

Neurodevelopmental and Behavioral Assessment for Fetal Alcohol Spectrum Disorders

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**The University of New Mexico,
Center on Alcoholism, Substance Abuse and
Addictions**

**Welcome to the Maine Quality Counts Webinar on Wed. Jan. 6th from 12-1 pm
For the audio, please call in to 1-866-740-1260 access code 5493654#**



Snuggle ME Webinar Series

Maine Quality Counts is cohosting two webinars on Fetal Alcohol Spectrum Disorders with the Maine Office of Substance Abuse and Mental Health Services, the Maine Medical Association, the Maine Chapter of the AAP, and the Maine CDC, as part of the Snuggle ME Project whose goal is to improve care and coordination for women and children affected by substance use in pregnancy.

The webinars will be recorded and slides posted on the Maine Quality Counts website, www.mainequalitycounts.org

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Today's Speakers

Ms. Kalberg is a Clinical Research Associate and Principal Investigator at The University of New Mexico - Center on Alcoholism, Substance Abuse and Addictions. Since 1996 she has worked on an FASD multidisciplinary diagnostic research team. Her background is in family studies and developmental disabilities; medical aspects, communication disorders, motor development, cognition, behavior, assessment, and intervention with a focus on fetal alcohol spectrum disorders (FASD).

Speaker Disclosure

None of the speakers today have any relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider of commercial services discussed in this CME activity.

Webinar objectives:

- Acquire information about the empirically-proven neurodevelopmental and behavioral deficits in individuals with prenatal alcohol exposure and fetal alcohol spectrum disorders (FASD)
- Utilize empirically-proven information to construct an assessment process for individuals who are referred for assessment because of suspected FASD.
- Compile an assessment battery for use with individuals to determine if they have a diagnosis of FASD.
- Combine results from a neurodevelopmental and behavioral assessment with results of a dysmorphology examination to determine if a client has FASD.



- **FAS**-Fetal alcohol syndrome
 - **pFAS**-Partial Fetal alcohol syndrome
 - With or Without confirmed prenatal alcohol exposure
 - **ARND**-Alcohol Related Neurodevelopmental Disorder
 - **ARBD**- Alcohol Related Birth Defect
-
- *Is the definition of ARND the same as the criteria for Neurodevelopmental compromise in FAS (ND-PAE)?*

FASD-Outcomes of Prenatal Alcohol Exposure



- ≥ 6 drinks/week for ≥ 2 weeks during pregnancy
- ≥ 3 drinks per occasion on 2 or more occasions during pregnancy
- Documentation of alcohol-related social or legal problems in proximity to (prior to or during) the index pregnancy (e.g., history of citation(s) for driving while intoxicated (DWI) or history of treatment for an alcohol-related condition.
- Positive testing with established alcohol-exposure biomarker(s) during pregnancy or at birth (e.g., analysis of fatty acid ethyl esters, phosphatidylethanol, and/or ethyl glucuronide in maternal hair, fingernails, urine, or blood, or placenta, or meconium)
- Increased prenatal risk associated with drinking during pregnancy as assessed by a validated screening tool of (e.g., T-ACE (tolerance, annoyance, cut down, eye-opener) or AUDIT (alcohol use disorders identification test)).

**Reminder of PAE Criteria – One
or more of the above**



The basis for an FASD diagnosis in humans is whether or not there are clinically significant deficits in functioning:

- FASD requisite Dysmorphology without functional deficits associated with PAE may tell a very different story
- The concern comes from the areas of functioning that are getting in the way of the individual's ability to behave, achieve, and learn

Basis for a Diagnosis



Empirical evidence about children prenatally exposed to alcohol

Cognitive/Neurocognitive

- *General Intelligence* - Average IQ scores fall in the low average and borderline ranges typically.
 - Streissguth et al., 2004; Mattson and Riley, 1998; Jacobson, et al., 2004; Bailey, et al., 2004
- *Executive Functioning* - Difficulty with planning, sequencing and organizing one's life, poor behavioral inhibition, and inflexibility.
 - Kodituwakku, et al. 1995, 2001; Kopera-Frye, et al., 1996; Mattson, et al., 1999(a); Mattson et al. 2012, 2013, Ware et al 2013; Nguyen et al., 2014.



Cognitive/Neurocognitive (cont.)

- ***Learning*** – Difficulty acquiring and maintaining information, especially in math and reading.
 - Mattson and Riley, 1999(b); Roebuck, Spencer and Mattson, 2004; Kaemingk, et al., 2003; Howell et al., 2006; Rasmussen et al., 2011
- ***Memory*** – Difficulty with memory for stories, spatial and design memory, and auditory memory.
 - Vaurio et al, 2011; Mattson et al., 2011; Mattson et al., 1996; Mattson et al., 2002
- ***Visual Spatial*** - Difficulty with visual spatial reasoning and visual spatial construction.
 - Ueker and Nadel, 1996; Hunt et al., 1995; Jirkowic et al., 2008.



Empirical evidence

Behavioral/Self-Regulation

- *Mood or behavioral regulation* – Mood lability, negative affect or irritability, behavioral outbursts.
 - Disney et al., 2008; Burd et al., 2003; D’Onofrio et al., 2007; Nash, et al., 2006; Whaley, et al., 2001; Thomas, et al., 1998; Bishop, et al., 2007.
- *Attention* – Difficulty shifting attention or sustaining mental effort
 - Steinhausen and Spohr, 1998; Coles, et al., 1997; Coles, et al., 2002; Bhatara et al., 2006; Mattson, et al., 2006.
- *Impulse Control* – Show impulsive responses and externalizing behaviors
 - Disney et al., 2008; Burd et al., 2003; D’Onofrio et al., 2007; Nash, et al., 2006; Whaley, et al., 2001; Thomas, et al., 1998; Bishop, et al., 2007.



Empirical Evidence

Adaptive Skills

Adaptive Domains:

- ***Communication*** – deficits in word comprehension and receptive skills
 - Mattson, et al.. 2002; McGhee, et al., 2008; Janzen, 1995
- ***Socialization*** – sometimes overly friendly with strangers, difficulty reading social cues and understanding the consequences of one's actions
 - Crocker et al, 2015; Coggins et al., 2003; Thomas et al, 1998
- ***Daily Living Skills*** – Difficulty following rules for safety, managing schedules, less likely to be able to live independently.
 - Fagerlund et al., 2012.
- ***Motor*** – poor fine motor skills, gross motor delays, difficulty with coordination and balance.
 - Kalberg, et al., 2006; Korkman, 2003; Adnams, 2001



The Updated Clinical Guidelines for Diagnosing Fetal Alcohol Spectrum Disorders

Neurobehavioral Components



Domains
to be
Tested

General Intelligence Measure

Measures of neurobehavioral abilities
(executive functioning, learning,
memory, visual spatial abilities)

Academic

Behavior – Self Regulation (Mood or behavioral
regulation, attention, impulse control)

Adaptive

Testing Domains



I. Fetal Alcohol Syndrome (FAS)

D. Neurobehavioral impairment*

1. For children ≥ 3 years of age (a or b):

a. **WITH COGNITIVE IMPAIRMENT:**

Evidence of **global impairment** (general conceptual ability ≥ 1.5 SD below the mean, or **performance IQ** or **verbal IQ** or **spatial IQ** ≥ 1.5 SD below the mean)

OR

Cognitive deficit in **at least 1** neurobehavioral domain ≥ 1.5 SD below the mean (executive functioning, specific learning impairment, memory impairment or visual spatial impairment)

b. **WITH BEHAVIORAL IMPAIRMENT WITHOUT COGNITIVE IMPAIRMENT:**

Evidence of behavioral deficit in **at least 1** domain ≥ 1.5 SD below the mean in impairments of self-regulation (mood or behavioral regulation impairment, attention deficit, or impulse control)

2. For children < 3 years of age:

- Evidence of developmental delay ≥ 1.5 SD below the mean



* Adaptive skills should be assessed, but such deficits cannot stand alone for diagnosis.

II. Partial Fetal Alcohol Syndrome (PFAS)

For children with or without documented prenatal alcohol exposure, a diagnosis of PFAS requires:

*B. Neurobehavioral impairment**

1. For children ≥ 3 years of age (a or b):

a. **WITH COGNITIVE IMPAIRMENT:**

Evidence of **global impairment** (general conceptual ability ≥ 1.5 SD below the mean, or **performance IQ** or **verbal IQ** or **spatial IQ** ≥ 1.5 SD below the mean)

OR

Cognitive deficit in **at least 1** neurobehavioral domain ≥ 1.5 SD below the mean (executive functioning, specific learning impairment, memory impairment or visual spatial impairment)

b. **WITH BEHAVIORAL IMPAIRMENT WITHOUT COGNITIVE IMPAIRMENT:**

Evidence of behavioral deficit in **at least 1** domain ≥ 1.5 SD below the mean in impairments of self-regulation (mood or behavioral regulation impairment, attention deficit, or impulse control)

2. For children < 3 years of age:

- Evidence of developmental delay ≥ 1.5 SD below the mean



** Adaptive skills should be assessed, but such deficits cannot stand alone for diagnosis.*

III. Alcohol-Related Neurodevelopmental Disorder (ARND)

B. Neurobehavioral impairment*

1. For children ≥ 3 years of age (a or b):

a. **WITH COGNITIVE IMPAIRMENT:**

Evidence of **global impairment** (general conceptual ability ≥ 1.5 SD below the mean, or **performance IQ** or **verbal IQ** or **spatial IQ** ≥ 1.5 SD below the mean)

OR

Cognitive deficit in **at least 2** neurobehavioral domain ≥ 1.5 SD below the mean (executive functioning, specific learning impairment, memory impairment or visual spatial impairment)

b. **WITH BEHAVIORAL IMPAIRMENT WITHOUT COGNITIVE IMPAIRMENT:**

Evidence of behavioral deficit in **at least 2** domain ≥ 1.5 SD below the mean in impairments of self-regulation (mood or behavioral regulation impairment, attention deficit, or impulse control)

* *Adaptive skills should be assessed, but such deficits cannot stand alone for diagnosis.*



Based on Goals of Research and Clinical Practice, it is advisable to select measures that:

- Reflect the impact of PAE on brain/behavior
 - ❖ Assess broadly
 - ❖ Include: Ability, Achievement, Behavior, Language, Adaptive Functioning
- Involve Standardized measures (normal curve, norms, percentiles)
- Respect amount of time needed and available for assessment
- Use widely used tests-no experimental measures
 - ❖ Easy to obtain tests
 - ❖ Easy to find qualified testers



Select Measures that:

- Reflect areas affected by Prenatal Alcohol Exposure- Based on Research
- Choose measures that are:
 - **Valid**- Each test measures what we think it measures
 - **Reliable**- The measures are the same everywhere and have been used successfully with the population where you are using it
- Involve the use of multiple sources of information (Parent, Child, Teacher)



Global Intellectual Ability

Measures:

- **Wechsler Intelligence Scales for Children – V (WISC-V)**
 - Ages 6 – 16
 - Global IQ and five additional index scores for verbal, processing speed, working memory, visual spatial ability, and fluid reasoning.
- **Differential Ability Scales (DAS-II)**
 - Ages 2.5 – 17
 - Global ability reflected in a General Conceptual Ability (GCA) score and index scores for verbal, nonverbal, visual spatial, and working memory
- **Wechsler Preschool and Primary Scale of Intelligence – IV (WPPSI-IV)**
 - Ages 2.5 – 7.5
 - Global ability score and index scores for verbal, nonverbal, visual spatial and working memory
- **Wechsler Adult Intelligence Scale – IV (WAIS-IV)**
 - Ages 16 – 90
 - Global ability reflected is Full Scale IQ (FSIQ) and index scores for verbal, perceptual reasoning, processing speed and working memory



***Neurocognitive* domains**

Measures:

Executive Functioning:

- **Delis-Kaplan Executive Functioning System (D-KEFS)**
 - Ages 8 – 89
- **Behavior Rating Inventory of Executive function (BRIEF)**
 - Ages 5 – 18

Specific Learning:

- **Woodcock Johnson-IV (WJ-IV)**
 - Ages 2 to 90
- **Wide Range Achievement Test – IV (WRAT-IV)**
 - Ages 5 to 94
- **Wechsler Individual Achievement Test –III (WIAT-III)**
 - Ages 4 to 50
- **California Verbal Learning Test-C (CVLT-C)**



***Neurocognitive* domains**

Measures (cont.):

Memory:

- **Differential Ability Scales –II (DAS-II) – working memory scales**
- **NEPSY-II**
 - Ages 3 to 16
- **Wide Range Assessment of Memory and Learning, II (WRAML-II)**
 - Ages 5-90
- **Wechsler Memory Scale – IV (WMS-IV)**
 - Ages 16-90

Visual Spatial:

- **Beery Visual Motor Integration (VMI)**
 - Ages 2 to 90
- **NEPSY – Visuomotor Precision**



Behavioral and Self-Regulation Measures:

Mood or behavioral regulation:

- **Achenbach** – Ages 6 - 18
 - Child Behavior Checklist (parent)- (CBCL)
 - Teacher Report Form (teacher) – (TRF)
 - Youth Self Report (child) – (YSR)
- **Computerized Diagnostic Interview – IV (C-DISC-IV)**
 - Ages 6 – 18
- **Behavior Assessment System for Children, 2 (BASC-2)**
 - Ages 2 - 21



***Behavioral and Self-Regulation* Measures (cont.):**

Attention:

- **Conners' Continuous Performance Test, III (CPT-III)**
 - Ages 8 and up
- **Test of Variables of Attention (TOVA)**
 - Ages 4 – 80
- **Achenbach: CBCL and YSR**
 - Ages 6 – 18

Impulse Control:

- **Behavior Assessment System for Children, 2 (BASC-2)**
 - Ages 2 – 21
- **Achenbach – Ages 6 - 18**
 - Child Behavior Checklist (parent)- (CBCL)
 - Teacher Report Form (teacher) – (TRF)
 - Youth Self Report (child) – (YSR)



Adaptive Behavior

Measures:

- **Vineland Adaptive Behavior Adaptive Skills in:**
 - **Communication**
 - **Socialization**
 - **Daily Living**
 - **Motor**
 - **Caregiver report forms and teacher report forms**
- **Adaptive Behavior Assessment System-3 (ABAS-3)**

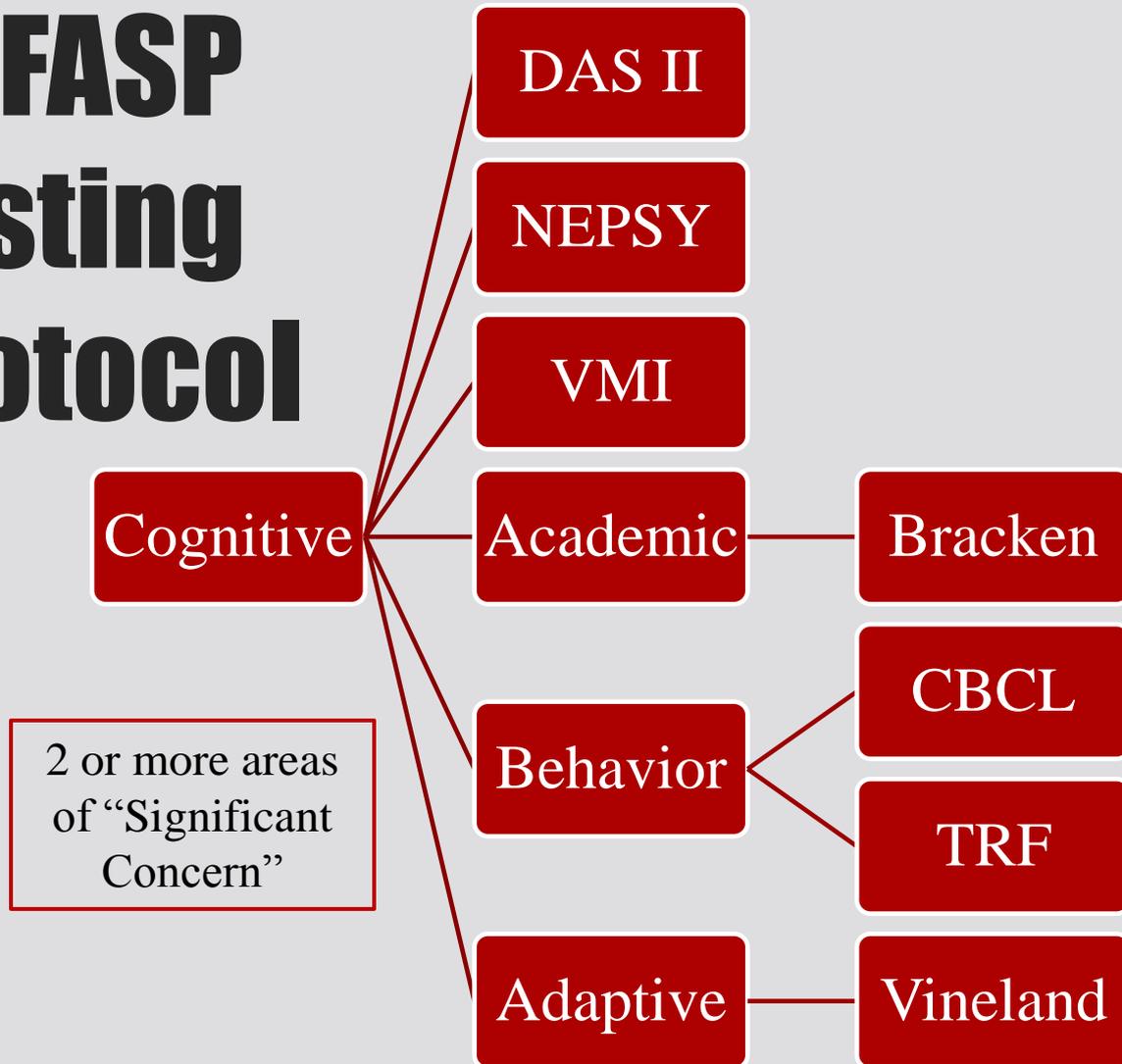


COFASP Study Aims

- Establish a prevalence estimate of FASD, including FAS, partial FAS and ARND.
 - Age range-1st grade, ages 5 to 7 years.
 - “Regular” class rooms and those with developmental disabilities
 - Based on evidence from growth, alcohol-related physical features, **neurobehavioral measures**, and prenatal alcohol exposure (PAE).



COFASP Testing Protocol



Cognitive Function: Direct Assessment of Child

- **Cognitive**

- ❖ Differential Ability Scales, 2nd Edition

- General Cognitive Ability (GCA), Verbal, Nonverbal, Spatial
- Relatively short to administer
- English/Spanish translation
- Reliable/Valid with standardized administration

- ❖ NEPSY

- Executive Functioning and Attention; Visual/Motor

- ❖ VMI

- Graphomotor and Visual/Motor Integration



Academic: Direct Assessment of Child

❖ Bracken Basic Concept Scale

- Numbers/Counting
- Size/Comparisons
- Shapes
- Direction/Position
- Time/Sequence

Preacademic Skills that are direct precursors to Later math performance.



Child Behavior: Parent/Teacher Report

❖ Achenbach Child Behavior Checklist (CBCL)

❖ Achenbach Teacher Report Form (TRF)

- Good Norms, reliability and validity
- Widely used; easy to administer and score
- Multiple languages

CBCL BEHAVIOR PROBLEM SCALES	Parent Ratings		Teacher Ratings	
	T-Score (Mean=50, SD=10)	%ile Rank	T-Score (Mean=50, SD=10)	%ile Rank
Emotionally Reactive				
Anxious/ Depressed				
Somatic Complaints				
Withdrawn				
Sleep Problems				
Attention Problems				
Aggressive Behavior				
Summary Scores				
Internalizing				
Externalizing				
Total Problems				

-Identifies common problem areas associated with prenatal alcohol exposure and FASD.



Child Adaptive Function: Caregiver Report

❖ Vineland Adaptive Behavior Scales, 2nd Edition

- Communications
- Daily Living Skills
- Socialization
- Motor Skills
- Summary Score

Identifies areas of adaptive dysfunction commonly reported in FASD.



What is **ARND**?-*Alcohol Related Neurodevelopmental Disorder*

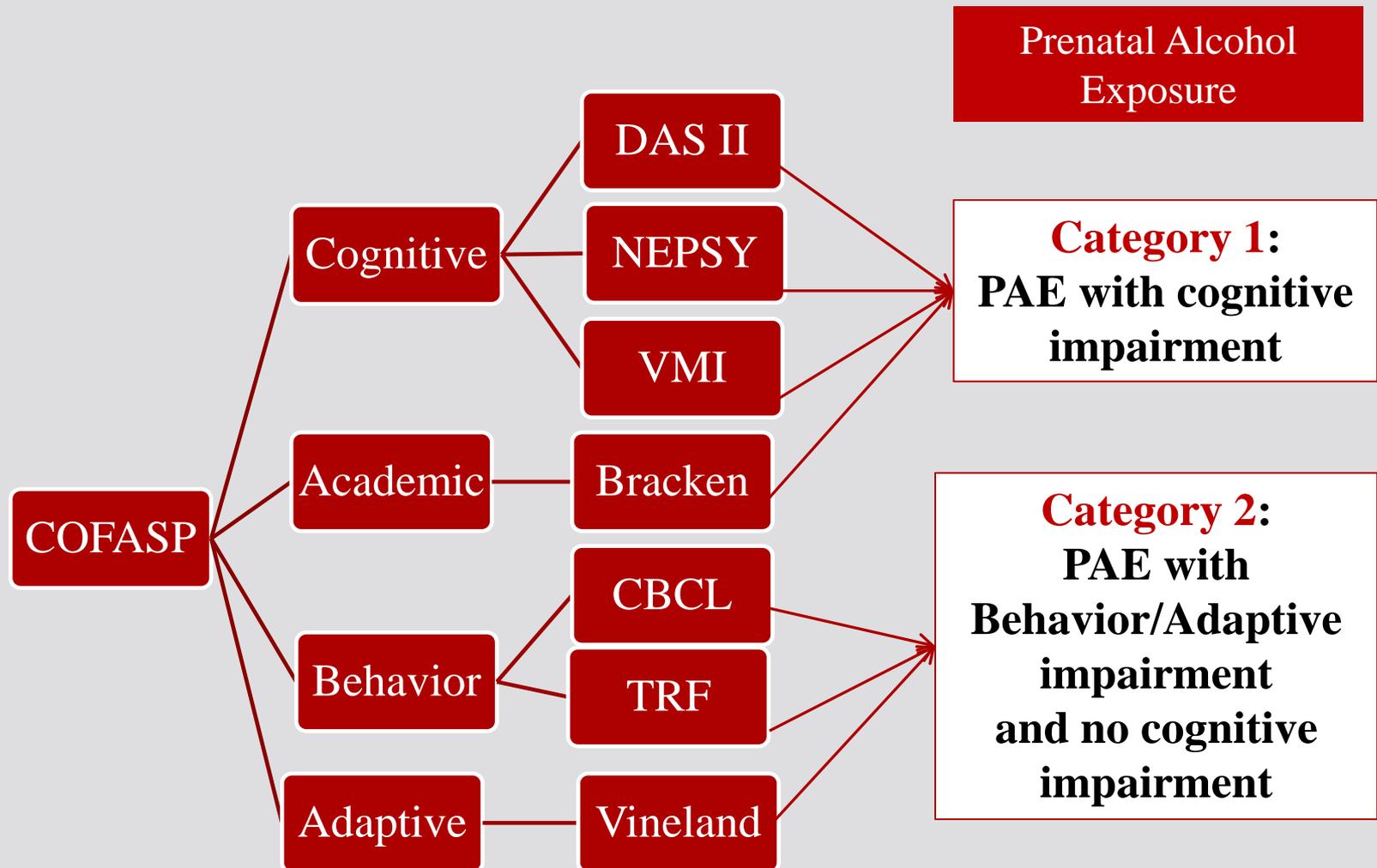
The neurodevelopmental criteria resulted in two categories:

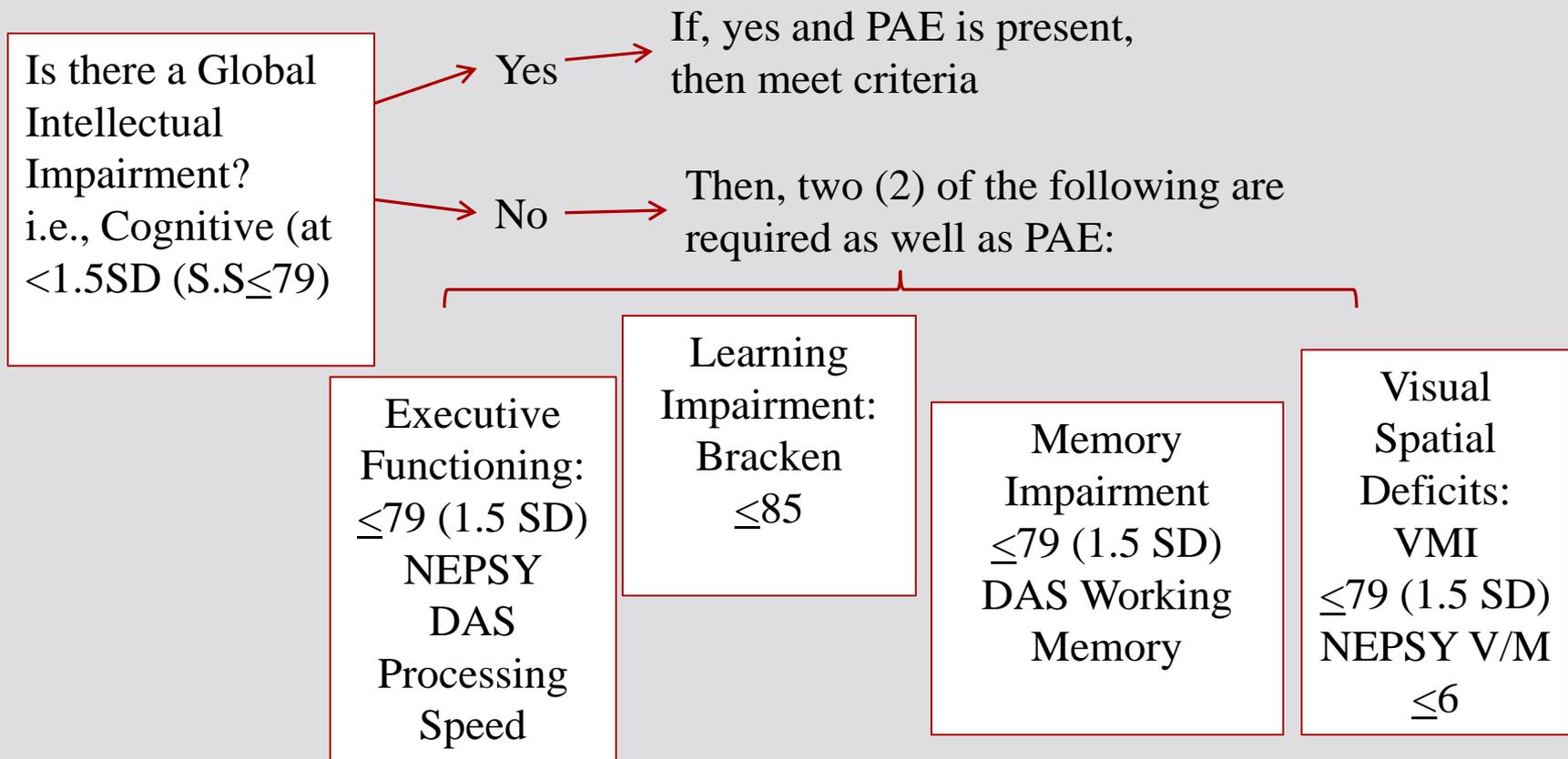
- **Category 1**: Prenatal alcohol with cognitive impairment
- **Category 2**: Prenatal alcohol with behavioral and/or adaptive but no cognitive impairment

CoFASP ARND Diagnostic Categories



CoFASP Testing Protocol and ARND





Thresholds for Cognitive Impairment related to PAE for ARND



Behavioral Impairment for ARND requires 2 of the following:

Mood or
Behavioral
Regulation

CBCL or TFR
T-score > 64

For:

Anxious/Depressed
Withdrawn/Depressed
Internalizing
Externalizing
Conduct
Affective
Anxiety

Attention

CBCL or TFR:
T-score > 64
For:
Attention Problems
ADHD

Impulse Control

CBCL or TFR
T-score > 64
For:
Rule Breaking
Behavior
Aggressive Behavior
Oppositional Defiant
Disorder

If only one Domain, then requires Deficit in
Adaptive Functioning

Thresholds for Behavioral Impairment for ARND



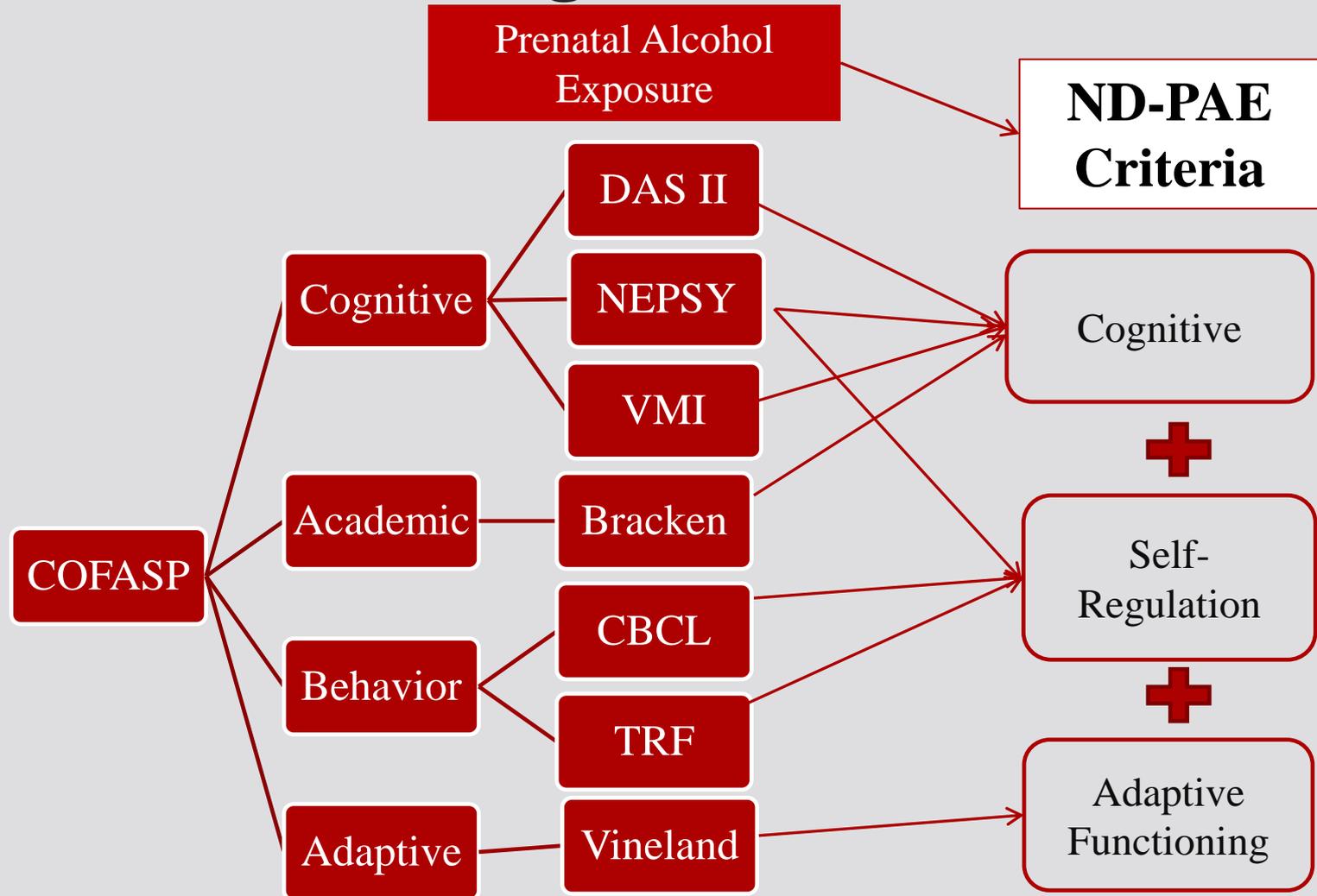
In DSM-5, Conditions for Further Study (pp.798-801)

- More than minimal alcohol exposure
- Impaired neurocognitive function
- Impaired Self-regulation
- Impairment in Adaptive functioning
- Onset of the disorder occurs in childhood
- The disturbance causes clinically significant distress
- Disorder cannot be explained by other means.

Neurobehavioral Disorder-Prenatal Alcohol Exposure (ND-PAE)



CoFASP Testing Protocol and ND-PAE



- Prenatal alcohol exposure affects the developing brain.
- It is necessary to capture behavioral outcomes to measure the impact of PAE on child development.
- Measuring cognition and behavior is difficult because of the many other factors that influence outcomes.
- For CoFASP, we have used many different measures and sources of information to capture these effects.
- The results will help us better understand how to identify children who are affected by PAE.

Summary



For More Information.....

- If you are interested in more information about Fetal Alcohol Spectrum Disorders, or would like to be involved in work to address prenatal substance exposure, please contact:

Nikki Busmanis, Fetal Alcohol Spectrum
Disorder/Drug Affected Baby State Coordinator

- Maine Office of Substance Abuse and Mental Health
Services

Nikki.Busmanis@maine.gov



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