



Irritability in Preschool Children:

Diagnostic and management considerations

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Disclosures

Brandene Lorrain:

- Has no affiliations with any pharmaceutical companies
- Co-owns and manages ElmTree Clinic
- Trainer and Mentor for NeuroRelational Framework

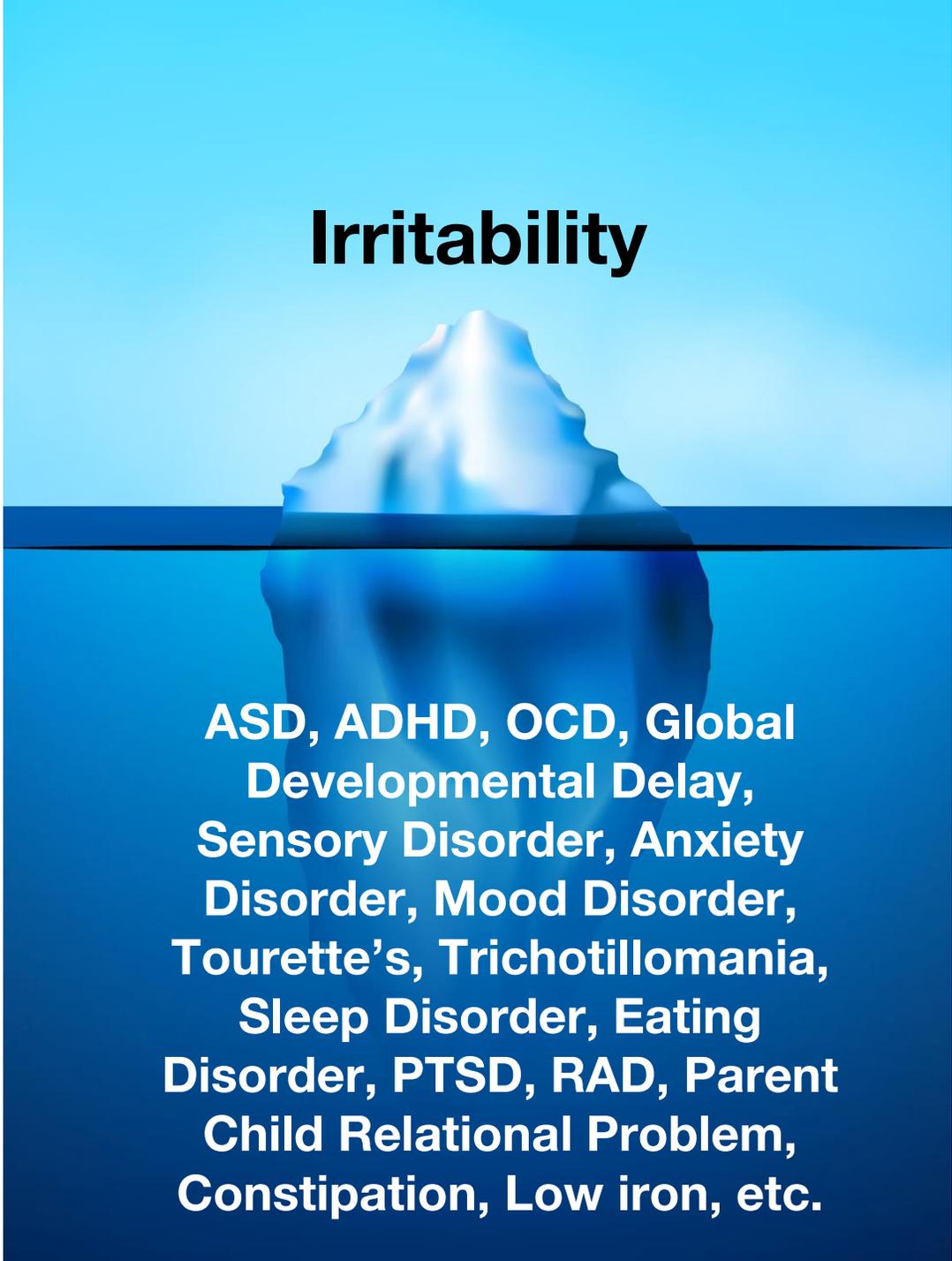


Objectives

- Discuss possible causes of irritability
- Reframe irritability as a stress response
- Recognize stress recovery, 4 stress responses, and 4 toxic stress patterns
- Discuss strategies to help with stress responses
- Discuss medication options to help with stress responses



Irritability



**ASD, ADHD, OCD, Global
Developmental Delay,
Sensory Disorder, Anxiety
Disorder, Mood Disorder,
Tourette's, Trichotillomania,
Sleep Disorder, Eating
Disorder, PTSD, RAD, Parent
Child Relational Problem,
Constipation, Low iron, etc.**

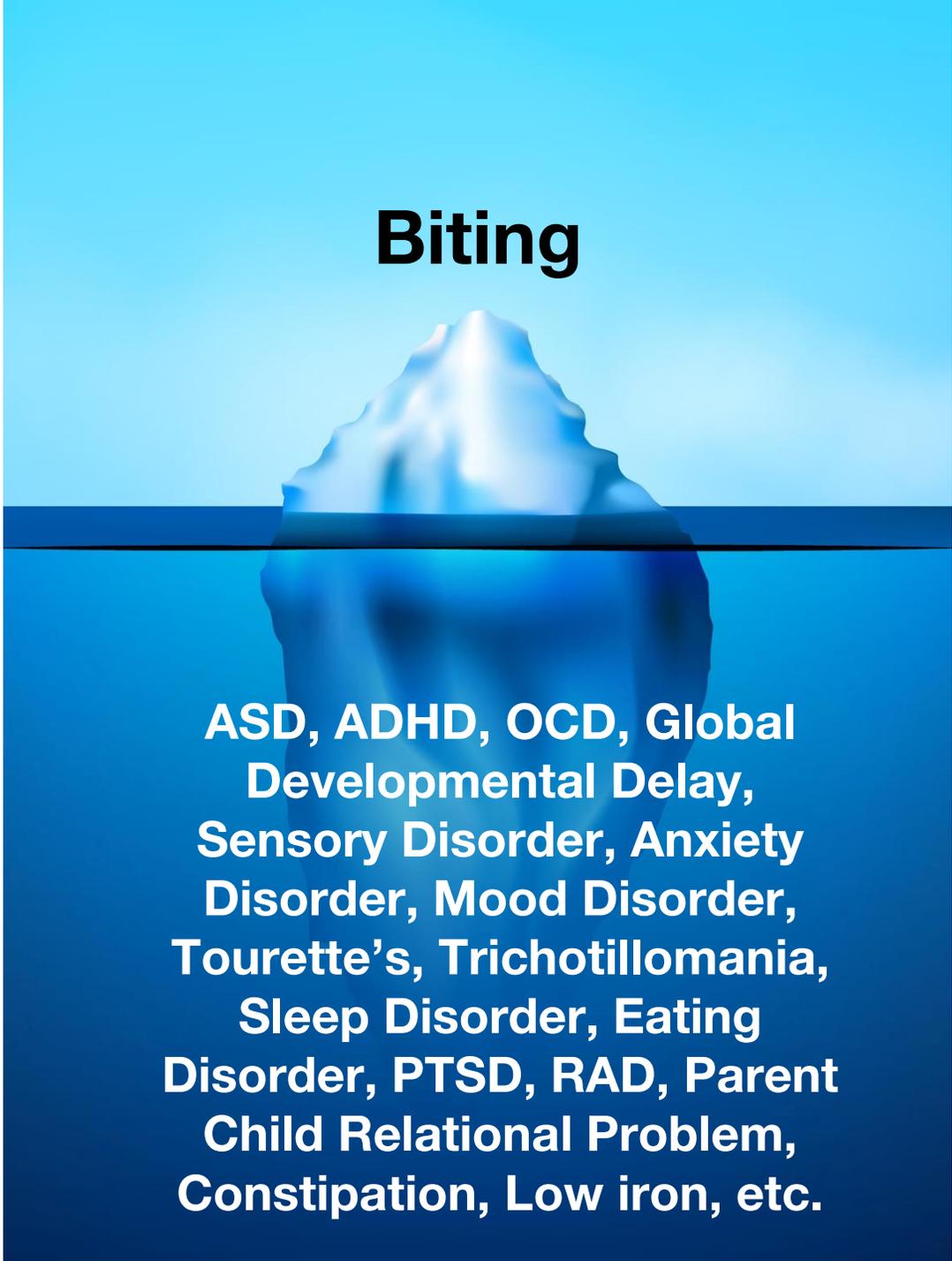


Hitting

**ASD, ADHD, OCD, Global
Developmental Delay,
Sensory Disorder, Anxiety
Disorder, Mood Disorder,
Tourette's, Trichotillomania,
Sleep Disorder, Eating
Disorder, PTSD, RAD, Parent
Child Relational Problem,
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Biting



**ASD, ADHD, OCD, Global
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Disorder, PTSD, RAD, Parent
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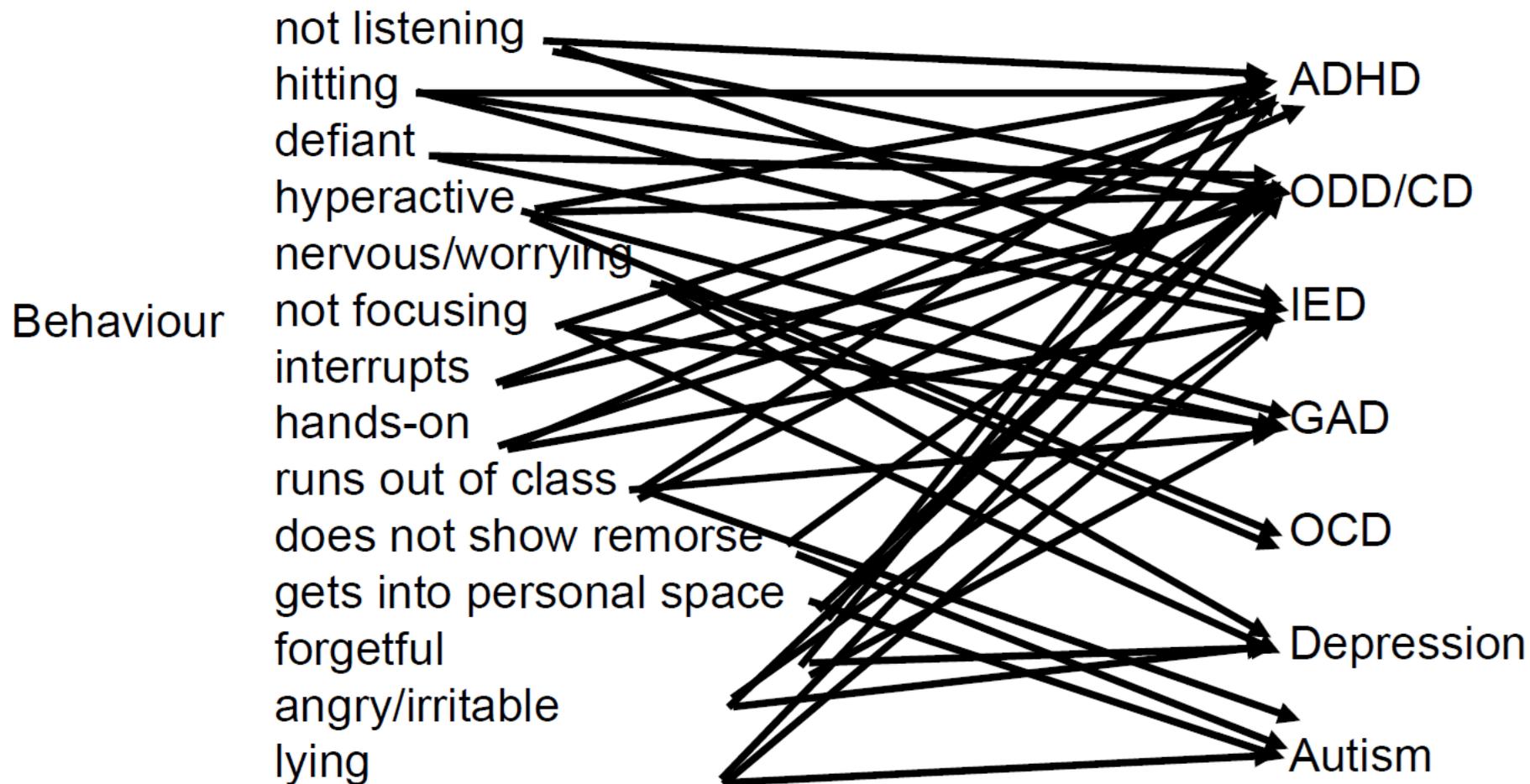
Kicked Out of Daycare



**ASD, ADHD, OCD, Global
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Child Relational Problem,
Constipation, Low iron, etc.**



“traditional” **medical** view of child behaviour

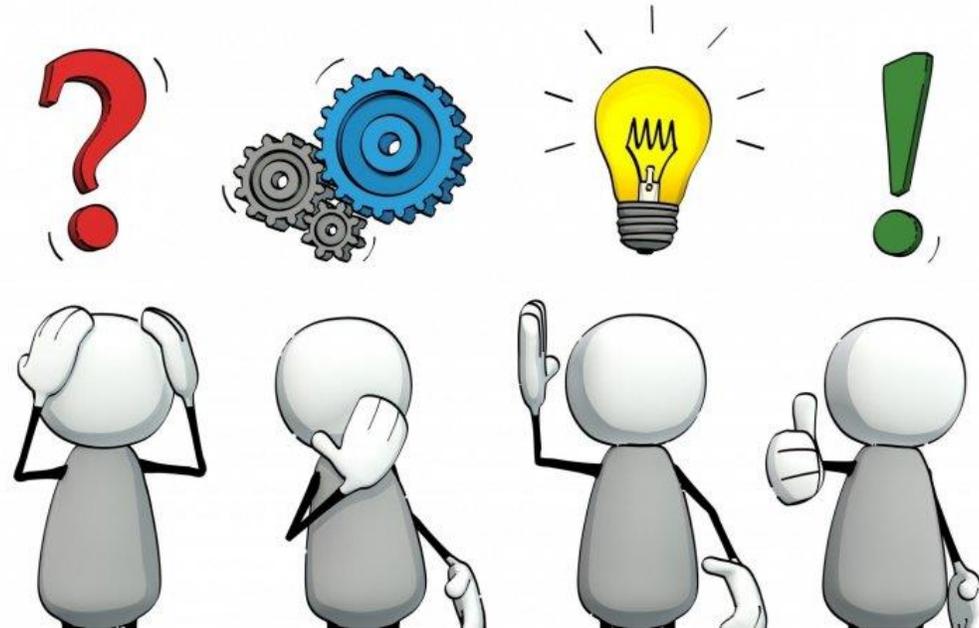


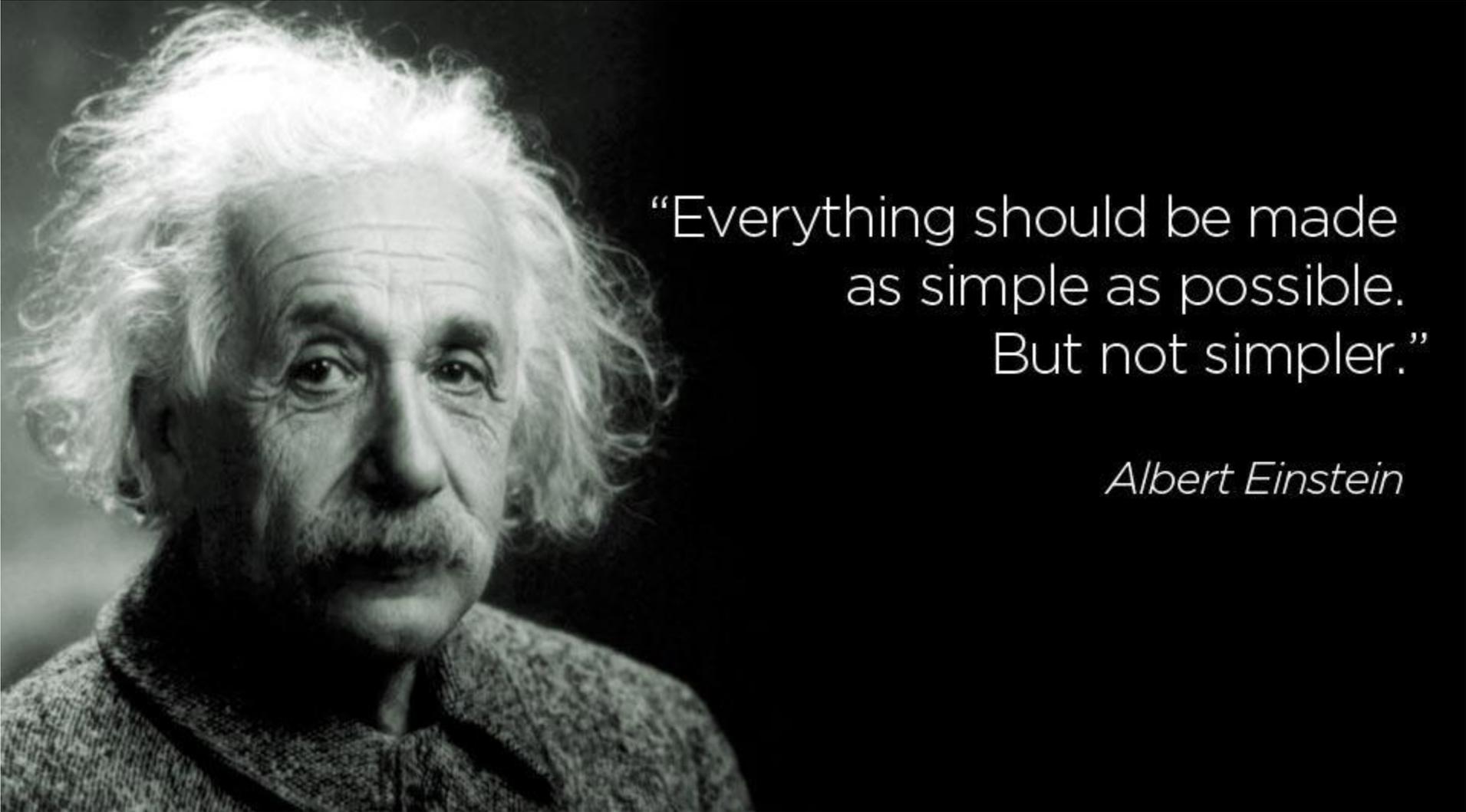


Irritability is a transdiagnostic and
transdisciplinary problem



Are we at risk of losing our ability to think?





“Everything should be made
as simple as possible.
But not simpler.”

Albert Einstein



Stress

What is stress?

Isn't stress bad?

Don't we all have too much stress?

What is the definition of it anyway?

What is this toxic stress thing we hear about?



NeuroRelational Framework (NRF)

- Neuro

- neurodevelopmentally sensitive

- Relational

- caring relationships are essential for brain development and healing

- Framework

- assessment & intervention practice
- within a promotion, prevention, and treatment continuum



What is Healthy Stress Recovery?

- **Healthy sleep**



- **Mostly green zone during the day**
- **Efficient recovery back to green zone when stressed**



Deep sleep is restorative...





How well does your child sleep?

- Can your child fall asleep on their own (without parent laying with them)?
- Can your child stay asleep the whole night (if older than 1 year)?
- Does your child's quantity of sleep meet minimum requirements?
(10 to 13 hours in 24 hours for a 2 to 5 year-old)
- Does your child have problems with their quality of sleep?
 - wake up refreshed or tired and cranky?
 - wake up frequently at night?
 - complain of pain in their legs or moving frequently?
- Does your child snore? Mouth breathe? Nasal congestion? Breath pauses?



How Well Are You Sleeping?

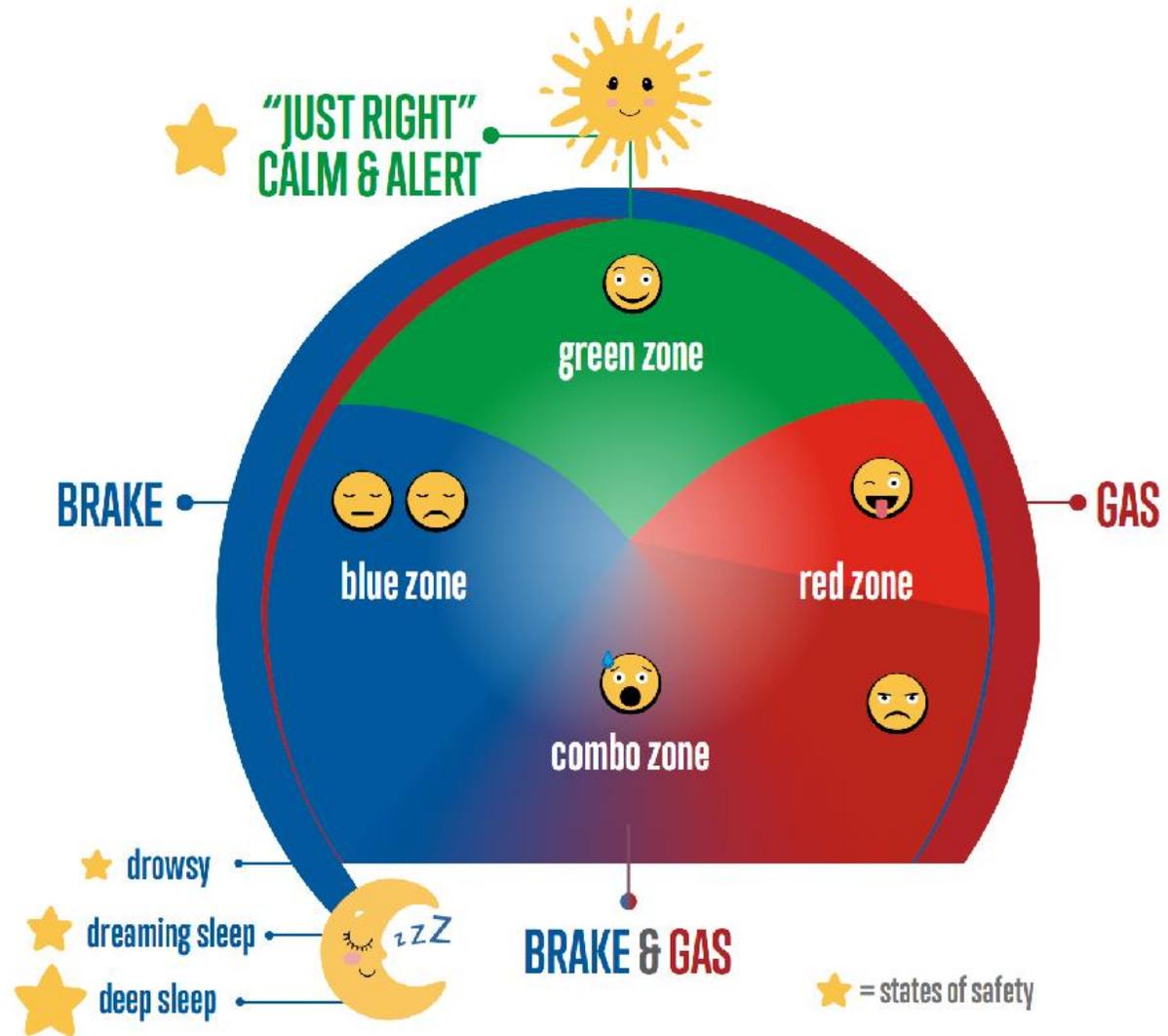
- Do you have a relaxing bedtime routine every evening?
- Do you co-sleep with another person or pet? Do you sleep well with a sleep buddy?
- Can you fall asleep quickly? Does it take you more than 20 minutes to fall asleep?
- Can you stay asleep? Do you wake up in the night and have trouble getting back to sleep? Are you up for a long time in the night?
- Do you get enough total sleep every night?
- Do you wake up feeling refreshed? Or do you wake up feeling tired or unwell?
- Do you feel tired during the day or sleepy? Does your child look tired during the day? Are they agitated or too active during the day?
- Are you restless? Leg cramps? Kicking? Moving around a lot in the bed?
- Do you snore? Do you breathe with your mouth open? Is your nose congested? Do you cough during the night? Do you have breathing pauses?
- Do you have nightmares, night terrors, sleepwalking, sleep talking, teeth grinding, bed wetting, or pain during your sleep?
- Do you have electronics in your bedroom? Are you or your child watching screens close to bedtime?

Age-Dependent Sleep Range Recommendations	0-3 months » 14-20 hrs	12-24 months » 11-14 hrs	7-13 years » 9-11 hrs	26-64 years » 7-9 hrs
	3-6 months » 14-16 hrs	2-4 years » 10-13 hrs	14-17 years » 8-10 hrs	65+ years » 7-8 hrs
	6-12 months » 13-15 hrs	4-7 years » 10-13 hrs	18-25 years » 7-9 hrs	



Sleep-Wake States Arc

SUPPORTS HEALTH



THE NEURORELATIONAL FRAMEWORK'S Awake States Indicators

These biomarkers are used to describe individual differences. Culture, context, and clusters of biomarkers are critical components to informing the awake states.

RED ZONE Too Fast/Gas Pedal	EYES <ul style="list-style-type: none"> Open, squinted or tightly closed eyes Eyes look quickly around the room or not attending to person or object of focus Pupils are dilated Frequent blinking FACIAL EXPRESSION <ul style="list-style-type: none"> Wide, open mouth Forced smile Clenched jaw or teeth VOICE <ul style="list-style-type: none"> High-pitched yelling or screaming Loud, shrill, piercing Out of control laughing Non-Stop talking 	BODY POSTURE/GESTURES <ul style="list-style-type: none"> Increased muscle tension Pushing, shoving, biting, and intruding into others' space Kicking, throwing, jumping, climbing Bumps into things, falls Fidgeting or restless (moving one's mouth, fingers, hands & legs, playing with hair or objects) Moving frequently from activity to activity; high levels of multi-tasking Animated gestures RHYTHM/RATE OF MOVEMENT <ul style="list-style-type: none"> Fast movements Impulsive and/or jerky movements Constant motion RHYTHM/RATE OF BREATHING <ul style="list-style-type: none"> Fast, shallow 	EYES <ul style="list-style-type: none"> Open, squinted or tightly closed eyes May have direct, intense eye contact May avoid eye contact Eye roll Pupils are dilated FACIAL EXPRESSION <ul style="list-style-type: none"> Wide, open mouth Anger, disgust Frown, grimace Forced smile Clenched jaw or teeth VOICE <ul style="list-style-type: none"> High-pitched crying, yelling or screaming Loud, shrill, piercing Hostile or grumpy Sarcastic Non-Stop talking 	BODY POSTURE/GESTURES <ul style="list-style-type: none"> Fingers spread out Arching body Increased muscle tension Pushing, shoving, and intruding into others' space Biting, hitting, kicking, throwing, jumping, climbing, spitting, scratching, head banging Threatening gestures (shakes finger, fist, halt hand) RHYTHM/RATE OF MOVEMENT <ul style="list-style-type: none"> Fast movements Impulsive and/or jerky movements Constant motion RHYTHM/RATE OF BREATHING <ul style="list-style-type: none"> Fast-deep
BLUE ZONE Too Slow/Brake	EYES <ul style="list-style-type: none"> Glazed-glassy eyes (looks through rather than at) Looks away for a long time, looks down Does not look around the room Does not look at or towards new events Looks at things more than people Tired eyes FACE <ul style="list-style-type: none"> Flat/blank Mouth turned down, sad No smiles or hints of smiles Few emotions shown Low tone in the cheeks 	VOICE <ul style="list-style-type: none"> Flat Makes few to no sounds Sounds cold, soft, sad, too quiet Monotone BODY <ul style="list-style-type: none"> Slumped/slouching Low muscle tone, floppy Little or no exploring play or curiosity Wanders aimlessly 	RHYTHM/RATE OF MOVEMENT <ul style="list-style-type: none"> Slow movements Slow to start moving Frozen, no startle response RHYTHM/RATE OF BREATHING <ul style="list-style-type: none"> Slow, shallow 	
COMBO ZONE Fast & Jerky/Gas & Brake	EYES <ul style="list-style-type: none"> Wide open eyes Stares at things Frequent breaks in eye contact Looks around with darting eyes FACE <ul style="list-style-type: none"> Raised eyebrows Trembling lips or mouth Mouth wide open Nasal flaring Furrowed brow Lip compression, pursed lips Startled expression 	VOICE <ul style="list-style-type: none"> High-pitched, nasal, sing-song voice Whimpers, weak voice Wobbly/quivering voice Fast changes in tone or pitch Pleading BODY <ul style="list-style-type: none"> Tense or rigid posture Winces, cowers, cringes, or hides Trembling hands Clings or grabs others Flails around 	RHYTHM/RATE OF MOVEMENT <ul style="list-style-type: none"> No movement, still body Repetitive movements (rocking, pacing, wrings hands, shakes foot) Fast movements Jerky movements RHYTHM/RATE OF BREATHING <ul style="list-style-type: none"> Uneven breathing Breath holding 	
GREEN ZONE Just Right/Alert	EYES <ul style="list-style-type: none"> Bright, shiny eyes Looks directly at people, objects with a gleam Looks away for breaks, then returns to eye contact FACE <ul style="list-style-type: none"> Smiles, shows joy Neutral Can express a range of all emotions – appropriate to context 	VOICE <ul style="list-style-type: none"> Laughing Fluctuations in tone – appropriate to context Fluctuations in speed – appropriate to context Melodic BODY <ul style="list-style-type: none"> Relaxed with good muscle tone Stable, balanced and coordinated movements Moves arms and legs toward center of the body Molds body into a caring adult when held Gestures are coordinated with body movements 	RHYTHM/RATE OF MOVEMENT <ul style="list-style-type: none"> Changes smoothly to respond to the environment Moves faster or slower – appropriate to context RHYTHM/RATE OF BREATHING <ul style="list-style-type: none"> Regular, even breathing 	





NRF Green Zone

GREEN ZONE
Just Right/Alert

EYES

- Bright, shiny eyes
- Looks directly at people, objects with a gleam
- Looks away for breaks, then returns to eye contact

FACE

- Smiles, shows joy
- Neutral
- Can express a range of all emotions – appropriate to context

VOICE

- Laughing
- Fluctuations in tone – appropriate to context
- Fluctuations in speed – appropriate to context
- Melodic

BODY

- Relaxed with good muscle tone
- Stable, balanced and coordinated movements
- Moves arms and legs toward center of the body
- Molds body into a caring adult when held
- Gestures are coordinated with body movements

RHYTHM/RATE OF MOVEMENT

- Changes smoothly to respond to the environment
- Moves faster or slower – appropriate to context

RHYTHM/RATE OF BREATHING

- Regular, even breathing



Video: GREEN ZONE





NRF Positive Red Zone

RED ZONE Too Fast/Gas Pedal

EYES

- Open, squinted or tightly closed eyes
- Eyes look quickly around the room or not attending to person or object of focus
- Pupils are dilated
- Frequent blinking

FACIAL EXPRESSION

- Wide, open mouth
- Forced smile
- Clenched jaw or teeth
- Giddy

VOICE

- High-pitched yelling or screaming
- Loud, shrill, piercing
- Out of control laughing
- Non-Stop talking



BODY POSTURE/GESTURES

- Increased muscle tension
- Pushing, shoving, biting, and intruding into others' space
- Kicking, throwing, jumping, climbing, twirling
- Bumps into things, falls
- Fidgeting or restless (moving one's mouth, fingers, hands & legs, playing with hair or objects)
- Moving frequently from activity to activity; high levels of multi-tasking
- Animated gestures

RHYTHM/RATE OF MOVEMENT

- Fast movements
- Impulsive and/or jerky movements
- Constant motion

RHYTHM/RATE OF BREATHING

- Fast, shallow



Video: Positive Red Zone

Source: <https://www.youtube.com/watch?v=JfS0IA9LXr0>





Video: Positive Red Zone



Source: Archive YouTube video



NRF Negative Red Zone

RED ZONE Too Fast/Gas Pedal

EYES

- Open, squinted or tightly closed eyes
- May have direct, intense eye contact
- May avoid eye contact
- Eye roll
- Pupils are dilated

FACIAL EXPRESSION

- Wide, open mouth
- Anger, disgust
- Frown, grimace Forced smile
- Clenched jaw or teeth

VOICE

- High-pitched crying, yelling or screaming
- Loud, shrill, piercing
- Hostile or grumpy
- Sarcastic
- Non-Stop talking



BODY POSTURE/GESTURES

- Fingers spread out
- Arching body
- Increased muscle tension
- Pushing, shoving, and intruding into others' space
- Biting, hitting, kicking, throwing, jumping, climbing, spitting, scratching, head banging
- Threatening gestures (shakes finger, fist, halt hand)

RHYTHM/RATE OF MOVEMENT

- Fast movements
- Impulsive and/or jerky movements
- Constant motion

RHYTHM/RATE OF BREATHING

- Fast-deep



Video: Negative Red Zone



Source: https://www.youtube.com/watch?v=c_0bhT98g9Y



Video: Negative Red Zone



Source: <https://www.youtube.com/watch?v=nFAsyYnTklw>



NRF Blue Zone

BLUE ZONE Too Slow/Brake

EYES

- Glazed-glassy eyes (looks through rather than at)
- Looks away for a long time, looks down
- Does not look around the room
- Does not look at or towards new events
- Looks at things more than people
- Tired eyes

FACE

- Flat/blank
- Mouth turned down, sad
- No smiles or hints of smiles
- Few emotions shown
- Low tone in the cheeks

VOICE

- Flat
- Makes few to no sounds
- Sounds cold, soft, sad, too quiet
- Monotone

BODY

- Slumped/slouching
- Low muscle tone, floppy
- Little or no exploring play or curiosity
- Wanders aimlessly

RHYTHM/RATE OF MOVEMENT

- Slow movements
- Slow to start moving
- Frozen, no startle response

RHYTHM/RATE OF BREATHING

- Slow, shallow



Video: Blue Zone



Source: Archive YouTube video



Video: Blue Zone



Source: <https://youtu.be/OwaxFAC6rzk>



NRF Combo Zone

COMBO ZONE Fast & Jerky/Gas & Brake

EYES

- Wide open eyes
- Stares at things
- Frequent breaks in eye contact
- Looks around with darting eyes

FACE

- Raised eyebrows
- Trembling lips or mouth, scared
- Mouth wide open
- Nasal flaring
- Furrowed brow, worried
- Lip compression, pursed lips
- Startled expression, surprised

VOICE

- High-pitched, nasal, sing-song voice
- Whimpers, weak voice
- Wobbly/quivering voice
- Fast changes in tone or pitch
- Pleading

BODY

- Tense or rigid posture
- Winces, cowers, cringes, or hides
- Trembling hands
- Clings or grabs others
- Flails around

RHYTHM/RATE OF MOVEMENT

- No movement, still body
- Repetitive movements (rocking, pacing, wrings hands, shakes foot)
- Fast movements
- Jerky movements

RHYTHM/RATE OF BREATHING

- Uneven breathing
- Breath holding



Video: Combo Zone



Source: Archive YouTube video



Video: Combo Zone



Source: <https://youtu.be/V5E-0Dix440>



Three Levels of Stress

Positive

**Brief increases in heart rate,
mild elevations in stress hormone levels.**

Tolerable

**Serious, temporary stress responses,
buffered by supportive relationships.**

Toxic

**Prolonged activation of stress response systems
in the absence of protective relationships.**



Three Levels of Stress - An NRF Adaptation

Positive – Safety (Dr. Lorrain's wisdom)

Healthy sleep & 70 to 80% green zone during the day
3 to 5 neg red, blue, and combo zones per day under 3 to 5 minutes
Pos red zone 3 times per day for about 20 minutes (energetic play)

Tolerable - Challenge

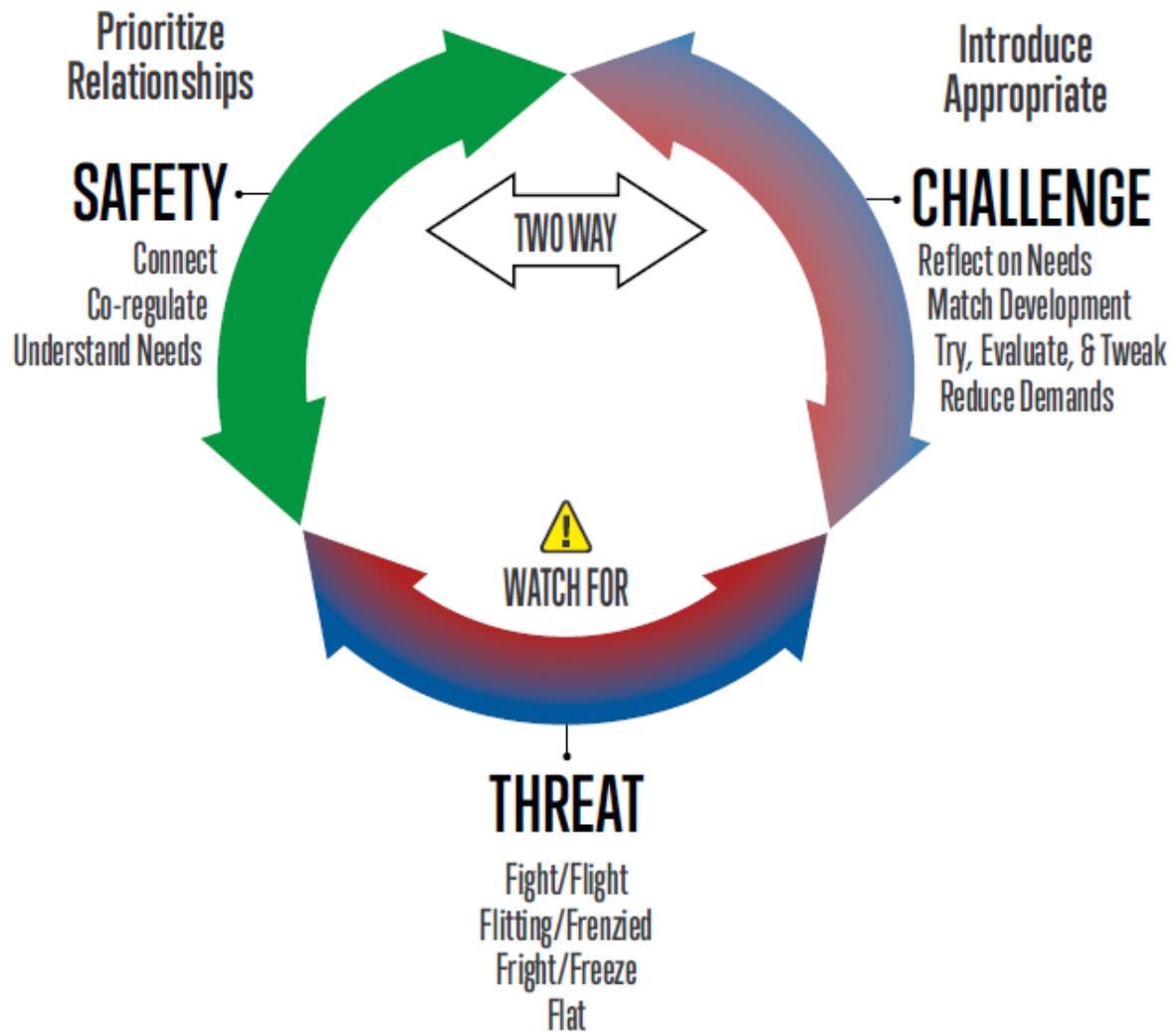
Less Green zone
Modulated stress responses with stress recovery
Stress responses are quicker, more intense, more frequent & longer

Toxic - Threat

Minimal Green Zone
Much less capacity to modulate stress responses
Fight/Flight, Flitting/Frenzied, Fright/Freeze, Flat/Flop/Faint



THE NEURORELATIONAL FRAMEWORK'S
Safety-Challenge-Threat Triad





How Do We Identify Toxic Stress Patterns?

1 TOO FREQUENT/
TOO QUICK
TOO INTENSE



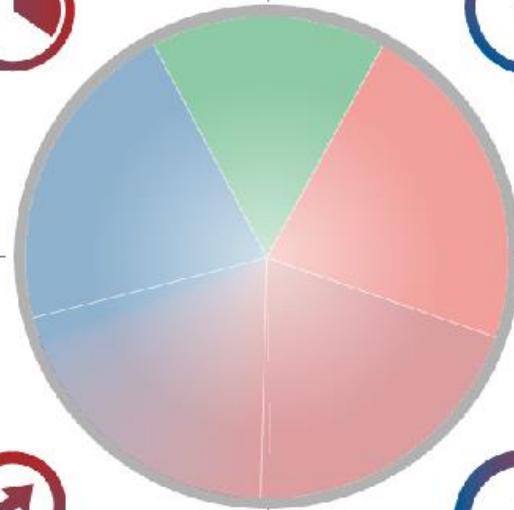
2 TOO LONG TO
RECOVER



3 DOES NOT
ADJUST TO
TRANSITIONS



4 POOR
RECOVERY TO
GREEN ZONE





Self-Regulation & Co-Regulation



<http://sasee.com/>

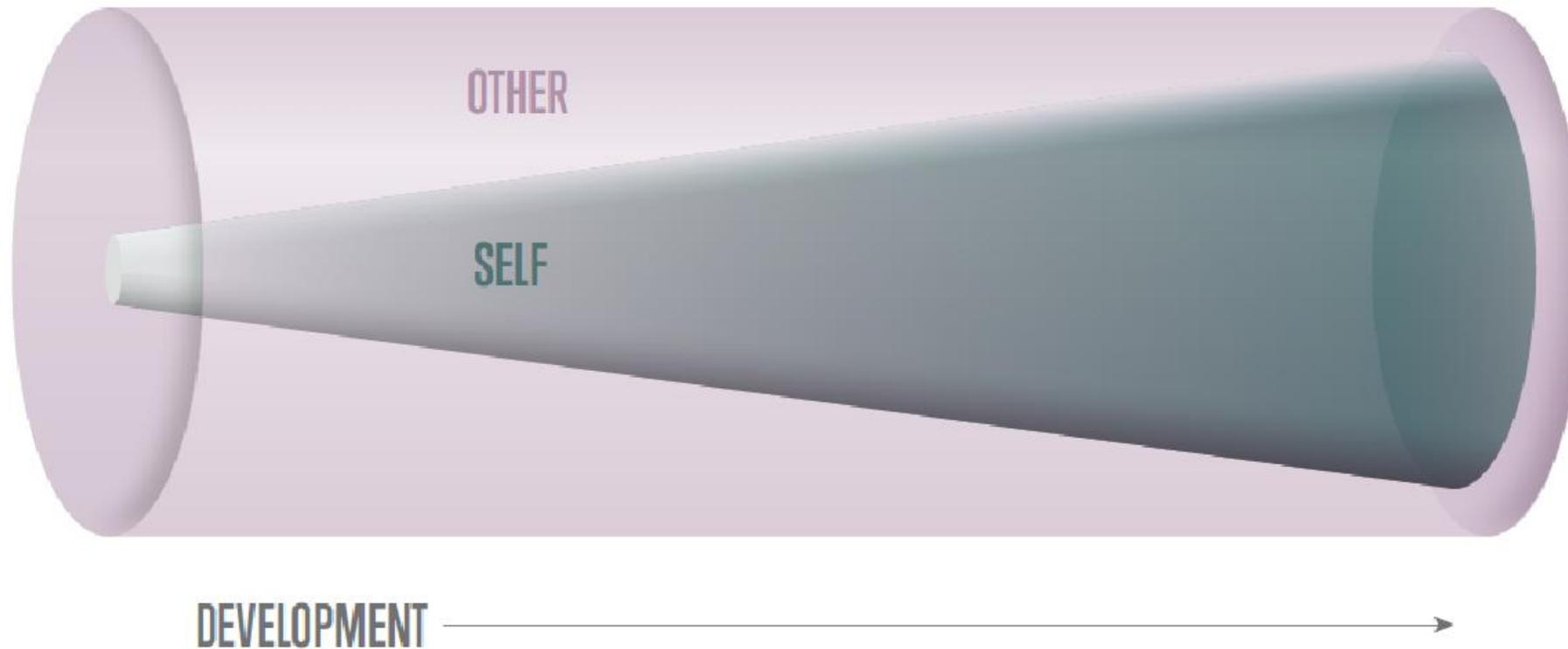
Put your oxygen mask on first, then help others

Recognize your own stress responses, get yourself calm, then support your child



THE NEURORELATIONAL FRAMEWORK'S

Co-Regulation Supports the Development of Self-Regulation



Changing balance between other-regulation and self-regulation as a child develops into an adult. (From "Ports of Entry and the Dynamics of Mother-Infant Interventions," by A.J. Sameroff, 2004, in *Treating Parent-Infant Relationship Problems*, p. 12, by A.J. Sameroff, S.C. McDonough, & K.L. Rusenblum [Eds.], New York: Guilford Press. Copyright 2004 by The Guilford Press. Reprinted with permission.) Found in the Neurorelational Framework Book on page 20. Adapted by C. Lillas 2016



A Doctor Co-Regulates His Patient



<https://www.youtube.com/watch?v=mROekpzSgEY>



**The most common issues we see,
Are likely the same ones that you see...**

- . Sleep**
- . Iron Deficiency**
- . Constipation**



Sleep

- Healthy sleep is critical for all mental and physical health
- Multiple factors impact sleep – important to screen/assess for sleep apnea
- <https://www.youtube.com/@elmtreeclinic/playlists> click sleep
- Babysleep.com website is the best one that we have found for both parents and professionals



Iron

- Iron is a cofactor in Dopamine production. If iron levels are low, we tend to have restless sleep, struggle to fall asleep, and wake up during the night
- Additionally, iron deficiency is a significant contributor to daytime hyperactivity and restlessness.
- Iron is critical for all brain development, including cognitive function.



Iron Indices

- **We routinely do bloodwork** in children from birth to 5 years old with sleep issues
- We check Ferritin, TIBC, iron, iron sats, and CBC.
- We recommend iron replacement if:
 - **Ferritin <50** (Stollery Sleep Clinic treats Ferritin <100)
 - TIBC high
 - Low iron
 - Low iron sats
 - Low Hemoglobin



Iron Replacement

- Dose - 3 to 5 mg/kg/day. We recommend one dose per day.
- Give with citrus and no calcium or magnesium 1 hour before or after iron.
- [https://elmtreeclinic.ca/handouts/Iron/Iron Handout for Families](https://elmtreeclinic.ca/handouts/Iron/Iron%20Handout%20for%20Families)



Challenges with Iron Supplementation

- Children often do not tolerate the taste of iron preparations. So, we suggest that parents get a few kinds to try.
- In Edmonton, one compounding pharmacy has made iron into chocolate squares.
- We do not treat with iron unless constipation is already treated, as Iron commonly causes constipation.
- We recommend increasing fluid intake when taking iron.
- Iron also causes the stool to be black. We know this, but parents worry about it, so it's worth mentioning to them.



Constipation

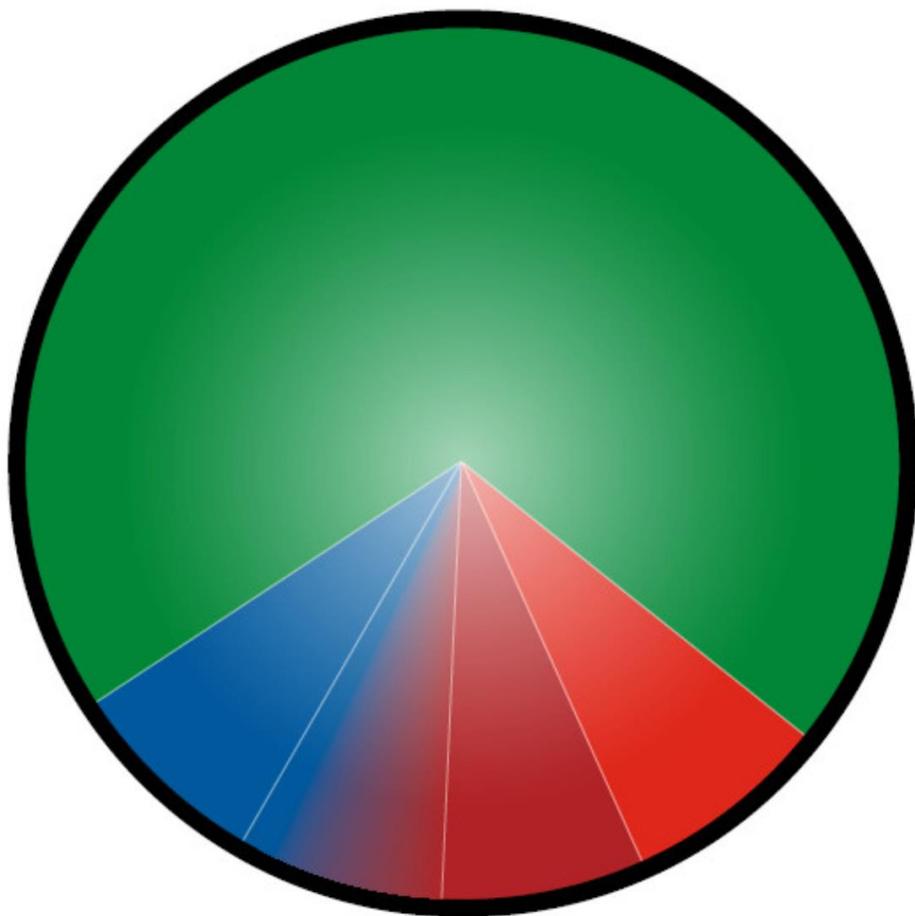
- Constipation could be a whole day workshop
- We highly recommend the work of Dr. Stephen Hodges
<https://www.bedwettingandaccidents.com/product-page/the-pre-m-o-p>
- Increase fluid and fiber first. We suggest what we call “liquidy foods,” as preschoolers don’t drink enough water
- Most daycares do not encourage enough fluid intake
- We typically suggest PEG3350 if fluids alone are not enough



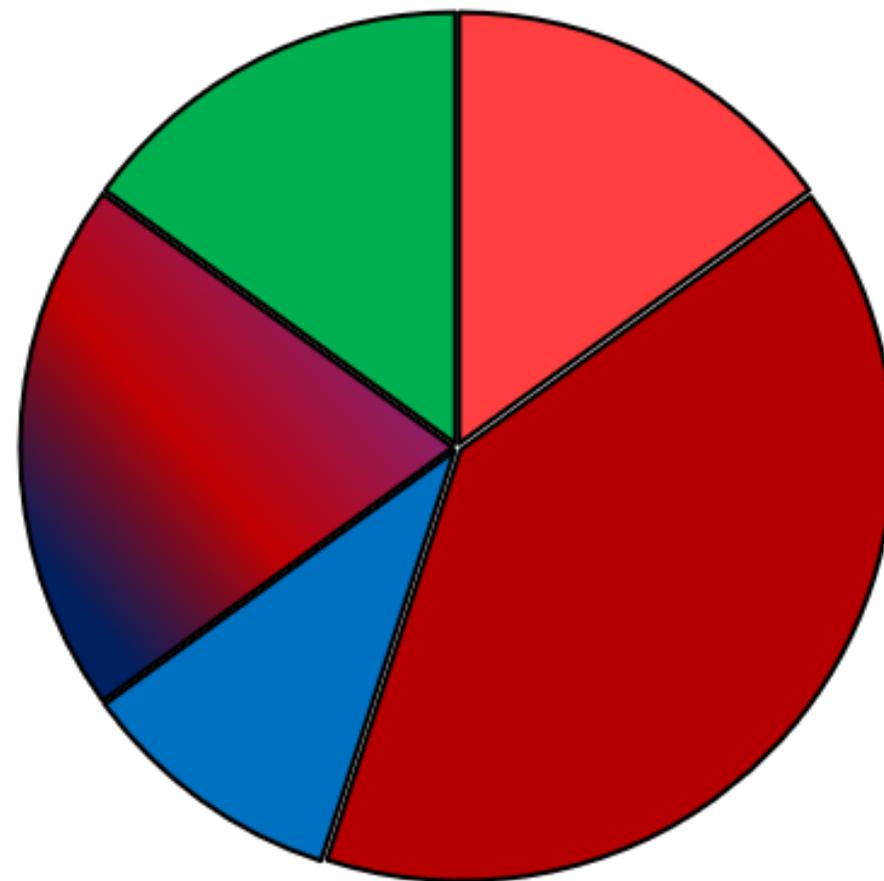
THE NEURORELATIONAL FRAMEWORK'S

Awake States Pie

ARE YOU IN ADAPTIVE STRESS?



Toxic Stress

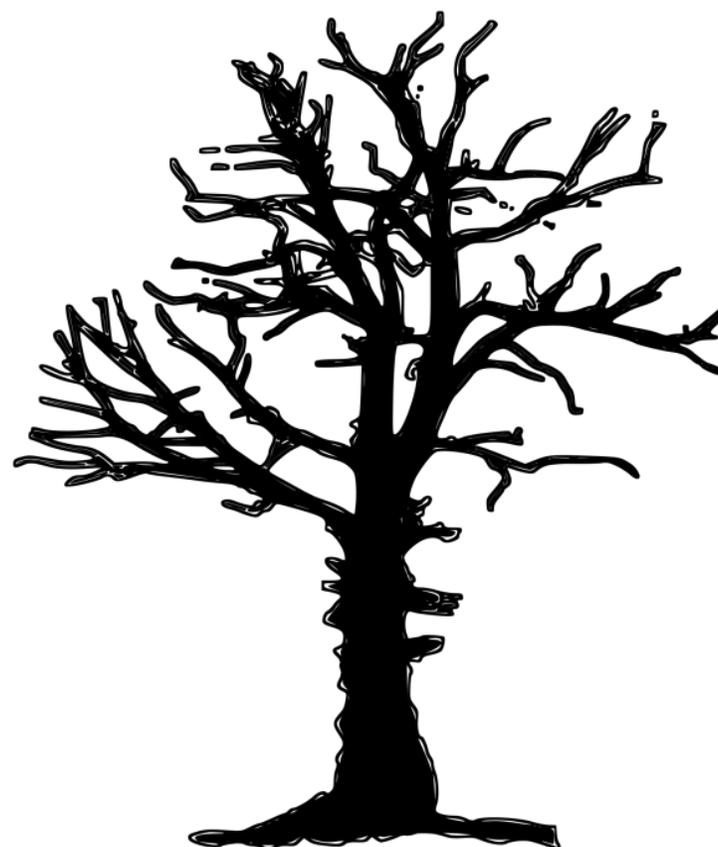


■ (+) Red ■ (-) Red ■ Blue ■ Combo ■ Green



Positive
procedural
memories?

Negative
procedural
memories?





Strategies

- See our website. <https://elmtreeclinic.ca/>. The handout section has strategies for almost everything listed under the water on the iceberg. In addition to links to websites that we believe can help families.
- Our YouTube channel. <https://www.youtube.com/@elmtreeclinic>. Videos on psychoeducation and strategies for sleep and anxiety.

NRF Foundations Manual

www.NRFcare.org

Free Starter Kit





Medications

- Pharmacologically, we are trying to help children get back into green zone **regardless of the underlying etiology**
- We mostly pick meds that help decrease sympathetic nervous system/gas pedal or activate parasympathetic nervous system/brake pedal
- We generally only use meds for children ages 2 to 5 with stress responses that don't seem to respond to the strategies we suggest. (See the handout and video sections on our website)
- We discourage polypharmacy with psychotropic medication in preschoolers



Clonidine

- Clonidine generally only lasts 3 to 4 hours in this age group, so we tend to dose it every 3 hours
- We start with 1 dose per day. That allows us to see how well the child responds. Also, lets us know how long it lasts
- We overlap doses by about ½ hour. So, if the dose lasts 3 ½ hours, then we give the next dose at the 3-hour mark
- Dose range: 0.003 to 0.008 mg/kg/day. We calculate the whole dose and divide it into 4 - 6 doses per day
- Should not be stopped abruptly, but weaned off for cardiac safety issues



Intuniv (Guanfacine)

- If swallowed, Intuniv XR will generally last *8 -12 hours*
- Most of our kids can't swallow meds, so we break into 0.25 – 0.5 mg and start with 1 dose in the am
- We tend to overlap doses by about $\frac{1}{2}$ hour. So if the dose lasts 7 hours, we give next dose at the $6 \frac{1}{2}$ hour mark
- Dose range: 0.05 to 0.12 mg/kg/day



Medication for Mental Health Disorders

In preschool children, no matter what the underlying etiology - Anxiety, ADHD, OCD, ...

We still try Clonidine or Intuniv first.



Anxiety

- SSRIs only (but not Paroxetine)
- Wait until 3 years old. Seems to have a paradoxical effect if given prior to 3 years old
- BL starts with Prozac 2 mg per day. Dr. Hapchyn starts with Luvox compounded to dose 6.25 mg TID
- SSRIs take a few days to 2 weeks to work at the correct dose
- Minimal side effects usually compared to adults



ADHD

Generally, we only use medication in 4-year-olds and older, as the prefrontal cortex doesn't start to develop until then.

My current strategy is to try 2.5 mg of Dexedrine for 1 week, then 5 mg of Ritalin for 1 week. Ask parents to check with school and home which worked best with the least side effects.

Then give a weight-based long-acting dose. 0.5 mg/kg/day for Dexedrine and 1 mg/day for Ritalin.

Ex. 30-pound 4-year-old (roughly 14 kg). If Dexedrine worked best, then Vyvanse 10 mg chewable or Adderall 5 mg and 5 mg at 2 pm. If Ritalin worked best, then Biphentin 10 mg (and Ritalin quick release 5 mg later in the day). If swallowing meds, may try Concerta 18 mg.



**To My Patients and Their Families
and to all My Colleagues**



For all you teach me every day



Questions and Comments





References

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- www.albertafamilywellness.org
- www.developingchild.harvard.edu
- <https://www.cssp.org/young-children-their-families/strengtheningfamilies>
- Parkin P, Koroshegyi C, Makam E, et al. Association between Serum Ferritin and Cognitive in Early Childhood. *J Pediatr*. 2020;217:189-191.