The Alphabet Soup of Neurodiversity:
Shifting Psychiatric Paradigms in Clinical Medication Management

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Wild Horse Pass Conference Center
Chandler, AZ
Objectives & Disclosures

➢ Terminology: Consider neurodevelopmental etiology (faulty brain wiring) in neuropsychiatric conditions (“neurodiverse” is less stigmatizing than “psychopathology”).

➢ Epidemiology: Appreciate epidemiological and societal implications of unrecognized and untreated neurodevelopmental conditions (esp., ND-PAE).

➢ Diagnostics: Identify diagnostic features of ND-PAE & elaborate a 4-domain treatment approach.

➢ Algorithm: Describe an algorithm for treatment (of ND-PAE).

➢ Include community-based supports in treatment planning for kids and transitional age youth with neurodiverse conditions.

The honoraria for this talk will be paid directly to 7th Generation Foundation, Inc. for operations of Dream Catcher Meadows, an inclusive green care farm animal sanctuary. www.7thGenerationFoundationInc.org

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Neurodevelopmental Disorders = “Functional BD’s”

**DSM-5 NDs:**
- Autism Spectrum (ASD)
- Intellectual Disability (IDD)
- Learning Disabilities (LDs)
- Developmental Delays (DDs)
- Speech/Language (S/L) & Communication Issues (SCD)
- Sensory & motor problems
- Attention Deficit Hyperactivity Disorder (ADHD)
- Fetal Alcohol Spectrum Disorder (FASD)
- Neurodevelopmental Disorder associated with Prenatal Alcohol Exposure (ND-PAE)

**What about:**
- Personality Disorders
- “Behavioral” & Mood Dysregulation??
- Anxiety & Arousal
- Perceptual Differences??
- “Addictive” disorders??
Rhetorical Questions:
➢ Do we pathologize people with neurodiverse conditions?
➢ Should the term “psychopathology” be applied to children or adolescents?
➢ Are we stigmatizing children/adolescents by not recognizing etiology?
➢ Are all types of neurodiversity part of a spectrum of human neurodevelopment?
Types of Birth Defects

**Physical BDs**
- “Birth Defects” id’ed @ birth
- Heart, lungs, liver, kidneys, other organ damage
- Legs, arms, hands, feet, fingers, toes
- Visible damage to eyes, ears, nose
- E.g., Cleft lip/palate, hypospadias, NTDs, phocomelia, cyclopia

**Functional BDs**
- AKA “Neurodevelopmental”
- Damage to the brain and nervous system
- Include neurocognitive issues, maladaptive social communication/perception, mood/arousal, sensory/motor problems
- Often not diagnosed until the child is older (e.g., developmental systems should be coming on line).

Q: What about neuroendocrine effects of environmental estrogens?
Q: What about ACEs trauma (Dev Trauma D/O)?
Because physical teratogens cause obvious birth defects, consumers are better protected from Category X drugs than neuroteratogens.
# Some Biological Mediators of Prenatal/Postnatal Neurodevelopmental Impairment

<table>
<thead>
<tr>
<th>Root Cause</th>
<th>Source(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>Beer, wine, liquor</td>
</tr>
<tr>
<td><strong>Nicotine</strong> (cotinine)</td>
<td>Cigarettes, tobacco products</td>
</tr>
<tr>
<td>Toluene</td>
<td>Paint, paint thinner, gasoline, polyurethane, other industrial chemicals</td>
</tr>
<tr>
<td>Lead</td>
<td>Paint, leaded gasoline</td>
</tr>
<tr>
<td>Physical Trauma</td>
<td>“Shaken baby,” other head trauma</td>
</tr>
<tr>
<td>Nutrient deficits</td>
<td>Micronutrients, caloric intake, malabsorption issues</td>
</tr>
<tr>
<td>Epigenetics</td>
<td>Preconceptional (male &amp; female) methylation effects</td>
</tr>
<tr>
<td>Genetics</td>
<td>Chromosomal deletions, insertions, microarray repeats, microinsertions/deletions</td>
</tr>
</tbody>
</table>
3-HIT MODEL of “NEURO-DEVELOP-MENTAL” DAMAGE Vs. “p factor” in Psychopathology

The “FASD Iceberg”

Neurodevelopmental Disorder associated with Prenatal Alcohol-related Syndromes 10-41.5% alcohol exposure, single exposures physical, and intellectual affects

Alcohol-related developmental Disorder 85-90% functional BDs

Adapted from Dr. Anne Streissguth, University of Washington at Seattle © 2023, Susan D. Rich, MD, MPH
Midline Brain Defects

(Mouse embryo at early 4th week
Human equivalent)

- Pregnant mouse dams exposed in one binge episode in the late 3rd week/early 4th week equivalent (4-5 servings of alcohol)

- Pups harvested 12 hours later

- Nile blue stain indicates areas of apoptosis (cell death) not seen in control pups

Courtesy of Kathleen K. Sulik, PhD
University of North Carolina Science; 1981

© Kathleen K. Sulik, PhD
Menses Begins

FERTILIZATION

IMPLANTATION

GASTRULATION

NEURULATION

Missed period ("Hmm..."")

BEGIN NEURAL TUBE CLOSURE

END NT CLOSURE

2nd Missed period ("Yikes!!!")

FETAL PERIOD BEGINS

Day 1

2 weeks post-LMP

Menses Begins

EMBRYO AGE = DAYS AFTER FERTILIZATION

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High Rates of Fetal Alcohol Disorders Found in Urban Areas

A study of patients in a Chicago clinic finds that nearly 40 percent of psychiatric patients present with a neurodevelopmental disorder due to prenatal alcohol exposure. A study of patients in a Chicago clinic finds that nearly 40 percent of psychiatric patients present with a neurodevelopmental disorder due to prenatal alcohol exposure. A study of patients in a Chicago clinic finds that nearly 40 percent of psychiatric patients present with a neurodevelopmental disorder due to prenatal alcohol exposure. A study of patients in a Chicago clinic finds that nearly 40 percent of psychiatric patients present with a neurodevelopmental disorder due to prenatal alcohol exposure.

Philip A. May, et al., JAMA. February 6, 2018;319(5):474-482.

U.S. Prevalence of FASD

➢ Represents more accurate estimates to date.

➢ May not be generalizable to all communities.

Conservative

✓ 11.3-50.0/1000 children

✓ 1/100-1/20

Weighted

✓ 31.1-98.5/1000 children

✓ 3/100 to 1 in 10

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Epidemiology

ND–PAE is the leading known, preventable cause of developmental disability.

- estimated 40,000 (1%) to 200,000 (5%) school age (May, et. al, 2018) = 1 in 20 school aged children.
- at least as common as autism (1%) and may be as common as Down’s Syndrome, spina bifida, cerebral palsy AND AUTISM combined.

Misdiagnosis & Missed Diagnoses in Foster & Adopted Children with Prenatal Alcohol Exposure

- 86.5% of youth with FASD never previously diagnosed or misdiagnosed.
- significant implications for intervention and therapeutic services.

Higher prevalence rates in socially marginalized (poor SDOH) communities with higher rates of alcohol use.

- 40% of psychiatric patients embedded in a family practice, Southside Chicago.

Centers for Disease Control and Prevention: [http://www.cdc.gov/ncbddd/fasd/data.html](http://www.cdc.gov/ncbddd/fasd/data.html)
Chasnoﬀ et al., Misdiagnosis and Missed Diagnoses in Foster and Adopted Children With Prenatal Alcohol Exposure. *Pediatrics* 135(2); Jan 2015

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Secondary Disabilities Study of FAS & FAE/ND-PAE

- Mental Health problems 90%
- Alcohol /drug problems 35%
- Disrupted school experience 61%
- Repeated inappropriate sexual behaviours 49%
- Trouble with the law 60%
- Confinement: hospital, alcohol rehab., jail 50%

Sample n=415, 6 to 51 years old, median IQ 86 (self-report)

Streissguth, et al., 1996
SOCIETAL BURDEN OF FAS

$5.4B–$6.5B = US FAS costs (2003 adj. 2010)

- An FAS birth carries lifetime health costs of $860,000 although can be as high as $4.2 million
- Cost estimates may be low: ARBD, ARND/ND–PAE, criminal justice, education, foster care not included
- FAS reduces “discounted” lifetime productivity – $200,000
- FAS prevention OR improved prognosis is “cost effective” – up to $850,000 per child


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Neurodevelopmental Disorder Associated with Prenatal Alcohol Exposure

Specified Other Neurodevelopmental Disorder

➢ ICD-10, Code F88

…is characterized by a range of developmental disabilities following exposure to alcohol in utero.

– Page 86, DSM-5.

In "Conditions for Further Study."

Section III, Emerging Measures and Models, DSM-5, pp. 798-801.

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ND–PAE (DSM–5 Diagnostic Criteria)

A. **More than minimal exposure** to alcohol during gestation…

B. **Impaired neurocognitive functioning**…: (at least one)
   1. …global intellectual performance (i.e., IQ of 70 or below, …)
   2. …executive functioning (poor planning and organization, inflexibility, difficulty with behavioral inhibition)
   3. …specific learning disability
   4. **Memory** impairment…
   5. …visual-spatial reasoning…

C. **Impaired self-regulation**…: (at least one)
   1. …mood or behavioral regulation…
   2. …attention deficit…
   3. …impulse control…


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ND–PAE (DSM–5 Diagnostic Criteria)

D. Impairment in adaptive functioning…: (two or more)
   1. Communication deficit…
   2. …social communication and interaction…
   3. …daily living skills…
   4. …motor skills…

E. Onset of the disorder (symptoms in Criteria B, C, and D) occurs in childhood.

F. The disturbance causes clinically significant distress or impairment in social, academic, occupational, or other important areas of functioning.

G. The disorder is not better explained by the postnatal use of a substance…, a general medical condition…, other known teratogen, a genetic condition, or environmental neglect.

Brain Abnormalities on MRI
in adolescents with FASD/ND-PAE

Mattson, et al., 1994; Mattson & Riley, 1995; Riley et al., 1995
Neurotypical Human Brain Wiring
Continues from Early Childhood into Adulthood

Longitudinal Development of Human Brain Wiring Continues from Childhood into Adulthood.
Prefrontal Cortex: “Executive Control Center”

- Attention
- Impulse control
- Working memory (reflection)
- Anticipation
- Prioritizing
- Strategizing
- Sequencing
- Organization
- Second thought
- Modulating mood
- Response flexibility
- Judgment
- Goal-directed behavior

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Fetal Alcohol Spectrum Disorder Impacts Brain Development Throughout Childhood and Adolescence Not Just at Birth;
Christian Beaulieu and Carmen Rasmussen, University of Alberta, The Journal of Neuroscience.
Is PAE implicated in the ‘p-factor’ of “Psychopathology” or “Brain Damage” (ND)?

**White Matter Microstructure and the General Psychopathology Factor in Children**

Alexander Neumann, PhD, Ryan L. Muetzel, PhD, Benjamin B. Lahey, PhD, Marian J. Bakermans-Kranenburg, PhD, Marinus H. van IJzendoorn, PhD, Vincent W. Jaddoe, MD, PhD, Manon H.J. Hillegers, MD, PhD, Tonya White, MD, PhD, Henning Tiemeier, MD, PhD

**Objective:** Co-occurrence of behavioral and emotional problems in childhood is widespread, and previous studies have suggested that this reflects vulnerability to experience a range of psychiatric problems, often termed a general psychopathology factor. However, the neurobiological substrate of this general factor is not well understood. We tested the hypothesis that lower overall white matter microstructure is associated with higher levels of the general psychopathology factor in children and less with specific factors.

**Method:** Global white matter microstructure at age 10 years was related to general and specific psychopathology factors. These factors were estimated using a latent bifactor model with multiple informants and instruments between ages 6 and 10 years in 3,030 children from the population-based birth cohort Generation R. The association of global white matter microstructure and the psychopathology factors was examined with a structural equation model adjusted for sex, age at scan, age at psychopathology assessment, parental education/income, and genetic ancestry.

**Results:** A 1-SD increase of the global white matter factor was associated with a $\beta = -0.07 \text{SD}$ (standard error [SE] = 0.02, $p < .01$) decrease in general psychopathology. In contrast, a 1-SD increase of white matter microstructure predicted an increase of $\beta = +0.07 \text{SD}$ (SE = 0.03, $p < .01$) specific externalizing factor levels. No association was found with the specific internalizing and specific attention factor.

**Conclusion:** The results suggest that general psychopathology in childhood is related to white matter structure across the brain and not only to specific tracts. Taking into account general psychopathology may also help reveal neurobiological mechanisms behind specific symptoms that are otherwise obscured by comorbidity.

**Key words:** magnetic resonance imaging, externalizing disorder, internalizing disorder, attention, structural equation modeling

New Research

Altered Neural Processing of Threat-Related Information in Children and Adolescents Exposed to Violence: A Transdiagnostic Mechanism Contributing to the Emergence of Psychopathology

David G. Weissman, PhD, Jessica L. Jenness, PhD, Natalie L. Colich, PhD, Adam Bryant Miller, PhD, Kelly A. Sambrook, MS, Margaret A. Sheridan, PhD, Katie A. McLaughlin, PhD

Objective: Exposure to violence in childhood is associated with increased risk for multiple forms of internalizing and externalizing psychopathology. We evaluated how exposure to violence in early life influences neural responses to neutral and threat-related stimuli in childhood and adolescence, developmental variation in these associations, and whether these neural response patterns convey transdiagnostic risk for psychopathology over time.

Method: Participants were 149 youths (75 female and 74 male), aged 8 to 17 years (mean = 12.8, SD = 2.63), who had experienced physical abuse, sexual abuse, or domestic violence (n = 76) or had never experienced violence (n = 73). Participants underwent functional magnetic resonance imaging scanning while passively viewing fearful, neutral, and scrambled faces presented rapidly in a block design without specific attentional demands. Internalizing and externalizing psychopathology were assessed concurrently with the scan and 2 years later and were used to compute a transdiagnostic general psychopathology factor (p factor).

Results: Exposure to violence was associated with reduced activation in the dorsal anterior cingulate cortex (dACC) and frontal pole (1,985 voxels, peak x, y, z = 6, 4, 40) when viewing fearful (versus scrambled) faces, and reduced activation in dorsomedial prefrontal cortex and superior frontal gyrus (1,970 voxels, peak x, y, z = 16, 64, 10) when viewing neutral faces, but not amygdala activation or connectivity. Lower dACC response to fearful faces predicted increase in the p factor 2 years later (B = -0.186, p = .031) and mediated the association of violence exposure with longitudinal increases in the p factor.

Conclusion: Reduced recruitment of the dACC—a region involved in salience processing, conflict monitoring, and cognitive control—in response to threat-related cues may convey increased transdiagnostic psychopathology risk in youths exposed to violence.

Key words: dorsal anterior cingulate cortex, fear, maltreatment, p factor, salience network

Seven (7) Senses – Hypo/Hypersensitivities can be affected by Prenatal Alcohol Exposure

1. Smell: olfactory nerve (I)
2. Sight: optic nerve (II)
3. Hearing: vestibulocochlear nerve (VIII)
4. Touch: somato-sensory nerves from the skin
5. Taste: hypoglossal nerve (XII).
7. Interoception:
   ✓ interpret internal signals from the body and internal organs (hunger, urination/defecation, fatigue, palpitations, etc.)
   ✓ sensory processing and prediction of internal bodily states.
   ✓ signals are transmitted to the brain via multiple neuronal pathways.
Defective Wiring of Interoceptive System

Misrepresentations of internal states
A disconnect between the body's signals & the brain's interpretation and prediction of those signals

Suggested to underlie some mental disorders:
✓ Autism spectrum disorders, anxiety/panic, PTSD, OCD, illness anxiety disorder; Depressive disorders, Borderline PD
✓ Somatic symptom disorders, Fibromyalgia, chronic pain, IBS, Eating disorders: anorexia nervosa, bulimia nervosa.

Alexithymia can be a PAE Functional Brain Deficit
✓ Amygdala-specific damage → Problems articulating emotions (Lack words to express feelings)
✓ Difficult to know the feelings/motivations of others → unconcerned or dispassionate; misunderstood as callous/unemotional (appears unconcerned)
✓ Acts out emotions in physical expression
✓ Alexithymia Deficit Model of psychosomatic symptoms posits that symptoms result from the direct shunting of arousal into the endocrine and autonomic nervous systems, due to absent or diminished psychological processes that would be mobilized in the average person (lack resiliency to overcome stressors). – Campbell 1996.

Sifneos, 1974; Coggins et al., 1998, 2008; Kapp & O’Malley, 2001; O’Malley and Nanson, 2002; Sullivan 2008
4-DOMAIN EVALUATION OF ND-PAE

✓ NEUROCOGNITIVE
- “Intellect” = Cognitive (IQ) & Executive Functions (EF) = working memory, processing speed, organization, planning, “filing,” scheduling, inhibitory control, attention/focus, detail-oriented, consequential thinking, gullibility

✓ SOCIAL COMMUNICATION & PERCEPTION (SQ)
- “Social intellect” = expressive/receptive language, social skills, empathy, reciprocity, dyadic relations, semantics, nuances, V/NV cues, pragmatics; cognitive flexibility

✓ EMOTIONAL (EQ)/MOOD REGULATION & AUTONOMIC AROUSAL
- “Emotional intellect” = “fight, flight, freeze, avoid;” sympathetic vs. parasympathetic (involuntary control), reactivity; rage = “limbic seizure” (AKA: fainting goats…myoclonic seizure)

✓ SENSORY & MOTOR
- Sensorium: multi-sensory, “sensory integration disorder,” hyper/hyposensitivities, temperature, texture, pressure preferences
- Kinaesthetic Abilities: fine/gross motor, coordination, balance, clumsy, oral–motor issues, affinity for hard physical contact.
- **7 Senses:** Sight, Hearing, Smelling, Taste, Touch, Proprioception, Interoception (hyposensitivity to sharp pain fibers → cutting behaviors)

❖ All influence Adaptive Functioning

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O’Malley K and Rich SD; Clinical Implications of a Link Between Fetal Alcohol Spectrum Disorders (FASD) and Autism or Asperger’s Disorder – A Neurodevelopmental Frame for Helping Understanding and Management; March 6, 2013; Chapter 20; “Recent Advances in Autism Spectrum Disorders – Volume I”, book edited by Michael Fitzgerald
**DOMAINS OF ND-PAE**

**“SENSORY & MOTOR:”**
(dysgraphia, delayed motor milestones – walking, talking; hypo/hypersensitivity)

**“EMOTIONAL REGULATION:”**
(sleep/wake disorders, stress response, “0-60” temperament, volatility, “flash point” & “emotional rheostat”)

**“COMMUNICATION:”**
(articulation, pragmatics, facial expressions & non-verbal cue recognition, social reciprocity)

**“NEUROCOGNITIVE:”**
(consequential thinking, “information filter,” attention, impulse regulation, culpability, “conscience”)

**Adaptive Functioning**

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EMOTIONAL REGULATION: “Emotional Intellect”

SOCIAL COMMUNICATION: “Social Intellect”
→ S/L → Perception
→ Reciprocity → Pragmatics

SENSORY & MOTOR: “Kinesthetic Abilities & Sensorium”

Adaptive Functioning

NEUROCOGNITIVE: “General Intellect & Executive Functions”

Autistic, Avoidant, Schizoid, Schizotypal, Narcissistic, Antisocial, Perceptive Aphasia, Thought disordered

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4-Domain Clinical Treatment Model

EMOTIONAL REGULATION: “Emotional Intellect”

SOCIAL COMMUNICATION: “Social Intellect”

SENSORY & MOTOR: “Kinesthetic Abilities & Sensorium”

Adaptive Functioning

NEUROCOGNITIVE: “General Intellect & Executive Functions”

→ Consequential Thinking
→ Reasoning → Judgment
→ Insight → Planning

“Sleepy Secretary” = “Sluggish Cognitive Tempo;”

ADHD, minimal brain dysfunction, disinhibited behavior, intellectual disability, executive functioning deficits, learning disabilities,
4-Domain Clinical Treatment Model

EMOTIONAL REGULATION: “Emotional Intellect”

SOCIAL COMMUNICATION: “Social Intellect”

SENSORY & MOTOR: “Kinesthetic Abilities & Sensorium”
- Sensory Integration
- Coordination
- Fine/Gross Motor
- Proprioception

Adaptive Functioning

Gross/fine motor problems, clumsy, physically intrusive, sensory issues, pain sensitive v. insensitive
4-Domain Clinical Treatment Model

EMOTIONAL REGULATION:
“Emotional Intellect”
→ Mood Dysregulation & Autonomic Arousal
→ “Faulty Rheostat”
→ Avoidant v. Reactive

SOCIAL COMMUNICATION:
“Social Intellect”

SENSORY & MOTOR:
“Kinesthetic Abilities & Sensorium”

NEUROCOGNITIVE:
“General Intellect & Executive Functions”

Histrionic
Bipolar
GAD/SAD
Alexythymia
Borderline
ND-PAE Medication Suggestions

"SENSORY & MOTOR:"
Sensory Processing, Coordination, & Motor Deficits

"COMMUNICATION:"
(gullibility, reciprocity, articulation, pragmatics, AH/VH/PI)

Adaptive Functioning

"EMOTIONAL REGULATION:"
Meds: Lamictal, Neurontin (?)

"NEUROCOGNITIVE:"
Kapvay/Clonidine; Tenex/Intuniv; Focalin/Quillivant. NOT Wellbutrin; AP’s. Caution: SSRIs; meds through liver

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ND-PAE Medication Suggestions

“COMMUNICATION:”
(gullibility, reciprocity, articulation, pragmatics, AH/VH/PI)

“SENSORY & MOTOR:”
Sensory Processing, Coordination, & Motor Deficits

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Kapvay/Clonidine; Tenex/Intuniv; Focalin/Quillivant.
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<table>
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<tr>
<th>Clinical Intervention Steps</th>
<th>Intervention</th>
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</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Diagnosis and nonpharmacological interventions</td>
</tr>
<tr>
<td>Step 2</td>
<td><strong>First line of algorithm:</strong> Domain-specific pharmacological intervention</td>
</tr>
<tr>
<td>Step 3</td>
<td><strong>Second line of algorithm:</strong> Domain-specific pharmacological intervention plus primary and secondary domain-specific intervention (maximum four medications in adults; two in children)</td>
</tr>
<tr>
<td>Step 4</td>
<td>Traditional treatment algorithms published for comorbid conditions (depressive disorder, Attention deficit hyperactivity disorder (ADHD), anxiety disorder, etc.)</td>
</tr>
<tr>
<td>Step 5</td>
<td>Consider medications under the adjunctive pharmacotherapy section (for adults only, this step does not apply to children)</td>
</tr>
</tbody>
</table>

ND-PAE/FASD, neurodevelopmental disorder associated with prenatal alcohol exposure and/or fetal alcohol spectrum disorder. 

*Note:* The primary diagnosis is ND-PAE/FASD and the most prominent presentations are the target of treatment.

O’Malley K and Rich SD; Clinical Implications of a Link Between Fetal Alcohol Spectrum Disorders (FASD) and Autism or Asperger’s Disorder – A Neurodevelopmental Frame for Helping Understanding and Management; March 6, 2013; Chapter 20; "Recent Advances in Autism Spectrum Disorders – Volume I", book edited by Michael Fitzgerald

Clusters of Signs & Symptoms

- Hypervigilance
- Aggression
- Insomnia
- Irritability
- Agitation
- Anger
- Anxiety
- Tension
- Reduced pain threshold

- Mood swings
- Excitability
- Anxiety
- Depression

- Restless movement
- Impulsiveness
- Inattention
- Executive dysfunction

- Impairments in:
  - Perspective taking
  - Frustration tolerance
  - Social skills
  - Reasoning
  - Reality testing
  - Abstraction

Hyperarousal

Emotional Regulation

Hyperactive/Neurocognitive

Cognitive Inflexibility

Non-Psychotropic Interventions: Social Support/Sleep/Nutrition/Exercise

1st Line
- Adrenergic Agent (Clonidine, Guanfacine)
- Mood stabilizer (Divalproex, Lamotrigine)
- Amphetamine based stimulants (Lisdexamfetamine, Dexedrine)
- Atypical neuroleptic (Risperidone)

2nd Line
- SSRI (Fluoxetine, Citalopram, Sertraline)
- SSRI (Fluoxetine, Citalopram, Sertraline)
- Other stimulants (Methylphenidate, Atomoxetine, Bupropion)
- Atypical neuroleptic (Olanzapine, Arispiprazole)

Adjunct

Consider Recommendations from Emerging Field Section

Important Notes:
1. This group of medications should not be used with preschool children and should only be used with children in consultation with child psychiatry.
2. The studies showing evidence for Citalopram came before the new warnings of QTc problems. The experts recommend that Escitalopram be considered favorably ahead of Citalopram.
3. The Adjunct section is only for adults and should not be used with children.

FIG 2. Proposed Psychotropic Medication Algorithm (*See Discussion section for full instructions on administering the algorithm, and special considerations for children and adolescents).
MULTIDISCIPLINARY TREATMENT
Medication Management

- Need randomized, controlled clinical trials
  - i.e., comparing FASD to garden-varietry ADHD
- Caution in use of **stimulant medications**
  - screen for co-morbid heart conditions
  - 50% response rate in this population
- Use TBI treatment model
  - Motto: “Start low & go slow”
  - one med at a time
  - lower doses, fewer meds
Medications & Targets

- Mood dysregulation & Autonomic Arousal
  - “Fight or Flight” **limbic-shunted “seizure:”** Lamotrigine, topiramate, gabapentin
  - Autonomic arousal: clonidine ER
  - Sleep: melatonin or clonidine

- Neurocognitive: (Inhibitory “Self-regulation”)
  - Impulsivity/Hyperactivity: clonidine/ER bid or guanfecine/ER → Prefrontal Cortex
  - **Caution:** P450 NZs = Wellbutrin; AP’s; SSRIs
NON-PHARMACEUTICAL THERAPEUTIC APPROACHES

"COMMUNICATION:"
Repetitive Social Skills Training, Neurotypical Peer Support, Cognitive Reframing, Role Play (difficulty generalizing)

"EMOTIONAL REGULATION:"
Nature, Farm Animal Therapy, DBT, Mindfulness Meditation, Breathing, Yoga, Thai Chi, Trigger Avoidance

"SENSORY & MOTOR:"
OT & PT; Early Desensitization; "How Your Engine Runs"

"NEUROCOGNITIVE:"
Specific Academic Supports, "External Brain," The ALERT Program, Vocational Training (early)

Adaptive Functioning
A 4-DIMENSIONAL PERSPECTIVE

The Individual with ND-PAE in the context of his/her Caregiving Environment
External Factors Influence Thoughts, Regulation, Functioning

- Touch
- Taste
- Texture
- Temperature

- Sounds
- Smells

- Tone
- Rhythm
- Vibration
- Cues
- Facial Expressions

- Situation
- Transitions
- Social Nuances

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Scaffolding: A Clinical Team Approach

Caregiver & Environment

Social Communication
- "Social Intellect"

Emotional Regulation
- "Emotional Intellect"

Neurocognitive
- "General Intellect & Executive Functions"

Sensory & Motor
- "Kinesthetic Abilities & Sensorium"

Psychologists & Neuropsychologists
Therapists,
Social Workers
Substance Abuse Counselors
Physical &/or Occupational Therapists
Speech/Language Pathologist
Case Managers
Nurse Practitioners
Psychiatrist

Caregiver & Environment

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✓ ALL Children AND Parents suspected of alcohol use

**Screening**

- NP Testing & evaluation w/ EF & AF
- Speech/language, including pragmatics, nonverbal, etc.
- SWOT (challenges vs. “hidden gifts”)

**Assessment**

- Patients/Clients (kids, adolescents & adults)
- Cocooning environment (like Down’s, Autism)
- Caregivers, Parents (foster, kinship, bio)
- School staff, teachers, community service providers; primary care; Vocational coaches; Supervisors
- PLEASE REFER FOR DISABILTY SUPPORT!
  - Regular NP testing with AF & EF
  - Ongoing holistic therapy & education
  - Teach Caregivers & Kids Meditation, Yoga, Bio/Neurofeedback
  - Teach basic life skills early
  - Vocational training throughout school years
  - Prepare Patients & Families for Guardianship, Advocacy
  - Life skills, navigating society, managing daily schedule, work ethic

**Education/Training**

- Patients/Clients (kids, adolescents & adults)
- Caregivers, Parents (foster, kinship, bio)
- School staff, teachers, community service providers; primary care; Vocational coaches; Supervisors

**Early & Continuous Intervention**

- Teach basic life skills early
- Vocational training throughout school years
- Prepare Patients & Families for Guardianship, Advocacy
- Life skills, navigating society, managing daily schedule, work ethic

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Steps for Resilient, Successful Child/Transitional Age Youth Development

Acceptance & Realistic Expectations

Attunement to Baby/Child’s Rhythms, Tone, Vibrations, Frequency

Adaptive Functioning Programming Geared toward Abilities & NDs

Allow Opportunities for Maslow’s Hierarchy of Needs (esp. Meaning & Purpose)

Awareness of NDs, Abilities, Interests, & Strengths
TREATMENT PLANNING SUMMARY

DSM-5 diagnosis of ND-PAE to develop a clinically-relevant, life-course neurodevelopmental treatment plan:

- Infant screening with CDC Milestone Tracker App: https://www.cdc.gov/ncbddd/actearly/milestones-app.html
- Referral of PARENTS for counseling/treatment/parent guidance
- Early childhood intervention: Infants & Toddlers Programs
- 3-6 Years & School aged: Individualized Education Plans
- Adolescents: Special Education Services for “Multiply Impaired”
- Transitional Age Youth: Consider Guardianship, SSI, Disability Services, Special Needs Housing, Vocational Assistance
- Young Adults’ Goal: Achieve Meaning and Purpose

ND-PAE Diagnosis

...by age 5 predicts better outcome for the child who...

- **Understands his/her “special needs”** → becomes a self-advocate or has advocates → strengths-based approach
  - focus on strengths/interests/abilities = improved self-image
  - realistic expectations of parents/caregivers/school

- **NDD child w/ “Grieving Parent”** vs. “Guilty Parent”
  - knowing early prevents future self-blame
  - Positive versus punitive parenting style

- Becomes integrated into an **accepting community & cocooned** from a harsh world view
  - more work is needed in “community tolerance” and integration of all differences

- More likely to get **academic/school system supports**
  - neurodevelopmental disorder vs. “emotional disorder” or “behavior problem”
“GRACE COURT”

A 24-unit Transitional Housing Community
for Women in Recovery and their Dependent Children
Robeson Health Care Corporation
Lumberton, North Carolina
February, 1998

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Farm Animal-assisted Therapy for ND-PAE/FASD Treatment
Preconceptional & Prenatal History

**Intendedness:**
- Planned vs. Unplanned?
- Use prior to pregnancy recognition?

**Heavy Paternal Use:**
- DNA histone modifications
- Methylation effects on sperm

**Age of Mother & Parity** (# pregnancy)

**Timing, Frequency & Duration of Alcohol Exposure**

**Other Substance Use:**
- Cigarettes, illegal drugs, chemicals

**Nutrition:** choline, zinc, other nutrients = neuroprotective

**Domestic Abuse:** effects of heightened stress response; catecholamine surges; physical trauma
Diagnostic/Screening Questions

- Was the pregnancy **unplanned or mistimed**?
- How many **cigarettes** (PPD) before, during, after pregnancy? Father smoked 5 years preconception (PC)?
- **How much alcohol** (beer, wine, liquor) before, during, & after pregnancy? While breastfeeding? Father 3 mos PC?
- Any **inadvertent binge use** (4–5 drinks) before the pregnancy was known (3–4 weeks post conception)?
- How many **other drugs** (i.e., OTC, prescription, recreational) before, during, or after the pregnancy?
Neurocognitive RED FLAGS

- Poor insight
- Impaired judgement
- Complex/mixed learning disorders with inability to link cause and effect
- Poor working memory
- Specific deficits in mathematics and or reading/writing skills
- Often marked split verbal/performace IQ 12–15 points
- Poor capacity for abstraction
- Metacognition deficits in school performance
- Executive function deficits in planning & organization

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Mood Dysregulation & Autonomic Arousal
(“faulty emotional thermostat & rheostat”)

- sleep/wake dysregulation
- aggression*
- hyper-reactivity
- low frustration tolerance*
- heightened stress response
- intense, immediate reactions to stimuli
- act before they think
- easily triggered, provoked, instigated*

*also influenced by environmental mediators

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Why So much “Mental Illness” in PAE?

**Theory of Mind:**
→ Alexithymia → Misperceive, misread & misinterpret social/non-verbal cues → cognitive disconnect to consequences

“Faulty Emotional Rheostat” = Limbic Seizures
→ Poor frustration tolerance → “rage episodes”
→ epileptiform discharges → more damage to neural networks

Sifneos, 1974; Coggins et al., 1998, 2008; Kapp & O’Malley, 2001; O’Malley and Nanson, 2002; Sullivan 2008

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Alexithymia can be a PAE Functional Brain Deficit

✓ Problems *articulating emotions*
✓ Lack words to express feelings
✓ Acts out emotions in physical expression
✓ **misunderstood as callous/unemotional (appears unconcerned)**
✓ Difficult to know the feelings/motivations of others

Sifneos, 1974; Coggins et al., 1998, 2008; Kapp & O'Malley, 2001; O'Malley and Nanson, 2002; Sullivan 2008
Alexithymia Deficit Model

of psychosomatic symptoms posits that symptoms result from the direct shunting of arousal into the endocrine and autonomic nervous systems, due to absent or diminished psychological processes that would be mobilized in the average person (lack resiliency to overcome stressors).

Campbell, 1996
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