

# Finding the simplicity in brain-based practice

Improve results, abundance and utilization

Dr. Amy Spoelstra



Caption  
FOCUS  
ACADEMY

1

## WHERE WE ARE NOW

**Spoelstra**  
Family Chiropractic

CHIROPRACTIC



NUTRITION



NDR



BRAIN-BASED  
MENTORING



**FOCUS**  
ACADEMY

**FOCUS**  
ELITEACCESS

**Brain Blossom**  
PROGRAM™

Spoelstra Family Chiropractic  
FOCUS Program 4 Pillars  
FOCUS Academy Certification  
FOCUS Elite Access  
FOCUS Academy Virtual CE's  
FOCUS Academy Research  
Brain Blossom Clinical  
Brain Blossom Educational (coming soon!)

2

## dr. amy spoelstra

- Spoelstra Family Chiropractic
- International speaker on development and processing disorders
- FOCUS program
- Neuro-Deflective Retraining Method™
- Navigate Your Healing™
- FOCUS Educational Seminars™
- FOCUS Academy™
- Brain Blossom™

*"Simplicity on the far side of complexity"*  
Oliver Wendell Holmes



Caption

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## CREATION OF THE FOCUS APPROACH AND SYSTEM FOR CHIROPRACTIC

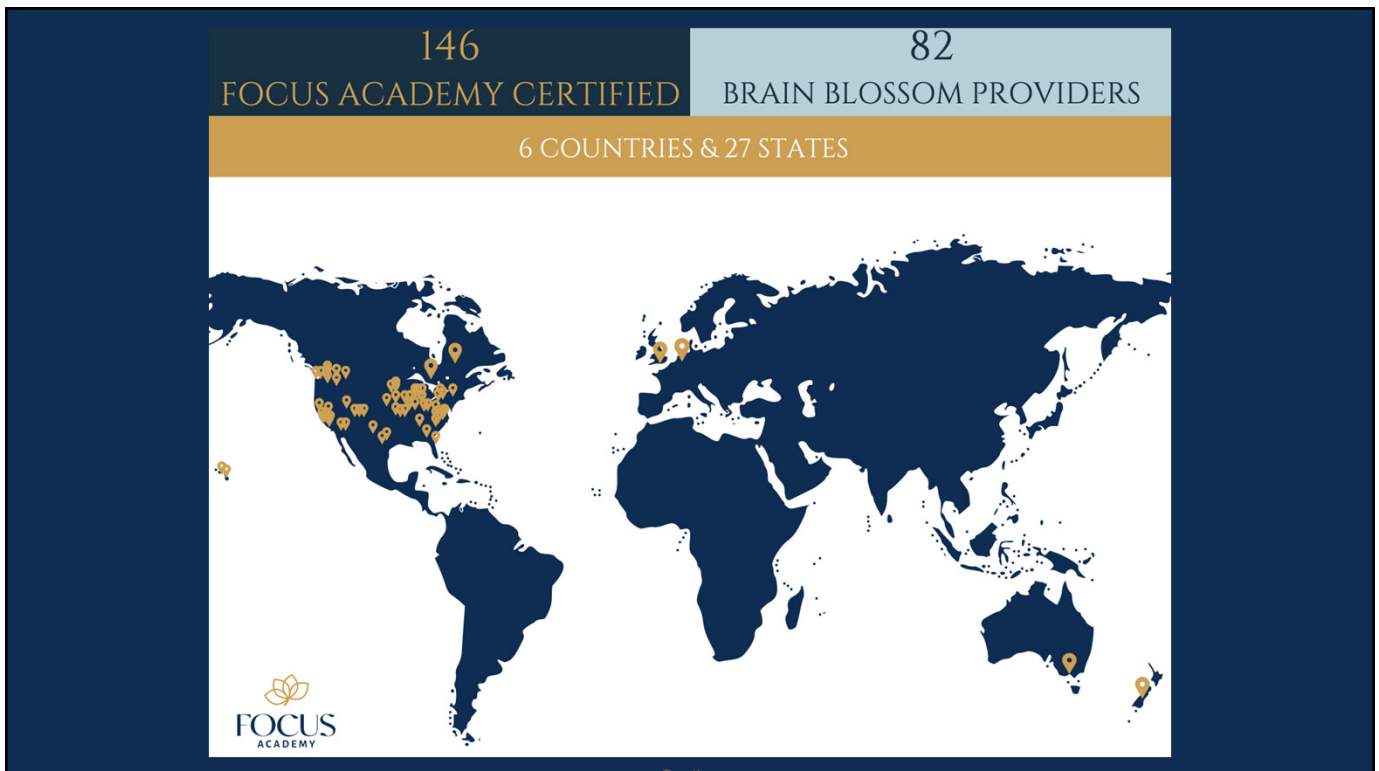
Personal Life Experience  
 Developmental Optometry/ Neuro  
 Optometry  
 Chiropractic  
 Gut Healing/Nutrition  
 Methylation/Epigenetics  
 Sally Goddard  
 Reflex Integration

Neuroeducation  
 Functional Neurology  
 Brain Based Parenting/Mentoring  
 TBRI (Trust Based Relational  
 Intervention)  
 Preconception

4



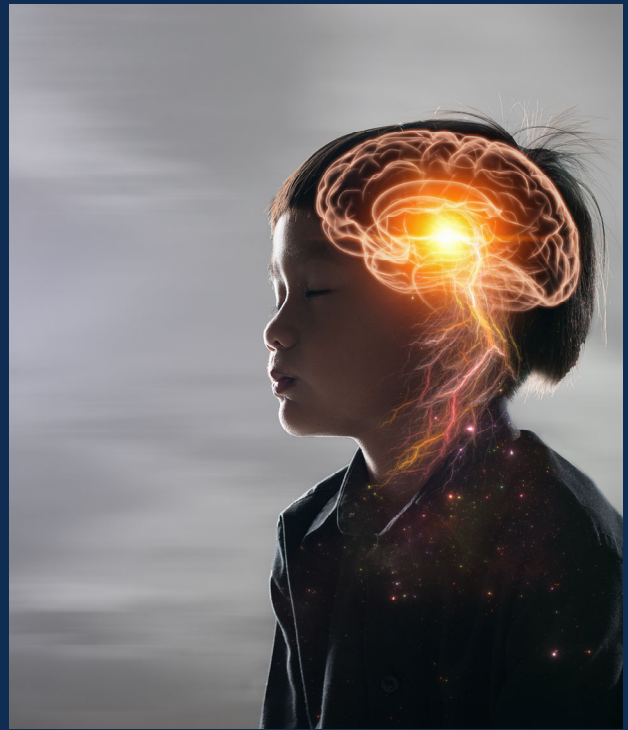
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## Chiropractic and development

- Spoelstra Family Chiropractic
- The FOCUS Academy
- Sherman College of Chiropractic



Caption

7



1

7 million disabled students in the U.S. make up 14% of national public school

2

1 in 5 learning differences  
ADD/Dyslexia

3

1 in 16 public school children have an IEP

4

20% of 18-24 year olds reported contemplating suicide in the last 30 days

5

40% of adults reported struggling with mental health challenges

8



## Pandemic/growth & development

Review of studies on impact of social restriction on mental and developmental health:

### CONCLUSIONS:

Studies suggest epidemics can lead to high stress, severe anxiety disorders, depression, increased risk of developmental delays and health problems in adulthood.

J. Pediatr. (Rio J). 2020 Sep 23  
doi: 10.1016/j.jped.2020.08.008 [Epub ahead of print]

PMCID: PMC7510529  
PMID: 32980318

### The potential impact of the COVID-19 pandemic on child growth and development: a systematic review

Liubiana Arantes de Araújo,<sup>a,\*</sup> Cássio Frederico Veloso,<sup>b</sup> Matheus de Campos Souza,<sup>c</sup> João Marcos Coelho de Azevedo,<sup>c</sup> and Giulio Tarro<sup>d,e,f,g</sup>

► Author information ► Article notes ► Copyright and License information ► Disclaimer

This article has been cited by other articles in PMC.

#### Abstract

**Objective**  
This was a systematic review of studies that examined the impact of epidemics or social restriction on mental and developmental health in parents and children/adolescents.

**Source of data**  
The PubMed, WHO COVID-19, and SciELO databases were searched on March 15, 2020, and on April 25, 2020, filtering for children (0–18 years) and humans.

**Synthesis of data**  
The tools used to mitigate the threat of a pandemic such as COVID-19 may very well threaten child growth and development. These tools — such as social restrictions, shutdowns, and school closures — contribute to stress in parents and children and can become risk factors that threaten child growth and development and may compromise the Sustainable Development Goals. The studies reviewed suggest that epidemics can lead to high levels of stress in parents and children, which begin with concerns about children becoming infected. These studies describe several potential mental and emotional consequences of epidemics such as COVID-19, H1N1, AIDS, and Ebola: severe anxiety or depression among parents and acute stress disorder, post-traumatic stress, anxiety disorders, and depression among children. These data can be related to adverse childhood experiences and elevated risk of toxic stress. The more adverse experiences, the greater the risk of developmental delays and health problems in adulthood, such as cognitive impairment, substance abuse, depression, and non-communicable diseases.

**Conclusion**  
Information about the impact of epidemics on parents and children is relevant to policy makers to aid them in developing strategies to help families cope with epidemic/pandemic-driven adversity and ensure their children's healthy development.

**Keywords:** COVID-19, Coronavirus, SARS-COV2, Child development, Toxic stress, Sustainable development goals

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## Ice Storm Study

Project Ice Storm:  
prenatal maternal stress affects cognitive and linguistic functioning in 5 1/2-year-old children.

### CONCLUSIONS:

Prenatal exposure to a moderately severe natural disaster is associated with lower cognitive and language abilities at 5(1/2) years of age.



Journal of the American Academy of Child & Adolescent Psychiatry  
Volume 47, Issue 9, September 2008, Pages 1063–1072



### Project Ice Storm: Prenatal Maternal Stress Affects Cognitive and Linguistic Functioning in 5½-Year-Old Children

#### Results

Children exposed in utero to high levels of objective stress had lower Full Scale IQs, Verbal IQs, and language abilities compared to children exposed to low or moderate levels of objective prenatal maternal stress; there were no effects of subjective stress or objective stress on Performance IQs. Trend analyses show that for all outcome variables except Block Design, there was a significant curvilinear association between objective stress and functioning.

#### Conclusions

Prenatal exposure to a moderately severe natural disaster is associated with lower cognitive and language abilities at 5½ years of age. *J. Am. Acad. Child Adolesc. Psychiatry*, 2008; 47:(9):1063–1072.

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# Adverse childhood experiences

The Gold Standard

## ACES can have lasting effects on....



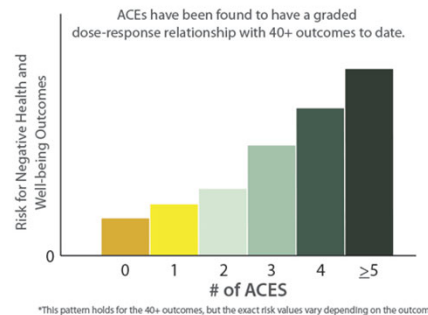
Health (obesity, diabetes, depression, suicide attempts, STDs, heart disease, cancer, stroke, COPD, broken bones)



Behaviors (smoking, alcoholism, drug use)

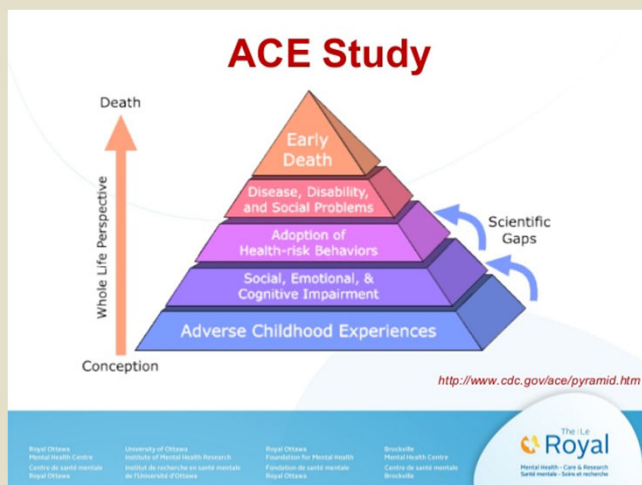


Life Potential (graduation rates, academic achievement, lost time from work)



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## limitations of the ace study



Trauma  
Toxins  
Thoughts

Physical  
Chemical  
Emotional

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## News

## Covid-19: Children born during the pandemic score lower on cognitive tests, study finds

BMJ 2021 ; 374 doi: <https://doi.org/10.1136/bmj.n2031> (Published 16 August 2021)

Cite this as: BMJ 2021;374:n2031

Children born during the pandemic score markedly lower on standard measures of verbal, motor, and overall cognitive ability, US researchers have found.

In a longitudinal study of 672 children from Rhode Island that has run since 2011, those born after the pandemic began showed results on the Mullen scales of early learning that corresponded to an average IQ score of 78, a drop of 22 points from the average of previous cohorts.

The study, which was funded by the US National Institutes of Health is awaiting peer review before publication in *JAMA Pediatrics*. But a preprint copy is available online.<sup>1</sup>

The researchers have largely ruled out a direct effect of the virus, as mothers or children with a history of testing positive for covid-19 were excluded from the analysis. Instead, the authors say, reduced interaction with parents and less outdoor exercise are likely culprits, along with effects that occurred during pregnancy.

Other research has hinted at behavioural effects in children born during the pandemic, including a recent study from Italy.<sup>2</sup>

Children born in 2019 did not experience a decline in development scores during the pandemic. "Their trajectories of maturation were unaltered," said lead author of the longitudinal study and paediatrician Sean Deoni of Brown University. "They seemed to be doing alright. It's really affecting those born during the pandemic, whether through transference from their mother, what she's experiencing during late term pregnancy, or during those crucial earliest months after birth."


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News US Politics World COVID-19 Climate Change Health Science Originals Veterans Contact

## Pandemic Babies Are Facing Speech & Social Development Delays. 5 Ways to Help

Abigail A. Allen  
July 2, 2022 · 5 min read



Caption

Typically, about 1 in 6 children experience a developmental delay. But children born during the pandemic, a 2022 study has found, have nearly twice the risk of developmental delays in communication and social development compared to babies born prior to the pandemic.

The reason, some researchers believe, is related to less interaction with other children, among other factors.

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Delays in communication can mean a child learns to talk later, talks less or uses gestures like pointing instead of talking. Social developmental delays might be present when a child doesn't respond to their name when called, doesn't look at what adults are paying attention to in the environment, or doesn't play with other children or with trusted adults.

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## Early Life Stress, Hormones, and Neurodevelopmental Disorders

Makris G., Eleftheriades A., Pervanidou P.

 Author affiliations

 Corresponding Author

Keywords: [Early life stress](#) [Prenatal maternal stress](#)  
[Neurodevelopmental disorders](#) [Autism spectrum disorder](#)  
[Attention deficit hyperactivity disorder](#)

Horm Res Paediatr

<https://doi.org/10.1159/000523942>

can have detrimental long-term influences on the physiology, cognition, and behavior of an individual. There is abundant evidence indicating that ELS exerts its lasting effects on the physical and mental health of the individual, likely acting through a number of mediating mechanisms, including the disruption of developmental programming of the fetus. Neurodevelopmental disorders (NDDs), for example, attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD), are a group of conditions that typically manifest during infancy, childhood, or adolescence and are characterized by developmental deficits in various domains. **Summary:** The scope of the current mini-review is to provide an up-to-date summary of the findings regarding the association of ELS and NDDs and the possible hormonal mechanisms through which PMS exerts its impact on neurodevelopment. We focus on the available evidence regarding children and adolescents diagnosed with ADHD or ASD. ELS exposure during developmental vulnerability windows may increase the risk for either subclinical neuropsychological alterations or clinical conditions, such as NDDs. In fact, a large body of evidence underlies the association of ELS exposure and increased risk for NDDs in the offspring.

**Key Messages:** The majority of data suggest that ELS, including PMS, may be associated with ADHD and ASD in the offspring, although there is no consensus regarding the critical developmental periods. Carefully controlled prospective studies are needed to

Caption

Caption

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## Profound neuroinflammation associated with long COVID

Download PDF Copy



By Neha Mathur

Reviewed by Aimee Molineux

In a recent study posted to the [medRxiv](#) preprint quantitative assessment, [<sup>18</sup>F]DPA-714 provides *in vivo* evidence of widespread neuroinflammation of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection.

### Study findings

As per the neuropsychological test scores, both long COVID patients suffered fatigue, severe functional impairment, and concentration problems. The first patient had mildly impaired sustained attention and verbal memory deficits, whereas the second had fluctuating sustained attention and visuo-constructive deficits.

Compared to a [<sup>18</sup>F]DPA-714 cohort of healthy control subjects and MS patients, the tracer parent fraction and whole blood activity concentration corrected for both the study patients were within the range. Thus, the differences in tracer metabolism could not reasonably explain any differences in [<sup>18</sup>F]DPA-714 binding.

The MRI of the healthy control subjects and the first long COVID patient was consistent with age; however, the MRI of the second patient had mild atrophy in the parietal region. Furthermore, the first patient showed severely elevated [<sup>18</sup>F]DPA-714 binding in all brain regions. Compared to healthy controls, BP<sub>ND</sub> (=k<sub>3</sub>/k<sub>4</sub>) values obtained from the 2T4k\_V<sub>B</sub> model in the first patient were increased by 121% on average, whereas the same values for the second patient increased on average by 79%.

Caption


<https://www.news-medical.net/news/20220607/Profound-neuroinflammation-associated-with-long-COVID.aspx>

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Published: 17 February 2015

## The role of inflammation in perinatal brain injury

Henrik Hagberg , Carina Mallard, Donna M. Ferriero, Susan J. Vannucci, Steven W. Levison, Zinaida S. Vexler & Pierre Gressens

*Nature Reviews Neurology* 11, 6589 Accesses | 465 Citations

### Abstract

Inflammation is increasingly recognized as being a critical contributor to both normal development and injury outcome in the immature brain. The focus of this Review is to highlight important differences in innate and adaptive immunity in immature versus adult brain, which support the notion that the consequences of inflammation will be entirely different depending on context and stage of CNS development. Perinatal brain injury can result from neonatal encephalopathy and perinatal arterial ischaemic stroke, usually at term, but also in preterm infants. Inflammation occurs before, during and after brain injury at term, and modulates vulnerability to and development of brain injury. Preterm birth, on the other hand, is often a result of exposure to inflammation at a very early developmental phase, which affects the brain not only during fetal life, but also over a protracted period of postnatal life in a neonatal intensive care setting, influencing critical phases of myelination and cortical plasticity. Neuroinflammation during the perinatal period can increase the risk of neurological and neuropsychiatric disease throughout childhood and adulthood, and is, therefore, of concern to the broader group of physicians who care for these individuals.

Caption

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## Male fetus susceptibility to maternal inflammation: C-reactive protein and brain development

Published online by Cambridge University Press: 02 December 2019

Sharon K Hunter, M. Camille Hoffman , Angelo D'Alessandro, Kathleen Noonan, Anna Wyrwa, Robert Freedman  and Amanda J. Law 

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### Conclusions

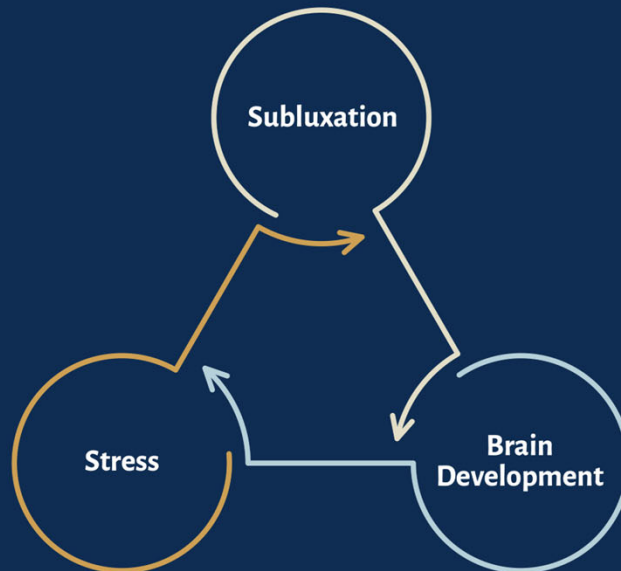
The male fetal-placental unit appears to be more sensitive to maternal inflammation than females. Effects are particularly marked on cerebral inhibition. Deficits in cerebral inhibition 1 month after birth, similar to those observed in several mental illnesses, including schizophrenia, indicate fetal developmental pathways that may lead to later mental illness. Deficits in early infant behavior follow. Early intervention before birth, including prenatal vitamins, folate, and choline supplements, may help prevent fetal development of pathophysiological deficits that can have life-long consequences for mental health.

Caption

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START WITH WHAT WE KNOW.....

## BRAIN-BASED CONCEPT #1



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## Brain-Based Concept #2

We must ask and  
answer the TWO  
MAIN QUESTIONS

**1** Are there any indicators of inefficiencies in the way your brain is receiving and sending information and are there indicators of alterations in autonomic balance?

**2** What tools are being used to process the world?

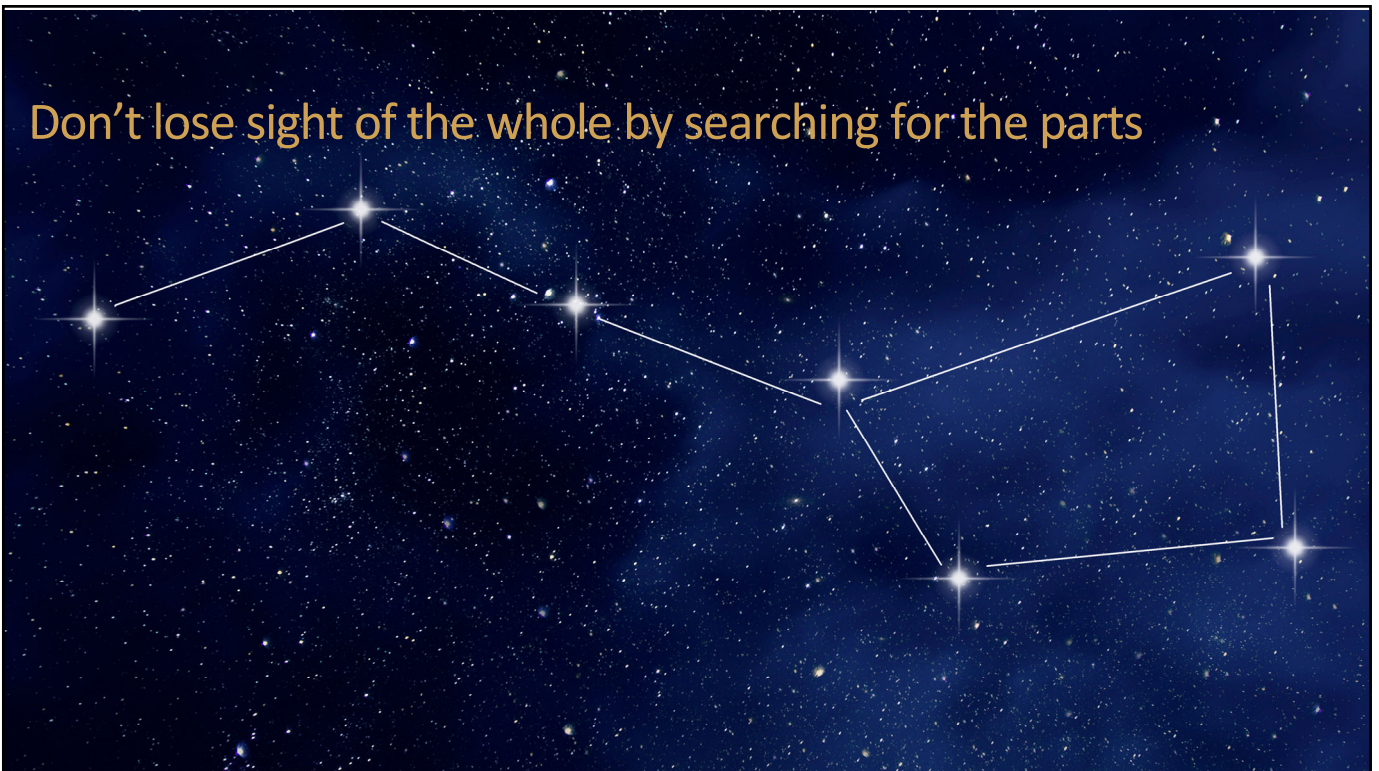
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# We are more than a sum of our parts



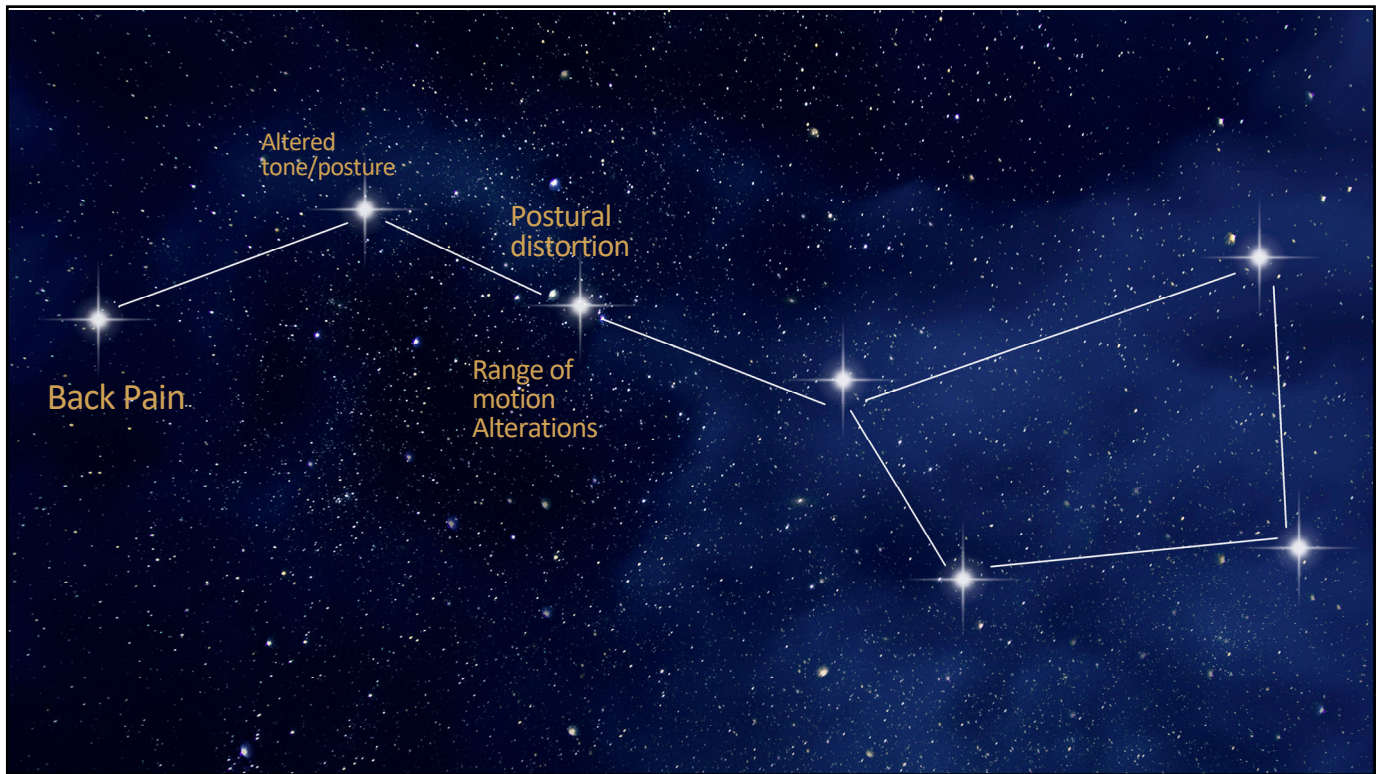
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Don't lose sight of the whole by searching for the parts

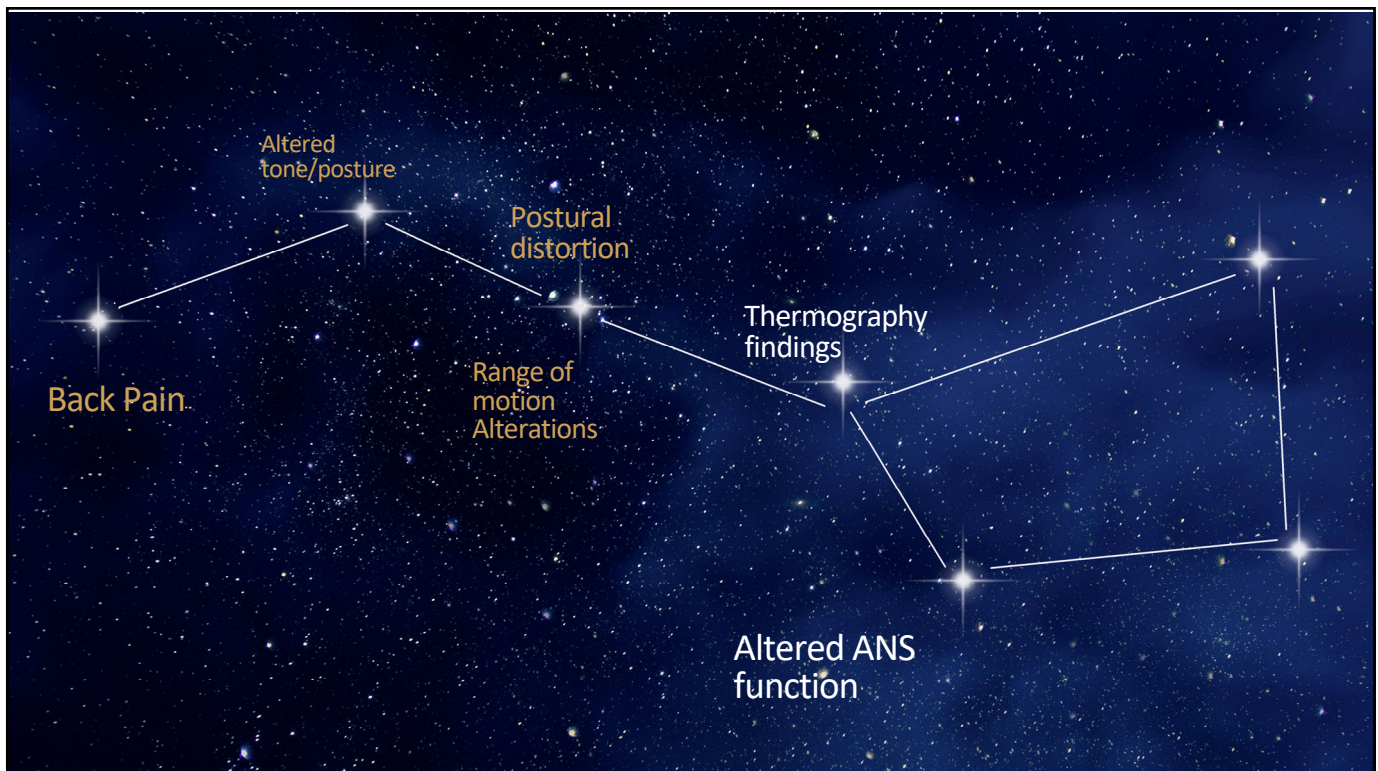


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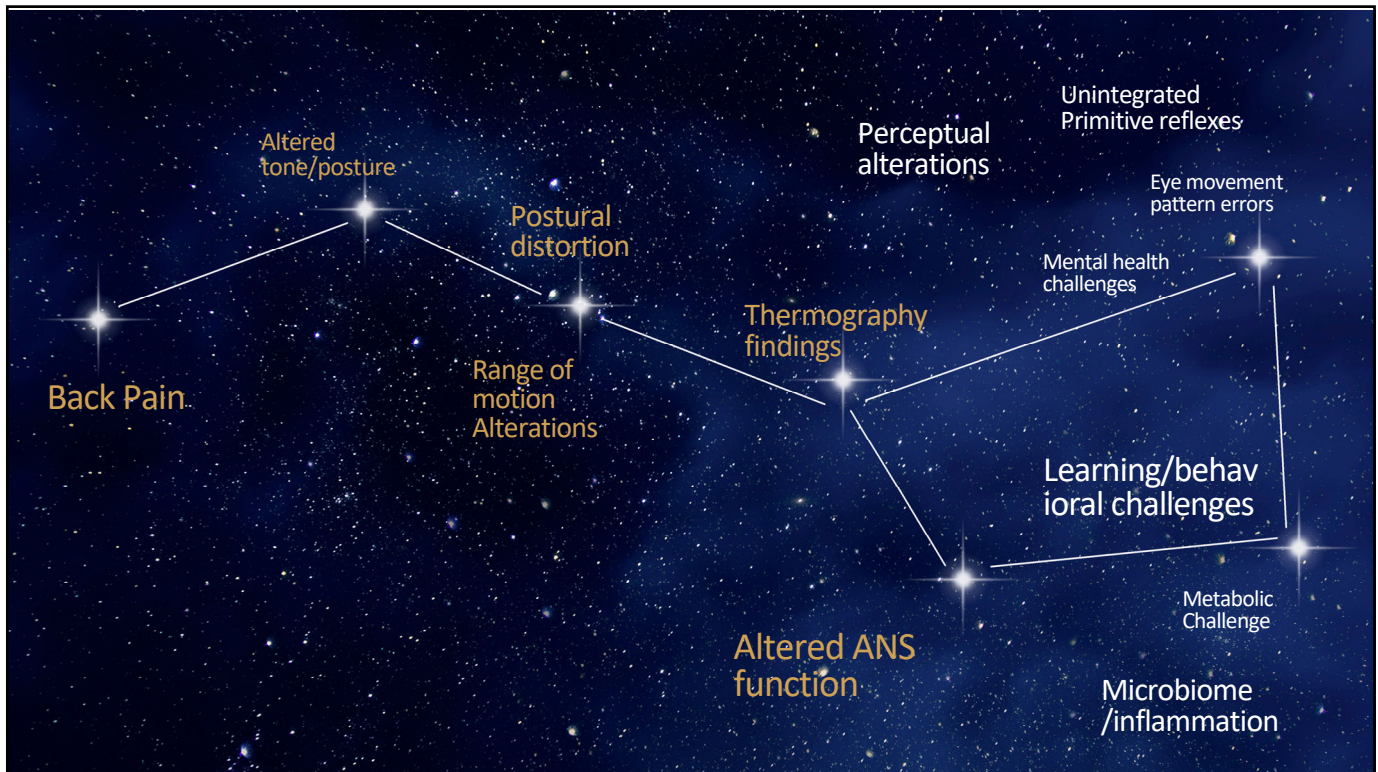


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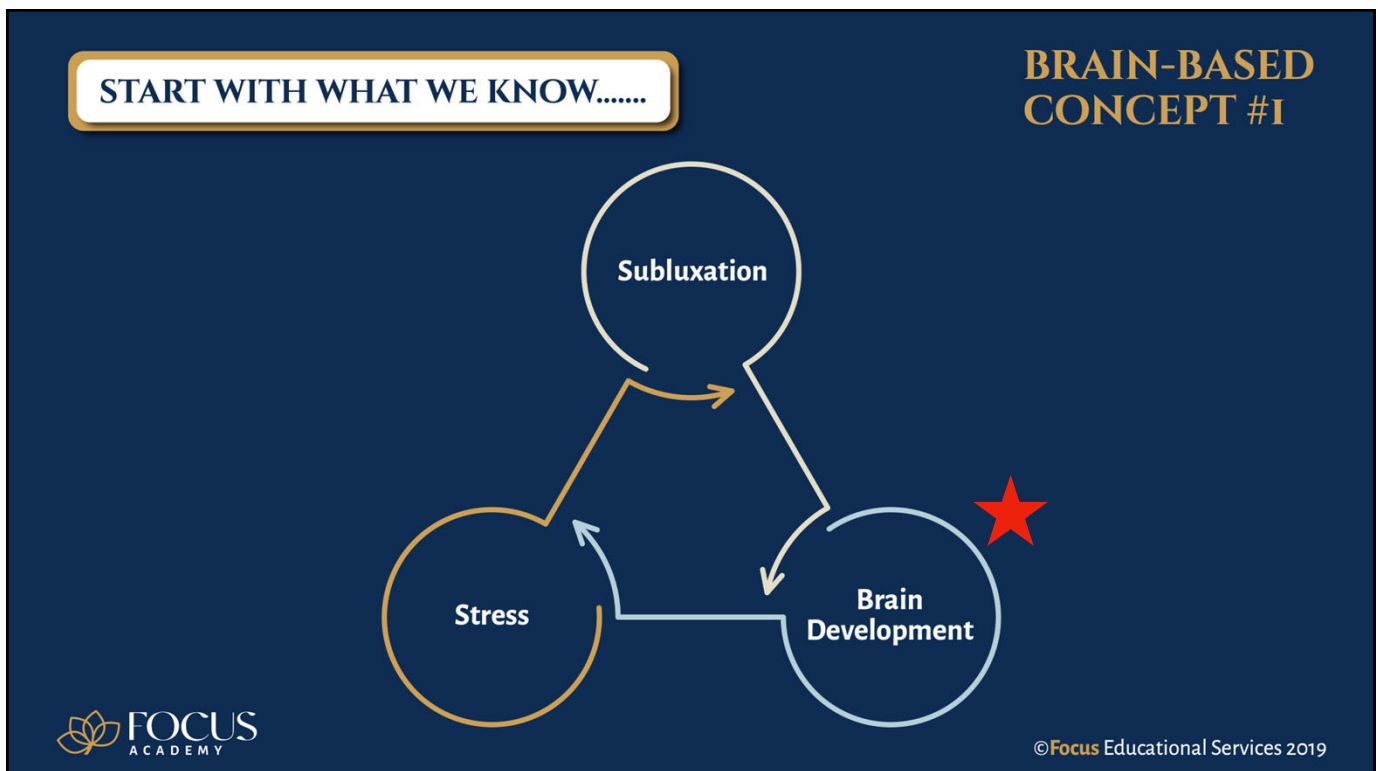


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## hierarchy

### WATCH & WONDER

- Observable
- Conceptual
- Behavior-producing

# 1



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### watch & wonder

#### Primitive Reflex

INTEGRATE BY ONE YEAR

#### Movement/ Touch

FIRST YEAR OF LIFE

#### Auditory/ Verbal

SECOND YEAR OF LIFE

#### Visual Cognition

SEE THE FUTURE/PAST



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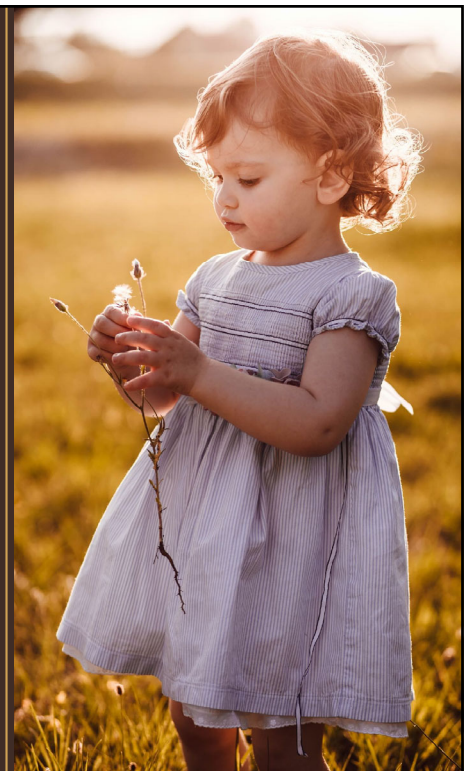
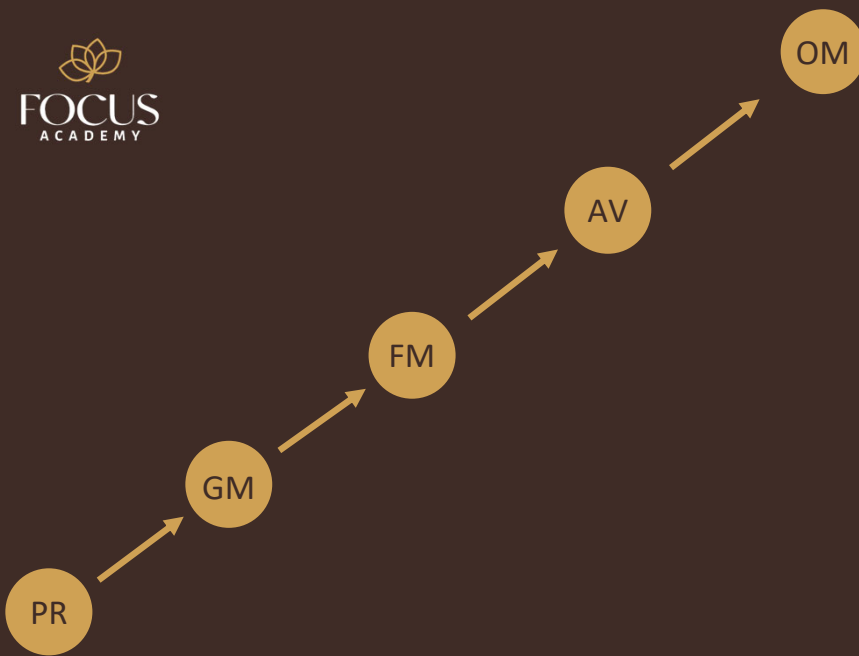
hierarchy

2

CLINICAL ASSESSMENT  
MEASURE, OBSERVE, AND NOTATE



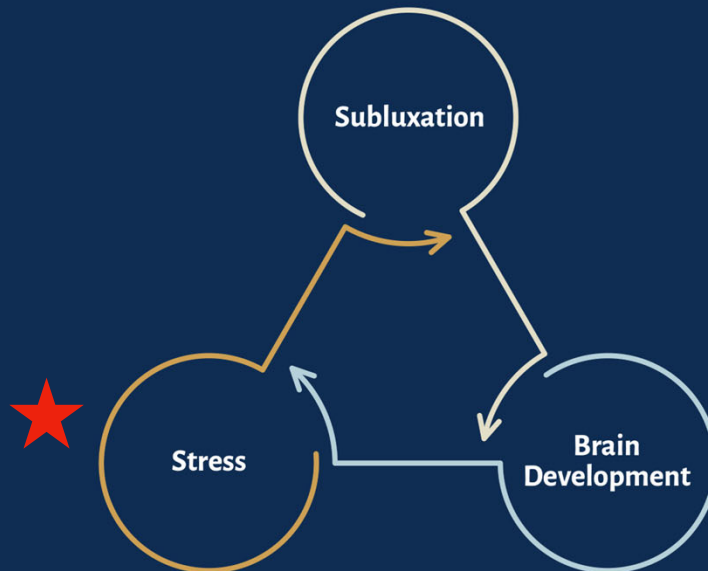
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START WITH WHAT WE KNOW.....

## BRAIN-BASED CONCEPT #1

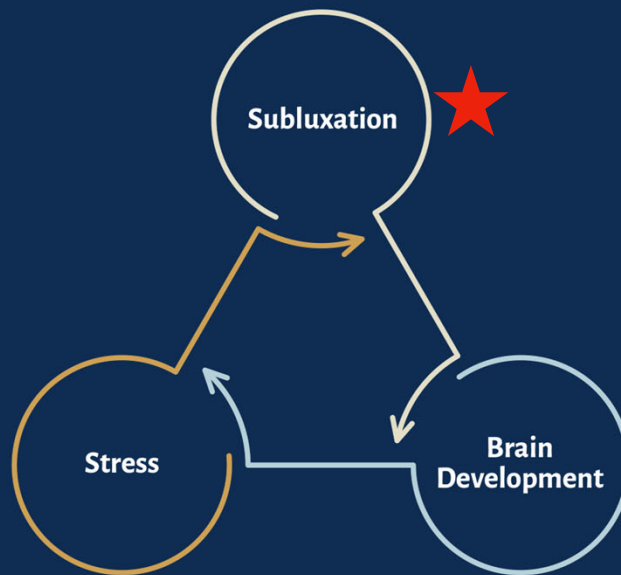


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START WITH WHAT WE KNOW.....

## BRAIN-BASED CONCEPT #1



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# anterior head posture

## AND AUTONOMIC FUNCTION

“Forward head posture is associated with abnormal autonomic nervous system function and disturbance of sensorimotor control.”



Full length article

### Is forward head posture relevant to autonomic nervous system function and cervical sensorimotor control? Cross sectional study

Ibrahim M. Moustafa<sup>a,b,c,d</sup>, Ahmed Youssef<sup>e,f</sup>, Amal Ahbouch<sup>g</sup>, May Tamim<sup>h</sup>, Deed E. Harrison<sup>i</sup>

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<sup>b</sup>Basic Science Department, Faculty of Physical Therapy, Cairo University, Cairo, Egypt

<sup>c</sup>Department of Rehabilitation Medicine, Tangji Hospital, Tangji Medical College, Huasheng University of Science and Technology, 330518, Jiaxing Avenue, Wuxi, 430030, Hubei, China

<sup>d</sup>Basic Science Department, Faculty of Physical Therapy, Beni-Suef University, Beni-Suef, Egypt

<sup>e</sup>CSP Nanjing (a spine research foundation), Jiang, 21, USA

#### ARTICLE INFO

**Keywords:**  
Cross sectional study  
Forward head posture  
Autonomic nervous system

#### ABSTRACT

**Background:** There is a growing interest concerning the understanding of the sagittal configuration of the cervical spine as a clinical outcome. However, evaluating sensorimotor control and autonomic nervous system for participants with forward head posture (FHP) compared to strictly matched control participants with normal head alignment has not been adequately addressed.

**Methods:** Sensorimotor control variables include smooth pursuit neck torsion test (SPNT), Overall stability index (OSI) and left and right rotation repositioning accuracy. Autonomic nervous system function includes amplitude and latency of skin sympathetic response (SR). We measured these variables in 80 participants with definite forward head posture (Craniovertebral angle less than 50 degrees) and 80 participants with age, gender, and BMI matched normal head alignment (Craniovertebral angle CVA) more than 50 degrees. Differences in variable measures were examined using the parametric t-test. Pearson correlation was used to evaluate the relationship between FHP, sensorimotor control, and autonomic nervous system function.

**Results:** The unpaired t-test analysis showed that there were statistically significant differences between the FHP group and control group for all of the sensorimotor measured variables including SPNT, OSI and left and right rotation repositioning accuracy ( $P < 0.001$ ). Also, there was a significant difference in neurophysiological findings, including SR amplitude ( $P = .005$ ), but there was no significant difference for SR Latency ( $P = .7$ ). The CVA significantly correlated with all measured variables ( $P < 0.001$ ).

**Conclusion:** Participants with FHP exhibited abnormal sensorimotor control and autonomic nervous system dysfunction compared to those with normal head alignment.

#### 5. Conclusion

We identified a forward head posture is associated with abnormal autonomic nervous system function and disturbance of cervical sensorimotor control. This finding has important implications for the assessment and rehabilitation of these subjects.

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Home > Featured

## Posture Assessed in Health Exam Detects Cognitive Decline

Featured Neuroscience Open Neuroscience Articles · June 10, 2022

**Summary:** An older person's posture may give clues to hidden cognitive decline, a new study reports.

**Source:** Shinshu University

A mass survey of citizens aged 50 to 89 years examined whether cognitive decline could be detected by sagittal spinal balance measurement based on a radiological approach. Doctors from Shinshu University observed associations of sagittal vertical axis (SVA) anteriorization and higher age with lower cognitive function.

The sagittal vertical axis is the length of a horizontal line connecting the posterior superior sacral end plate to a vertical plumbline dropped from the centroid of the C7 vertebral body. The more the head and neck protrude in front of the pelvis when viewed from the side, (the greater the length) the more likely subjects are to show symptoms of mild cognitive decline.

Caption

<https://neurosciencenews.com/posture-cognitive-decline-20803/>

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## Head posture & ANS and sensorimotor control

“Participants with forward head posture exhibited abnormal sensorimotor and autonomic nervous system dysfunction compared to normal head alignment”

> *Gait Posture*. 2020 Mar;77:29–35. doi: 10.1016/j.gaitpost.2020.01.004. Epub 2020 Jan 7.

### Is forward head posture relevant to autonomic nervous system function and cervical sensorimotor control? Cross sectional study

Ibrahim M Moustafa<sup>1</sup>, Ahmed Youssef<sup>2</sup>, Amal Ahbouch<sup>3</sup>, May Tamim<sup>3</sup>, Deed E Harrison<sup>4</sup>

Affiliations + expand

PMID: 31955048 DOI: 10.1016/j.gaitpost.2020.01.004

#### Abstract

**Background:** There is a growing interest concerning the understanding of the sagittal configuration of the cervical spine as a clinical outcome. However, evaluating sensorimotor control and autonomic nervous system for participants with forward head posture (FHP) compared to strictly matched control participants with normal head alignment has not been adequately addressed.

**Methods:** Sensorimotor control variables include smooth pursuit neck torsion test (SPNT), Overall stability index (OSI) and left and right rotation repositioning accuracy. Autonomic nervous system function includes amplitude and latency of skin sympathetic response (SSR). We measured these variables in 80 participants with definite forward head posture (Craniovertebral angle less than 50 degrees) and 80 participants with age, gender, and BMI matched normal head alignment (Craniovertebral angle (CVA) more than 50 degrees). Differences in variable measures were examined using the parametric t-test. Pearson correlation was used to evaluate the relationship between FHP, sensorimotor control, and autonomic nervous system function.

**Results:** The unpaired t-test analysis showed that there were statistically significant differences between the FHP group and control group for all of the sensorimotor measured variables including SPNT, OSI and left and right rotation repositioning accuracy ( $P < 0.001$ ). Also, there was a significant difference in neurophysiological findings, including SSR amplitude ( $P = .005$ ), but there was no significant difference for SSR Latency ( $P = .7$ ). The CVA significantly correlated with all measured variables ( $P < 0.001$ ).

**Conclusions:** Participants with FHP exhibited abnormal sensorimotor control and autonomic nervous system dysfunction compared to those with normal head alignment.

**Keywords:** Autonomic nervous system; Cross sectional study; Forward head posture.

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## Evaluation of cervical position sense in forward head posture

“Results of this study indicated that subjects with FHP had more repositioning error in some cervical movement related to healthy Individuals”

Volume 16, Issue 1 (Spring 2015)

J Rehab 2015, 16(1): 48-57 | Back to browse issues

### The Evaluation of Cervical Position Sense in Forward Head Posture Subjects and Compares It with Normal Subjects

Bahar Shaghayegh-Fard<sup>1</sup>, Amir Ahmadi<sup>\*2</sup>, Nader Ma'rroufi<sup>1</sup>, Javad Sarraf-Zadeh<sup>1</sup>

1- Iran University of Medical Science

2- Rehabilitation Faculty of Iran University of Medical Sciences, Tehran, Iran.

**Abstract:** (4414 Views)

**Objective:** One of the most common faulty posture of cervical spine is forward head posture (FHP). According to biomechanical changes in the muscles and ligaments of the neck which are rich source of mechanoreceptors, proprioception possibly impaired in forward head posture. Assessment of neck repositioning angles can be an indicator to assess proprioception of this region. The aim of this study was to investigate cervical proprioception in forward head posture subjects in sagittal plane and compare it with normal subjects.

Caption

**Results:** Absolute error did not show significant difference between two groups ( $P > 0.05$ ) but constant error of neutral angle when return from forward flexion showed significant difference between two groups ( $P < 0.05$ ). Also a significant correlation was found between body mass index (BMI) and CVA. This means that increase in BMI could decrease CVA ( $P < 0.05$ ).

**Conclusion:** Results of this study indicated that subjects with FHP had more repositioning error in some cervical movements related to the healthy individuals.

Caption

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## HEAD LAG AND PULL TO SIT TEST

“Head lag was significantly associated with Autism Spectrum Disorder at 36 months”

“Head lag with other alterations in early development may be associated with autism risk and may serve as an early indicator”

> *Am J Occup Ther.* Sep-Oct 2012;66(5):577-85. doi: 10.5014/ajot.2012.004192.

### Head lag in infants at risk for autism: a preliminary study

Joanne E Flanagan<sup>1</sup>, Rebecca Landa, Anjana Bhat, Margaret Bauman

Affiliations + expand

PMID: 22917124 DOI: 10.5014/ajot.2012.004192

#### Abstract

**OBJECTIVE.**Poor postural control during pull-to-sit is a predictor of developmental disruption in cerebral palsy and preterm populations but has not been examined in infants at risk for autism. We examined the association between head lag

**METHOD.**High-risk participants were sibling high-risk infants prospectively from 6–36 mo and 21 low-risk infants. We conducted a subsequent betw risk and 21 low-risk infants. **RESULTS.**Head l disorder at 36 mo ( $p = .020$ ) and was more f ( $p = .018$ ). **CONCLUSION.**Head lag with othe with autism risk and may serve as an early in clinical implications for occupational therapi

Copyright © 2012 by the American Occupational

#### Abstract

**OBJECTIVE.**Poor postural control during pull-to-sit is a predictor of developmental disruption in cerebral palsy and preterm populations but has not been examined in infants at risk for autism. We examined the association between head lag during pull-to-sit at age 6 mo and autism risk status.

**METHOD.**High-risk participants were siblings of children with autism. We studied one sample of 40 high-risk infants prospectively from 6–36 mo and obtained diagnostic classifications of autism or no autism. We conducted a subsequent between-group comparison with a new sample of 20 high-risk and 21 low-risk infants.

**RESULTS.**Head lag was significantly associated with autism spectrum disorder at 36 mo ( $p = .020$ ) and was more frequently observed in high-risk than in low-risk infants ( $p = .018$ ).

**CONCLUSION.**Head lag with other alterations in early development may be associated with autism risk and may serve as an early indicator of neurodevelopmental disruption. Results have clinical implications for occupational therapists in early intervention practice.

Flanagan JE, Landa R, Bhat A, Bauman M. Head lag in infants at risk for autism: a preliminary study. *Am J Occup Ther.* 2012;66(5):577-585. doi:10.5014/ajot.2012.004192

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## Sensorimotor disturbances in neck disorders/ postural stability, head and eye movement

“Dysfunction in the cervical receptors in neck disorders can alter afferent input, changing integration timing and tuning of sensorimotor control”



Manual Therapy

Volume 13, Issue 1, February 2008, Pages 2-11



Masterclass

### Sensorimotor disturbances in neck disorders affecting postural stability, head and eye movement control

Julia Treleaven

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#### Abstract

The receptors in the cervical spine have important connections to the vestibular and visual apparatus as well as several areas of the central nervous system. Dysfunction of the cervical receptors in neck disorders can alter afferent input subsequently changing the integration, timing and tuning of sensorimotor control. Measurable changes in cervical joint position sense, eye movement control and postural stability and reports of dizziness and unsteadiness by patients with neck disorders can be related to such alterations to sensorimotor control.

It is advocated that assessment and management of abnormal cervical somatosensory input and sensorimotor control in neck pain patients is as important as considering lower limb proprioceptive retraining following an ankle or knee injury. Afferent information from the cervical receptors can be altered via a number of mechanisms such as trauma, functional impairment of the receptors, changes in muscle spindle sensitivity and the vast effects of pain at many levels of the nervous system. Recommendations for clinical assessment and management of such sensorimotor control disturbances in neck disorders are presented based on

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## CLINICAL CLUES FOR SUBLUXATION



### MOVEMENT/POSTURAL DISTORTION

1

POSTURAL CHANGES

2

RANGE OF MOTION ALTERATIONS

3

X-RAY CHANGES

### NEUROLOGICAL COMPROMISE

1

PARASPINAL THERMOGRAPHY

2

HRV

3

SURFACE EMG

4

PUPIL RESPONSE

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## Brain-Based Concept #2

We must ask and answer the TWO MAIN QUESTIONS


1

Are there any indicators of inefficiencies in the way your brain is receiving and sending information and are there indicators of alterations in autonomic balance?

2

What tools is this patient using to process their world?

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ELITEACCESS

## CLINICAL EXAM

LOOKING FOR CLUES TO ANSWERING  
THE TWO BIG QUESTIONS

Patient Name: \_\_\_\_\_

**1** Is anything altering the way your brain is receiving and sending information?

**MOVEMENT ALTERATION / POSTURAL DISTORTION**

☐ Posture Changes

☐ Range of Motion Changes

☐ Changes on X-ray

**NEUROLOGICAL COMPROMISE**

☐ Paraspinal Thermography

☐ Surface EMG

☐ Heart Rate Variability

**2** What are your primary tools you are using to process your world?

☐ Primitive Reflexes

☐ Gross Motor

☐ Fine Motor

☐ Auditory / Verbal

☐ Eye Movements

☐ Visual Cognition


**NOTES**

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### what you See

- Emotional outbursts
- Physical outbursts

## Brain-Based Lens

- Chronic inflammation since birth, chronic stress response
- Primitive reflexes unintegrated
- Head tilt
- Eye movement errors and visual perceptual errors
- Difficulty processing and keeping up with increased demand at school and socially

## CLINICAL EXAM

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**NOTES**

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\_\_\_\_\_

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## What You See

- Rude teenager not making eye contact or being responsive

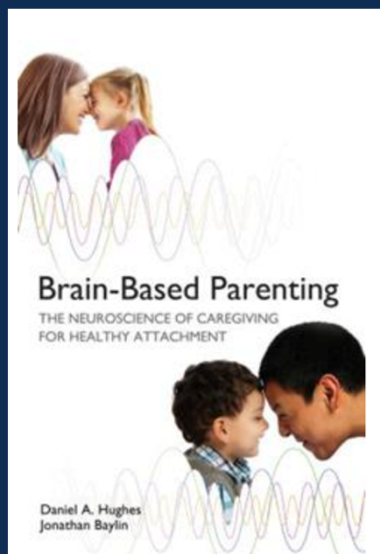
## Brain-Based Lens

- Anxiety and fear paralysis
- Lacking the tools to connect and learned avoidance
- Eye movement errors leading to insecurity of space and socialization

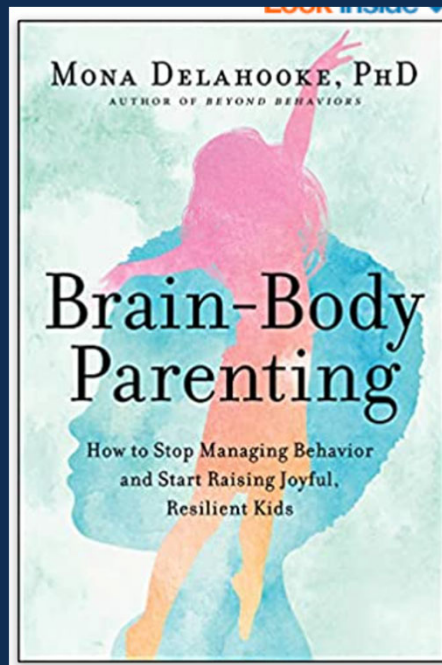
CLINICAL EXAM	
LOOKING FOR CLUES TO ANSWERING THE TWO BIG QUESTIONS	
Patient Name: _____	
<b>1</b> Is anything altering the way your brain is receiving and sending information?	<b>2</b> What are your primary tools you are using to process your world?
<b>MOVEMENT ALTERATION / POSTURAL DISTORTION</b> <input checked="" type="checkbox"/> Posture Changes <input checked="" type="checkbox"/> Range of Motion Changes <input checked="" type="checkbox"/> Changes on X-ray	<input checked="" type="checkbox"/> Primitive Reflexes <input type="checkbox"/> Gross Motor <input type="checkbox"/> Fine Motor <input type="checkbox"/> Auditory / Verbal <input checked="" type="checkbox"/> Eye Movements <input checked="" type="checkbox"/> Visual Cognition
<b>NEUROLOGICAL COMPROMISE</b> <input checked="" type="checkbox"/> Graspal Thermography <input checked="" type="checkbox"/> Surface EMG <input checked="" type="checkbox"/> Heart Rate Variability	<b>NOTES</b> _____ _____ _____ _____

FOCUS LEARN

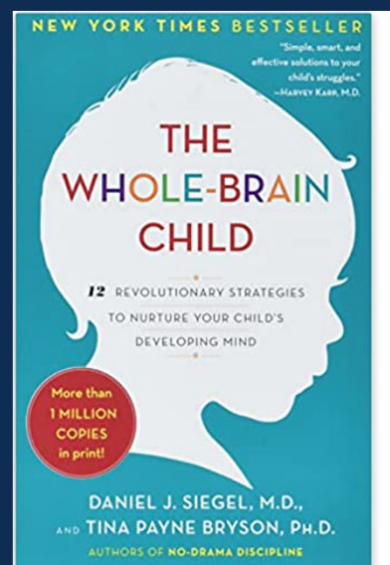
43



Caption



Caption



Caption

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