- omega 3 and omega 6
Some of the food sources of omega 3 and omega 6 fatty acids are fish and shellfish, flaxseed, hemp oil, soya oil, canola oil, chia seeds, pumpkin seeds, sunflower seeds, leafy vegetables and walnuts.
<table>
<thead>
<tr>
<th>Fish</th>
<th>Mercury (ppm) (grams/3-oz.)</th>
<th>Omega-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canned tuna (light)</td>
<td>0.12</td>
<td>0.17–0.24</td>
</tr>
<tr>
<td>Shrimp</td>
<td>ND*</td>
<td>0.29</td>
</tr>
<tr>
<td>Pollock</td>
<td>0.06</td>
<td>0.45</td>
</tr>
<tr>
<td>Salmon</td>
<td>0.01</td>
<td>1.1–1.9</td>
</tr>
<tr>
<td>Cod</td>
<td>0.11</td>
<td>0.15–0.24</td>
</tr>
<tr>
<td>Catfish</td>
<td>0.05</td>
<td>0.22–0.3</td>
</tr>
<tr>
<td>Clams</td>
<td>ND*</td>
<td>0.25</td>
</tr>
<tr>
<td>Flounder/sole</td>
<td>0.05</td>
<td>0.48</td>
</tr>
<tr>
<td>Crabs</td>
<td>0.06</td>
<td>0.27–0.40</td>
</tr>
<tr>
<td>Scallops</td>
<td>0.05</td>
<td>0.18–0.34</td>
</tr>
</tbody>
</table>

Thursday, September 11, 14
<table>
<thead>
<tr>
<th>Fish</th>
<th>Value</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobster</td>
<td>0.31</td>
<td>0.07–0.46</td>
</tr>
<tr>
<td>Grouper</td>
<td>0.55</td>
<td>0.23</td>
</tr>
<tr>
<td>Halibut</td>
<td>0.26</td>
<td>0.60–1.12</td>
</tr>
<tr>
<td>Oysters</td>
<td>ND*</td>
<td>0.37–1.14</td>
</tr>
<tr>
<td>Mahi mahi</td>
<td>0.19</td>
<td>0.13</td>
</tr>
<tr>
<td>Herring</td>
<td>0.04</td>
<td>1.9–2.0</td>
</tr>
<tr>
<td>Shark</td>
<td>0.99</td>
<td>0.83</td>
</tr>
<tr>
<td>Swordfish</td>
<td>0.97</td>
<td>0.97</td>
</tr>
<tr>
<td>Tilefish</td>
<td>1.45</td>
<td>0.90</td>
</tr>
<tr>
<td>Mackerel</td>
<td>0.73</td>
<td>0.36</td>
</tr>
<tr>
<td>Tuna</td>
<td>0.38</td>
<td>0.21–1.1</td>
</tr>
<tr>
<td>Red snapper</td>
<td>0.60</td>
<td>0.29</td>
</tr>
<tr>
<td>Orange roughy</td>
<td>0.54</td>
<td>0.028</td>
</tr>
</tbody>
</table>
Omega-3 EFAs, ADHD and Behavioral Disorders
Effect of supplementation with polyunsaturated fatty acids and micronutrients on learning and behavior problems associated with child ADHD
132 Australian children aged 7 to 12 years with scores $\geq 2$ SD above the population average on the Conners ADHD Index
PUFAs alone, PUFAs + micronutrients, or placebo
Significant medium to strong positive treatment effects were found on parent ratings of core ADHD symptoms, inattention, hyperactivity/impulsivity, on the Conners Parent Rating Scale (CPRS) in both PUFA treatment groups compared with the placebo group.
No additional effects were found with the micronutrients
Highly unsaturated fatty acids (HUFA)
A randomized double-blind, placebo-controlled study of the effects of supplementation with highly unsaturated fatty acids on ADHD-related symptoms in children with specific learning disabilities
The effects of HUFA supplementation on ADHD-related symptoms in children with specific learning difficulties (mainly dyslexia) who also showed ADHD features
41 children (aged 8-12 yrs) with both specific learning difficulties and above-average ADHD ratings were randomly allocated to HUFA supplementation or placebo for 12 wks
After 12 wks mean scores for cognitive problems and general behavior problems were significantly lower for the group treated with HUFA than for the placebo group.
There were significant improvements from baseline on 7 out of 14 scales for active treatment, compared with none for placebo.
Omega-3 fatty acids in boys with behavior, learning, and health problems
Physiology & Behavior. Vol 59(4-5) Apr-May 1996, 915-920
Compared behavior, learning, and health problems in 32 boys (aged 6-12 yrs) with lower plasma phospholipid total omega-3 or total omega-6 fatty acid levels with those in 64 boys with higher levels of these fatty acids.
A greater frequency of symptoms indicative of essential fatty acid deficiency was reported by the parents of Ss with lower plasma omega-3 or omega-6 fatty acid concentrations than those with higher levels
A greater number of behavior problems, assessed by the Conners' Rating Scale, temper tantrums, and sleep problems was reported in Ss with lower total omega-3 fatty acid concentrations.
Additionally, more learning and health problems were found in Ss with lower total omega-3 fatty acid concentrations.
Omega-3 fatty acids and antioxidants in neurological and psychiatric diseases: an overview
Omega-3 fatty acids are known to play a role in nervous system activity, cognitive development, memory-related learning, neuroplasticity of nerve membranes, synaptogenesis and synaptic transmission.
The brain is considered abnormally sensitive to oxidative damage, and aging is considered one of the most significant risk factors for degenerative neurological disorders.
A number of critical trials have confirmed the benefits of dietary supplementation with omega-3 fatty acids not only in several psychiatric conditions, but also in inflammatory and autoimmune and neurodegenerative diseases.
Fish oil and mental health: the role of n-3 long-chain polyunsaturated fatty acids in cognitive development and neurological disorders
The role of marine n-3 long-chain polyunsaturated fatty acids in brain functions, including the development of the central nervous system and neurological disorders
Although an optimal balance in n-3/n-6 long-chain polyunsaturated fatty acid ratio is important for proper neurodevelopment and cognitive functions, results from randomized controlled trials are controversial and do not confirm any useful effect of supplementation on development of preterm and term infants.
The relationship between fatty acid status and mental disorders is confirmed by reduced levels of n-3 long-chain polyunsaturated fatty acids in erythrocyte membranes of patients with central nervous system disorders.
Nevertheless, there are very little data supporting the use of fish oil in those patients.
The only way to verify whether n-3 long-chain polyunsaturated fatty acids are a potential therapeutic option in the management and prevention of mental disorders is to conduct a large definitive randomized controlled trials similar to those required for the licensing of any new pharmacological treatment.
Long-chain polyunsaturated fatty acids in childhood developmental and psychiatric disorders
Both omega-3 and omega-6 long-chain PUFA (LC-PUFA) are crucial to brain development and function.
Omega-3 LC-PUFA in particular are often lacking in modern diets in developed countries.
Increasing evidence, reviewed here, indicates that LC-PUFA deficiencies or imbalances are associated with childhood developmental and psychiatric disorders including ADHD, dyslexia, dyspraxia, and autistic spectrum disorders.
These conditions show a high clinical overlap and run in the same families, as well as showing associations with various adult psychiatric disorders in which FA abnormalities are already implicated, such as depression, other mood disorders, and schizophrenia.
Preliminary evidence from controlled trials also suggests that dietary supplementation with LC-PUFA might help in the management of these kinds of childhood behavioral and learning difficulties.
Treatment with omega-3 FA appears most promising, but the few small studies published to date have involved different populations, study designs, treatments, and outcome measures.
Large-scale studies are now needed to confirm the benefits reported.
Further research is also required to assess the durability of such treatment effects, to determine optimal treatment compositions and dosages, and to develop reliable ways of identifying those individuals most likely to benefit from this kind of treatment.
Potential diagnostic aids for abnormal fatty acid metabolism in a range of neurodevelopmental disorders
Prostaglandins Leukotrienes & Essential Fatty Acids. 63(1-2):65-8, 2000 Jul-Aug
Disorders of neurodevelopment include attention deficit hyperactivity disorder, dyspraxia, dyslexia and autism.
All of these disorders have been reported as associated with fatty acid abnormalities ranging from genetic abnormalities in the enzymes involved in phospholipid metabolism to symptoms reportedly improved following dietary supplementation with long chain fatty acids.
If definitive disorders of lipid metabolism could be defined then the diagnosis and subsequent management of neurodevelopmental disorders might be transformed.
In the identification of those disorders of development which involve lipid metabolism, there are now several tests, measures of lipid metabolism, which could be useful
Could oxidative stress be a factor in neurodevelopmental disorders?
Prostaglandins Leukotrienes & Essential Fatty Acids. 63(1-2):61-3, 2000 Jul-Aug
Eicosanoids are signaling molecules made by oxygenation of twenty-carbon essential fatty acids, (EFAs).
They exert complex control over many bodily systems, mainly in inflammation or immunity, and as messengers in the central nervous system.
The networks of controls that depend on eicosanoids are among the most complex in the human body.
Eicosanoids derive from either omega-3 or omega-6 essential fatty acids
There is evidence of co-morbidity in the neurodevelopmental disorders and they display depletion of polyunsaturated fatty acids (PUFAs) in their plasma and red cell membranes.
This suggests an abnormal fatty acid metabolism, which may affect cell signalling and synthesis of eicosanoids.
This common feature in the neurodevelopmental disorders may be genetic in origin: however, oxidative stress may also contribute to decreased PUFAs found in these disorders.
Omega 3 Fatty Acids and Mood Disorders
Depression
Several controlled studies in adults have demonstrated usefulness and effectiveness
Few studies have been done in children
e.g., Effectiveness of complementary and self-help treatments for depression in children and adolescents

2006;185:368-372
Omega-3 treatment of childhood depression: a controlled, double-blind pilot study
Am J Psychiatry.
2006;16:1098-1100
Bipolar Mood Disorder
Studies in adult patients show some benefit; no evidence in children
Supplements
Dietary supplements and natural products as psychotherapeutic agents
Alternative therapies are widely used by consumers. A number of herbs and dietary supplements have demonstrable effects on mood, memory, and insomnia.
There is a significant amount of evidence supporting the use of Hypericum perforatum (St. John's wort) for depression and Ginkgo biloba for dementia.
There is intriguing preliminary evidence for the use of folate, tryptophan, and phenylalanine as adjuncts to enhance the effectiveness of conventional antidepressants.
S-adenosylmethionine (SAMe) seems to have antidepressant effects.
Omega-3 polyunsaturated fatty acids, particularly docosahexaenoic acid, may have mood-stabilizing effects.
More research should be conducted on these and other natural products for the prevention and treatment of various psychiatric disorders.
SAMe
SAMe is made by the body and is a metabolite present in all living cells.
SAMe has been found effective for treating major depressive disorder in 13 trials comparing it to placebo, and 19 trials comparing it to tricyclic antidepressants with more than 1400 patients studied.
The mechanism for SAMe's effectiveness in Major Depression is unclear.
S-Adenosyl methionine (SAM) is a coenzyme involved in methyl group transfers
More than 40 metabolic reactions involve the transfer of a methyl group from SAM to various substrates such as nucleic acids, proteins and lipids.
Since SAMe functions as a precursor to methylation, aminopropylation and transulfuration pathways, its mechanism may be related to being the most important methyl donor in the brain and essential for polyamine synthesis.
SAMe is an intermediate in the synthesis of norepinephrine, dopamine and serotonin.
S-Adenosyl-L-Methionine for Treatment of Depression, Osteoarthritis, and Liver Disease
Out of 39 unique studies considered, 28 studies were included in a meta-analysis of the efficacy of SAMe to decrease symptoms of depression.
Compared to placebo, treatment with SAMe was associated with an improvement of approximately 6 points in the score of the Hamilton Rating Scale for Depression measured at 3 weeks.
This degree of improvement is statistically as well as clinically significant and is equivalent to a partial response to treatment.
Compared to treatment with conventional antidepressant pharmacology, treatment with SAMe was not associated with a statistically significant difference in outcomes.
SAMe use in children and adolescents
Discusses the successful use of S-adenosylmethionine (SAMe) for Major Depression in three youths (a 16-yr-old male and 8- and 11-yr-old females)
Bipolar Disorder and Schizophrenia Findings
S-adenosyl methionine and DNA methyltransferase-1 mRNA overexpression in psychosis
Prefrontal cortex levels of the methyl donor S-adenosyl methionine were increased by about two-fold in schizophrenia and bipolar disorder patients, but not in unipolar depressed patients compared with nonpsychiatric subjects.
CoEnzyme Q 10
Is a powerful antioxidant that buffers the potential adverse consequences of free radicals produced during oxidative phosphorylation in the inner mitochondrial membrane.
It is an essential component of the mitochondrial electron-transport chain. It is involved in the manufacturing of adenosine triphosphate (ATP) and has been linked with improving cognitive functions.
Oxidative stress, resulting in glutathione loss and oxidative DNA and protein damage, has been implicated in many neurodegenerative disorders, including Alzheimer's disease, Parkinson's disease, and Huntington's disease.
Alzheimer’s Disease: Suppresses brain protein carbonyl levels which are markers of oxidative damage
Behavioural Brain Research.
This study shows the neuroprotective effect of CoQ10 on cognitive impairments and oxidative damage in hippocampus and cerebral cortex of intracerebroventricular-streptozotocin (ICV-STZ) infused rats.
A 16-month randomized, placebo-controlled pilot trial in 80 subjects with mild Parkinson's disease found significant benefits for oral CoQ10 1,200 mg/day to slow functional deterioration.
Other:
Heart Failure
Glaucoma
Male Infertility
Hypertension
Exercise enhancement
Psychiatric Benefits?
Improving Children’s Diets
Nutritional changes heighten children's achievement: A 5-year study
Childrens' Achievement Program for Educational Readiness at an elementary school that evaluated whether nutritional changes, and changes in habits surrounding nutrition, would have a long-term impact on the children's learning and behavioral performances.
Children were given a modified menu in which refined carbohydrate foods were eliminated and fresh fruits and juices, whole wheat flour, honey, and unprocessed foods were substituted for other foods.
The teachers found that within a period of 6 months after making modifications in the children's diet, significant improvements were achieved in both behavior and learning patterns of the children.
Herbal Medicine
(Another Lecture)
Common Herbs Used for ADHD

- Echinacea
- Siberian Ginseng
- Brahmi (Bacopa monnieri)
- Blue-green algae
- Ginkgo biloba
- Oligomeric proanthocyanidin (OPCs, Pycnogenol)
- Valerian (Valeriana officinalis)
- Lemon balm (Melissa officinalis)
- Kava (Piper methysticum)
- Chamomile (Matricaria recutita)
- Passion Flower (Passiflora incarnata)
- Hops (Humulus lupulus)
Common Herbs for Treating Depression
St. John’s Wort (Hypericum perforatum)
5-hydroxytryptophan (5-HT) (extracted from Griffonia simplicifolia)
Supplements that contain amino acids also reduce symptoms, because they are converted to neurotransmitters that alleviate depression and other mental disorders.
Common herbs used to treat anxiety
Kava-kava
(Piper methysticum)
Valerian
Others:
Ashwagandha
Borage juice
Bugleweed
California poppy
Catnip
Chamomile
Fennel
Feverfew
Hops
Lemon balm
Meadowsweet
Mullein
Motherwort
Oats
Passion Flower
Peppermint
Skullcap
Verbena
Summary:
Balanced healthy diet
Avoid processed foods, non-nutrients
Exercise
Supplements?
Herbs?
Prevention
Obesity and its sequelae
Problems due to allergens
Problems due to vitamin deficiency
Problems due to toxins
Treatment
Healthy Diet
Essential Fatty Acids?
SAMe?
Herbal medicine?
Bottom line- what does research about complementary and alternative medicine say?
Omega-3:

Depression: Several studies in adults, few in children. Good evidence

Bipolar disorder: Studies in adults: some benefit, no evidence in children

ADHD: Several controlled studies, inconsistent results, results uncertain

Specific developmental disorders: Few studies, suggestion of some benefit for reading and spelling
St. John’s Wort

Depression: Many studies in adult patients, limited data for children. May be beneficial as antidepressants in mild depression.
SAMe

Depression: Adult data increasingly showing that SAMe may be as effective as antidepressants, no clear evidence for children
Kava
Valerian
Passionflower

Anxiety: no evidence in children
Harvard School of Public Health
Healthy Eating Pyramid
1. Start with exercise. A healthy diet is built on a base of regular exercise, which keeps calories in balance and weight in check.
2. Focus on food, not grams. The Healthy Eating Pyramid doesn’t worry about specific servings or grams of food, so neither should you. It’s a simple, general guide to how you should eat when you eat.
3. Go with plants. Eating a plant-based diet is healthiest. Choose plenty of vegetables, fruits, whole grains, and healthy fats, like olive and canola oil.
4. Cut way back on American staples. Red meat, refined grains, potatoes, sugary drinks, and salty snacks are part of American culture, but they’re also really unhealthy. Go for a plant-based diet rich in non-starchy vegetables, fruits, and whole grains. And if you eat meat, fish and poultry are the best choices.
5. Take a multivitamin, and (adults only), maybe have a drink. Taking a multivitamin can be a good nutrition insurance policy. Moderate drinking for many people can have real health benefits, but it's not for everyone. Those who don’t drink shouldn’t feel that they need to start.