

Biohacking the Brain & Polyvagal in Practice

Monika Buerger, BA, DC, MSc



Copyright 2026 Dr. Monika Buerger. All rights reserved.

1

Background & Affiliations

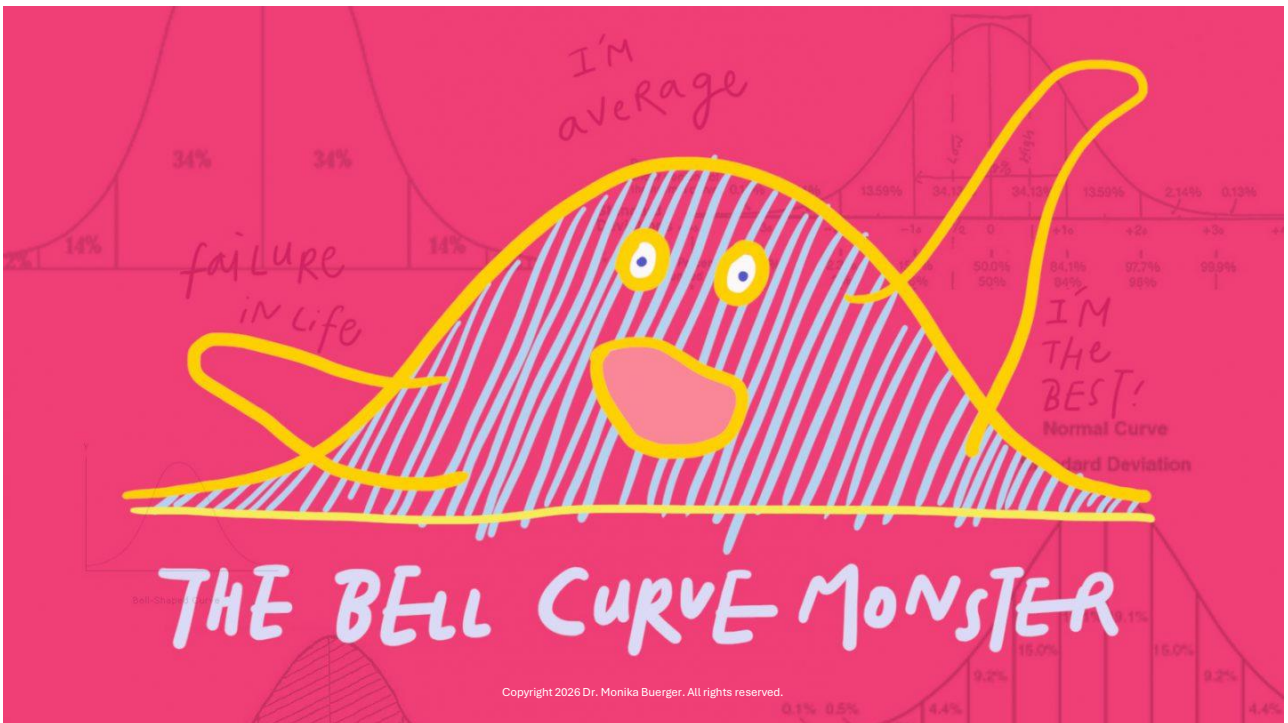
- 35 yrs private clinical practice
- Exercise Physiologist
- Doctor of Chiropractic
- Applied (Clinical) Neuroscientist
- National & International Lecturer
- Author
- Founder of the **Academy of Neurodevelopmental Practices**
- Chief Science Officer, **Bioligent**



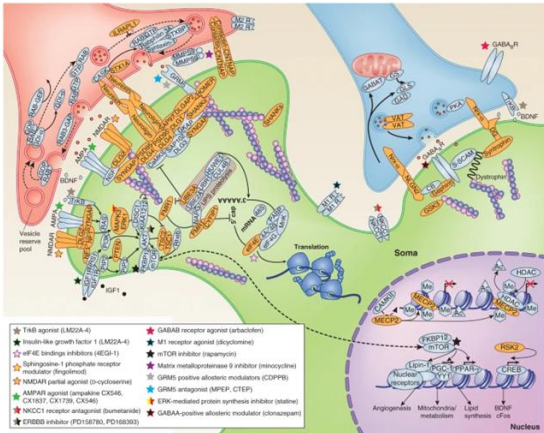
2



3



4



Delorme et al. (2013)

Citation: Ji L, Menu I, Majbri A, Bhatia T, Trentacosta CJ, Thomason ME (2024) Trajectories

RESEARCH ARTICLE

Trajectories of human brain functional connectome maturation across the birth transition

Lanxin Ji^{1*}, Iris Menu¹, Amyn Majbri¹, Tanya Bhatia¹, Christopher J. Trentacosta², Moriah E. Thomason^{1,3,4}

¹ Department of Child and Adolescent Psychiatry, New York University School of Medicine, New York, New York State, United States of America, ² Department of Psychology, Wayne State University, Detroit, Michigan, United States of America, ³ Department of Population Health, New York University School of Medicine, New York, New York State, United States of America, ⁴ Neuroscience Institute, New York University School of Medicine, New York, New York State, United States of America

* lanxin.ji@nyulangone.org

Abstract

Understanding the sequence and timing of brain functional network development at the beginning of human life is critically important from both normative and clinical perspectives. Yet, we presently lack rigorous examination of the longitudinal emergence of human brain



Goals & Outcomes



Overview of vagal tone and the Polyvagal Theory



Chiropractic Neuroscience Made Easy



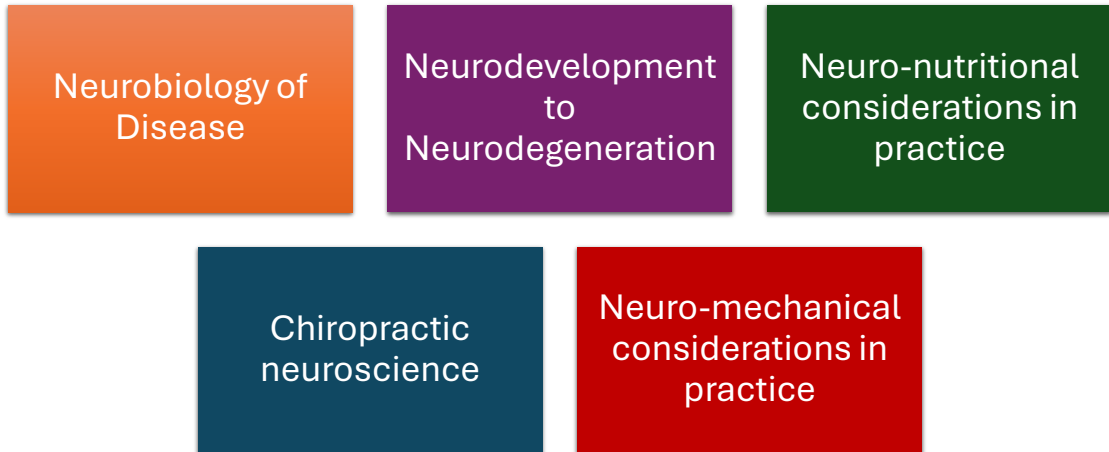
Vagal tone and the gut-brain-sensory axis: from neurodevelopment to neurodegeneration



Management strategies in your practices: Neuromechanical & Neuronutritional



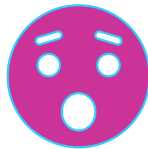
Let's Roll....



Copyright 2026 Dr. Monika Buerger. All rights reserved.

7

POP QUIZ!



8

NeuroFocused care to optimize innate *human* expression

CHIROPRACTIC ADJUSTMENT



9

Chiropractic management using a brain-based model of care for a 15-year-old adolescent boy with migraine headaches and behavioral and learning difficulties: a case report

Kurt W. Kuhn DC, PhD, MS, MS-ACP^{a,*}, Jerrilyn Cambron DC, PhD, MPH, MT^b

^a Private Practice, Waterloo, IA

^b Professor, Research, Basic and Clinical Science, National University of Health Sciences, Lombard, IL

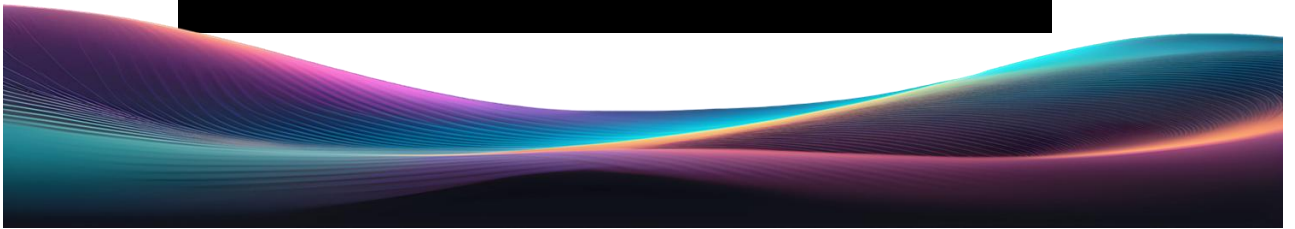
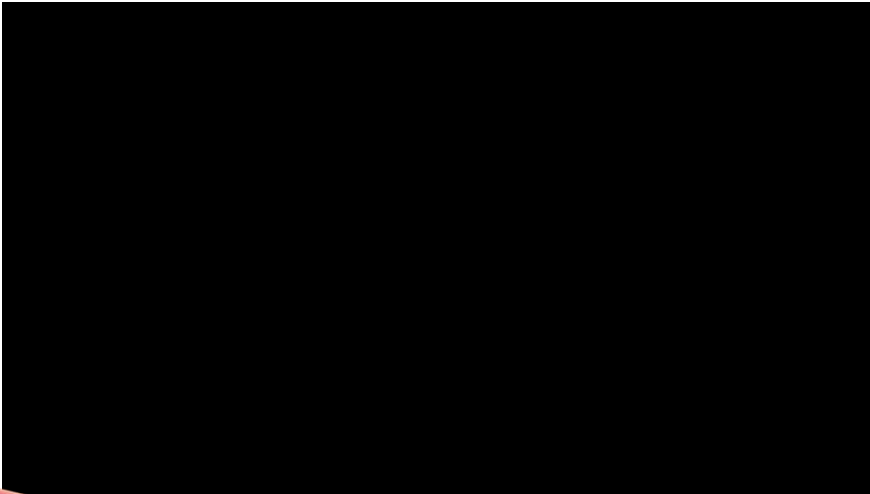
Received 23 March 2013; received in revised form 23 June 2013; accepted 26 June 2013

Key words:

Abstract

Objective: The purpose of this report is to describe chiropractic management of a 15-year-old adolescent boy with migraine headaches and behavioral and learning difficulties.

10



11



12

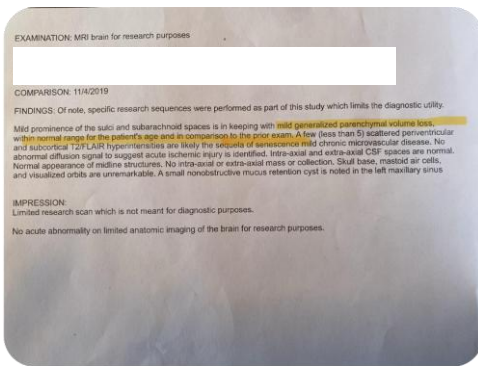


I went to Disneyland!



Copyright 2026 Dr. Monika Buerger. All rights reserved.

13



The Golden Years.....



Copyright 2026 Dr. Monika Buerger. All rights reserved.

14

**The story you are telling
yourself is the same story
you are telling the world!**

Monika Buerger



Copyright 2026 Dr. Monika Buerger

Copyright 2026 Dr. Monika Buerger. All rights reserved.

15

**Science
Art
Philosophy**



Copyright 2026 Dr. Monika Buerger. All rights reserved.

16

1 in 
children in the U.S. have
AUTISM



Copyright 2026 Dr. Monika Buerger. All rights reserved.

17

1 in **6** children in the U.S.
has at least
ONE developmental delay



Copyright 2026 Dr. Monika Buerger. All rights reserved.

18

1 in 
ages  17 years old
ADHD



Copyright 2026 Dr. Monika Buerger. All rights reserved.

19

Ages 3-17 years
9.4%
Anxiety



Copyright 2026 Dr. Monika Buerger. All rights reserved.

20

Ages 3-17 years
4.4%
Depression



Copyright 2026 Dr. Monika Buerger. All rights reserved.

21

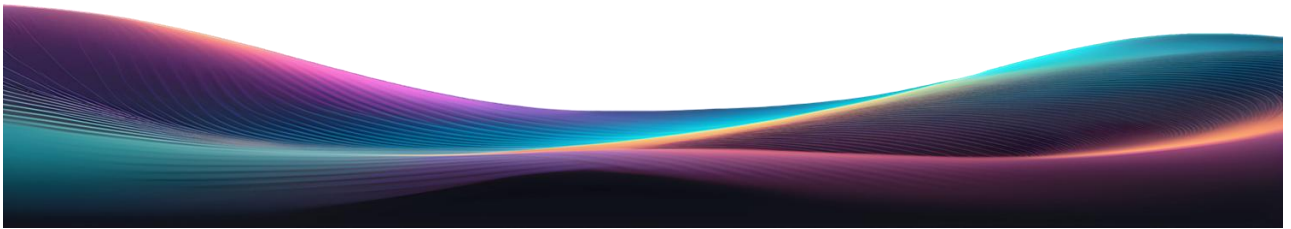
Ages 3-17 years
8.9%
Behavioral Problems



Copyright 2026 Dr. Monika Buerger. All rights reserved.

22

Suicide rates rose **62%** for ages **10 to 24** from **2007** through **2021**



23

19.1% in the US have been diagnosed with **GAD** **#1 Mental Illness in 2024**



24

Mental Illness

Adult Prevalence:

23.4% of adults experienced AMI, with 5.6% experiencing serious mental illness (SMI).

Youth Mental Health:

15.4% of adolescents (ages 12-17) experienced a major depressive episode.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

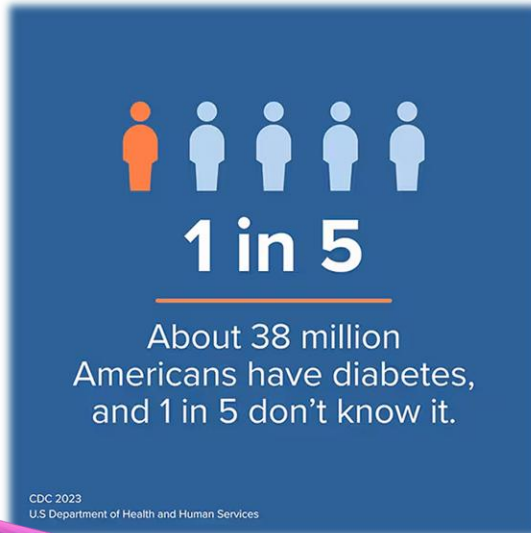
25

Drug overdoses in the United States claimed more than 100,000 lives for a third consecutive year in 2023 — a more than 50 percent jump since 2019



Copyright 2026 Dr. Monika Buerger. All rights reserved.

26



27

DEMENTIA 1 in 9
age 65 and older (10.9%)
have Alzheimer's

28

DEMENTIA rates TRIPPLE by 2050



Copyright 2026 Dr. Monika Buerger. All rights reserved.

29

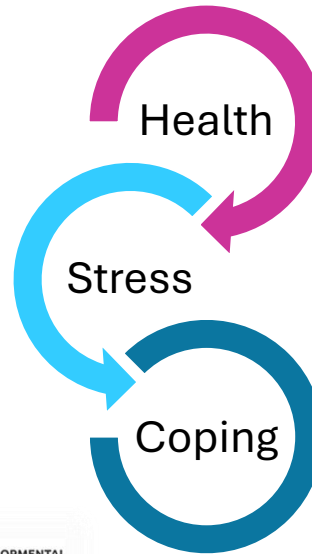
**Assume Every Child
Has PTSD These Days
Until Proven Otherwise**

Kathy Wu, PhD
May 28, 2022



30

- Life experiences help shape one's **sense of coherence**.
- Life is understood as more or less **comprehensible, meaningful and manageable**.
- A strong sense of coherence helps one mobilize resources to **cope** with **stressors** and **manage** tension **successfully**.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

31

Coherence

A state of **harmony** between the **mind, body, and spirit**, or the ability to cope with stressors in a healthy way.

NEUROADAPTATION



Copyright 2026 Dr. Monika Buerger. All rights reserved.

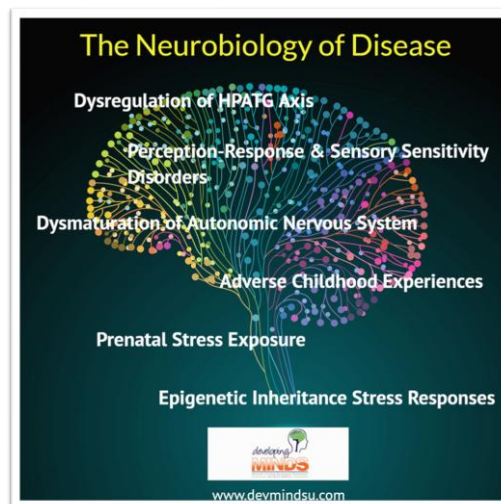
32

Salutogenic approaches to pregnancy, birth, neonatal, and infant care & the placenta as the **third BRAIN**



Copyright 2026 Dr. Monika Buerger. All rights reserved.

33



34

The Beautiful (Mal)adapting Nervous System

Exposure *in utero* to high levels of maternal stress is well documented as a cause of motor, cognitive, and language development impairment in young children.



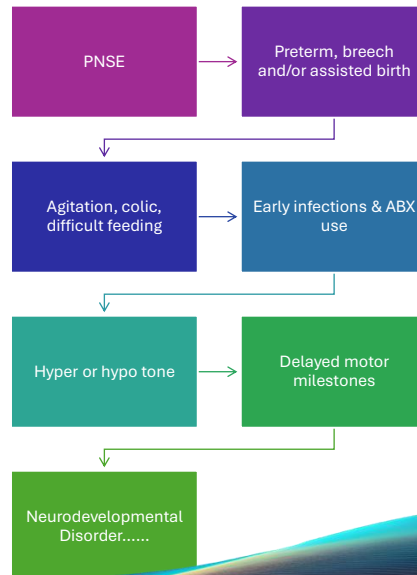
International Journal of Infectious Diseases 139 (2024) 146–152



Copyright 2026 Dr. Monika Buerger. All rights reserved.

35

What we will see.....more of!



Copyright 2026 Dr. Monika Buerger

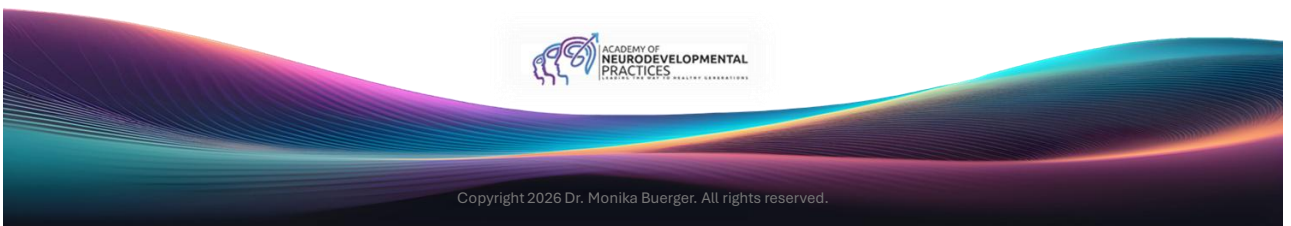
36

1 in 10 babies in the U.S. are born PRETERM



37

When does the **ANS** mature?!



38

CONCLUSIONS AND RELEVANCE

Receipt of a preemptive intervention for ASD from age 9 months among a sample of infants showing early signs of ASD led to reduced ASD symptom severity across early childhood and reduced the odds of an ASD diagnosis at age 3 years.

Research
JAMA Pediatrics | Original Investigation
Effect of Preemptive Intervention on Developmental Outcomes Among Infants Showing Early Signs of Autism
A Randomized Clinical Trial of Outcomes to Diagnosis

Andrew C. Whitehouse, PhD, Kavitha J. Varma, PhD, Sarah Miller, MEd, Kathleen Winkler, PhD, Gal A. Akshay, PhD, Josephine Barakati, PhD, Catherine A. Snow, PhD, Laurel Beeghly, MS, Marjorie Beeghly, PhD, Ellen Chen, MEd, Laura Chhabildas, PhD, Alexander D. Gill, MD, Lorenza Giordano, PhD, Stefano Ghetti, PhD, Cheryl D. Howse, PhD, Jane Chuah, MEd, Megan Clark, DCP, Cherie C. Coats, PhD, Megan C. Criss, PhD, Tessa Daniels, PhD, David H. Dedrick, PhD, David P. Finkelstein, PhD, MEd, Michael G. Hines, PhD, Catherine Hinderliter, PhD, Nancy Karas, PhD, Lester Lerner, PhD, Veda Samra, PhD, Isabella Smith, PhD, Carol Tabor, PhD, Scott Wankling, MEd, Wang Xiaoyan, PhD, John Wray, MEd, Matthew N. Cooper, PhD, Jonathan Green, MEd, Ronald M. Hooley, PhD

IMPORTANCE: Intervention for individuals with autism spectrum disorder (ASD) typically commences after diagnosis. No trial of an intervention administered to infants before diagnosis has shown an effect on diagnostic outcomes to date.

OBJECTIVE: To determine the efficacy of a preemptive intervention for ASD beginning during the prenatal period.

DESIGN, SETTING, AND PARTICIPANTS: This 2-site, single-center, blinded, randomized clinical trial of a preemptive intervention in social care was conducted at 2 Australian research centers (Brisbane, Melbourne). Community spending was used to recruit 234 infants, aged 9 to 14 months showing early behaviors associated with later ASD, as measured by the Social Attention and Communication Questionnaire-Revised. Recruitment occurred from June 9, 2016, to March 30, 2018. Final follow-up data were collected on April 15, 2020.

INTERVENTIONS: Infants were randomized on a 1:1 ratio to receive either a preemptive intervention (social care) or usual care (no social care) during a 12-month period. The preemptive intervention was delivered by a social care worker (SCW) to the family.

Full Abstract

Supplemental Content



VOLUME Vol.06 Issue02 2026
PAGE NO. 212-215
DOI 10.37547/ijp/Vol06Issue02-49

Holding Therapy for Children with Autism and Its Impact on The Family's Psychological Environment

Nazokat Abidova
Lecturer at the Nizami National Pedagogical University of Uzbekistan, Doctor of Pedagogical Sciences (PhD), Associate Professor, Uzbekistan

Received: 31 December 2025; Accepted: 23 January 2026; Published: 28 February 2026

Abstract: Holding therapy for children with autism is currently used worldwide as one of the most effective methods. It plays a crucial role not only in effective interventions for children with autism within the family environment but also in fostering a positive attitude toward the child and their abilities within the family. This article examines the impact of holding therapy on the family environment through interventions for children with autism.

Original Article

Effects of infant touch on the growth and neurodevelopment of preterm infants

Qingqing Yang¹, Qiyang Du²,
Huichan Yang¹, Yanfei Ma¹, Hongbin Zhu³

ABSTRACT

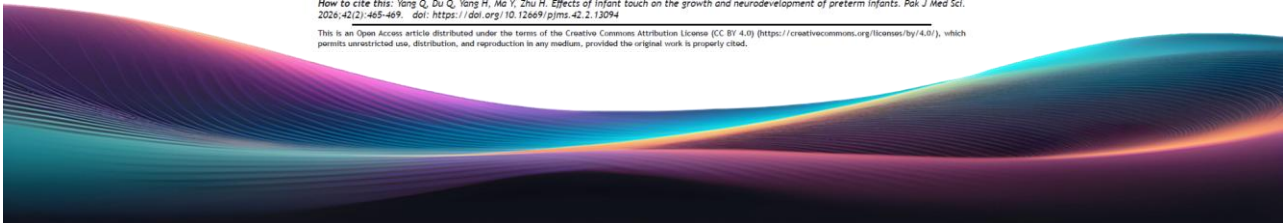
Objective: To investigate the effects of infant touch on the growth and neurodevelopment of preterm infants. **Methodology:** An observational study was conducted involving 64 preterm infants and their mothers, who were recruited from the Maternity & Child Care Centre of Qinhuangdao between April 2023 to May 2024. They were randomly assigned to either the control or the touch group. The control group received conventional care, whereas the touch group received infant touch therapy in addition to conventional care. The two groups were compared in terms of growth parameters, neurodevelopmental outcomes and maternal emotional well-being. Growth indices, neurodevelopmental scores and maternal emotional scores were assessed and analysed. **Results:** On the first day of life, no statistically significant differences were observed between the groups for any infant or maternal variables ($P > 0.05$). After 35 days, the touch group demonstrated significantly greater body weight, length, head circumference and milk intake than the control group. Neuro-behavioural scale scores were also higher in the touch group. In addition, maternal depression and anxiety scores were lower in the touch group, whereas maternal satisfaction scores were higher and all differences reached statistical significance ($P < 0.05$). **Conclusion:** Infant touch is an effective intervention for promoting growth in preterm infants, while alleviating maternal anxiety and depression, exerting a positive impact on the growth and neurodevelopment of preterm infants.

KEYWORDS: Anxiety and depression, Growth, Infant touch, Neurodevelopment, Preterm infants.

doi: <https://doi.org/10.12669/pjms.42.2.13094>

How to cite this: Yang Q, Du Q, Yang H, Ma Y, Zhu H. Effects of infant touch on the growth and neurodevelopment of preterm infants. Pak J Med Sci. 2026; 42(2):465-469. doi: <https://doi.org/10.12669/pjms.42.2.13094>

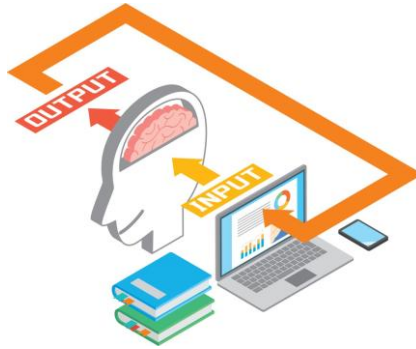
This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



Brain Building & Bonding



What goes up, must come down!

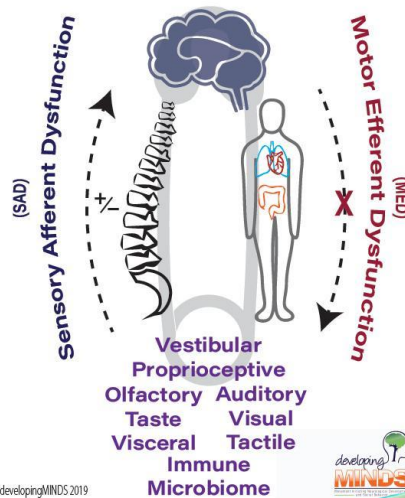


Copyright 2026 Dr. Monika Buerger. All rights reserved.

43

Previous experiences lead to
 Predictive responses to
 Present (internal and external)
 environmental experiences

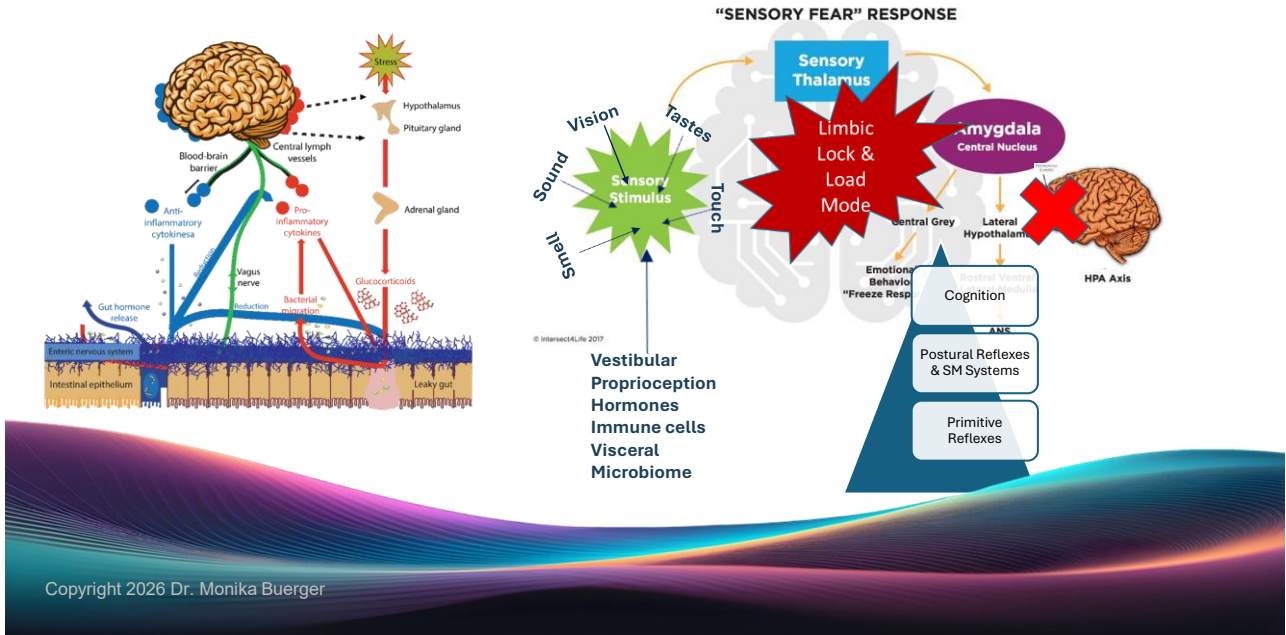
Perception-Response Disorders™



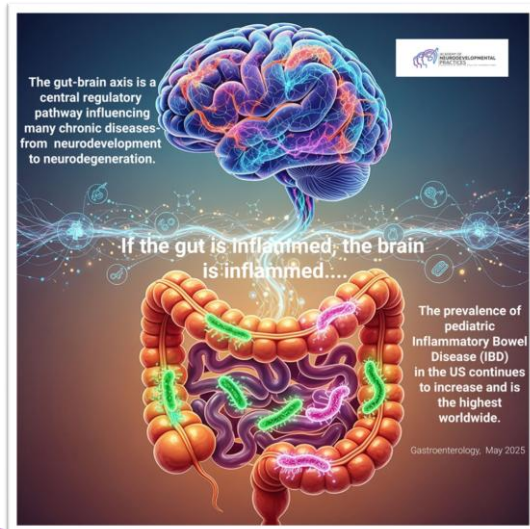
©developingMINDS 2019

Copyright 2026 Dr. Monika Buerger. All rights reserved.

44



45



46



Copyright 2026 Dr. Monika Buerger. All rights reserved.

Prenatal stress primes the brain for long-term vulnerabilities to neurodegeneration and related disorders.....



47

American Institute of Stress

33% report being extremely stressed

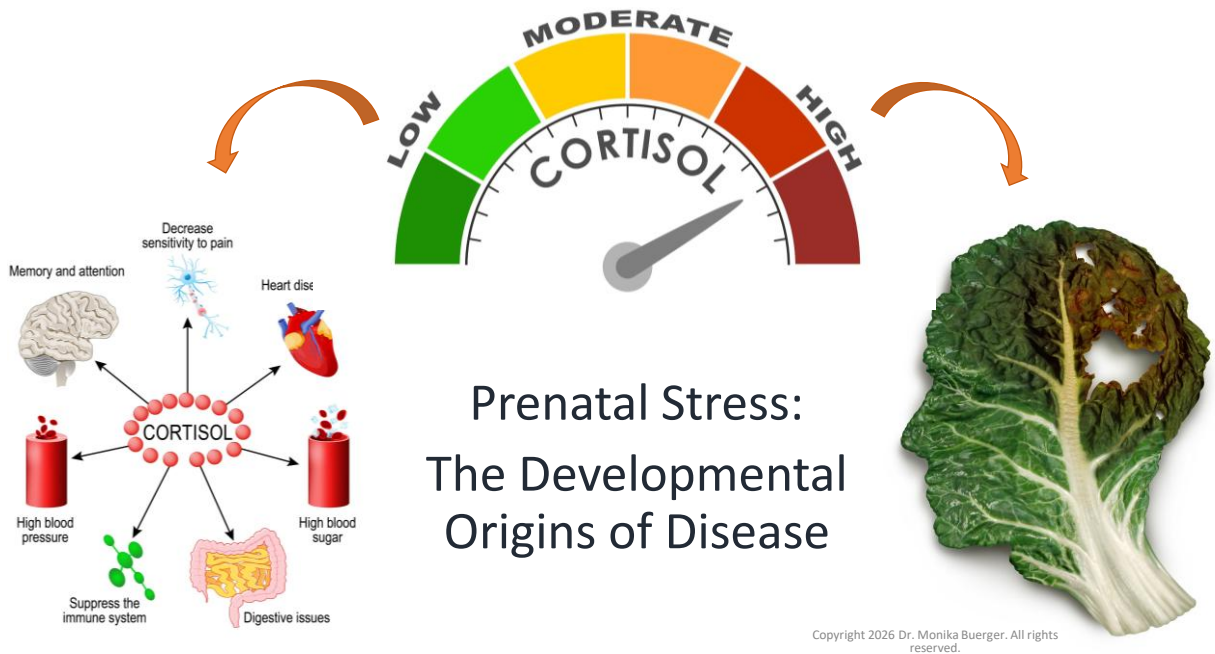
77% report that stress is impacting their physical health

73% report that stress is impacting their **mental health**

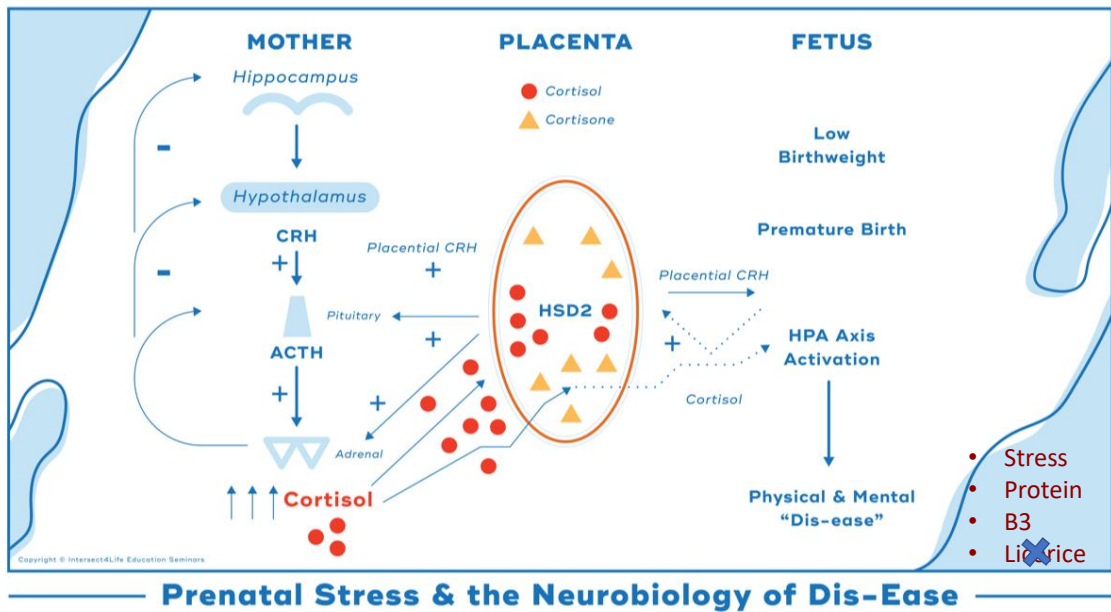


Copyright 2026 Dr. Monika Buerger

48



49



50

Stress Cycle



51

G x E x E

Hit #3

Subsequent
Exposure to Stress
Tips the Scale



Hit #2

Prenatal Stress



Hit #1:

Genetic
Predisposition

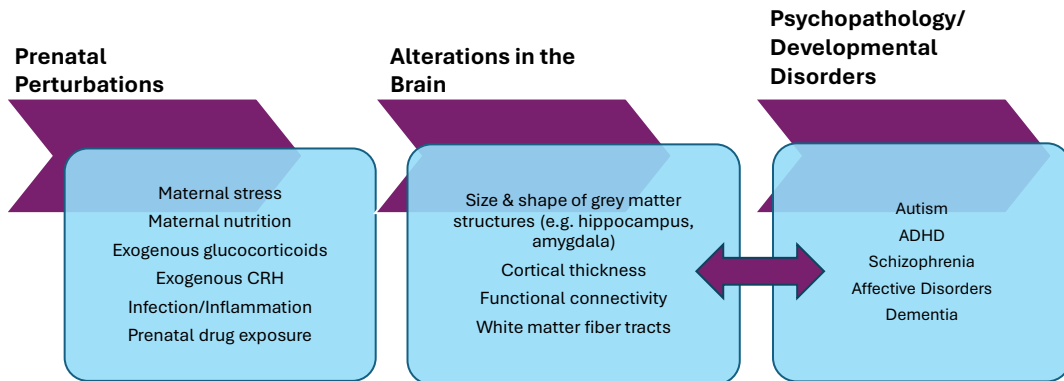


The
"3 Hit"
Model



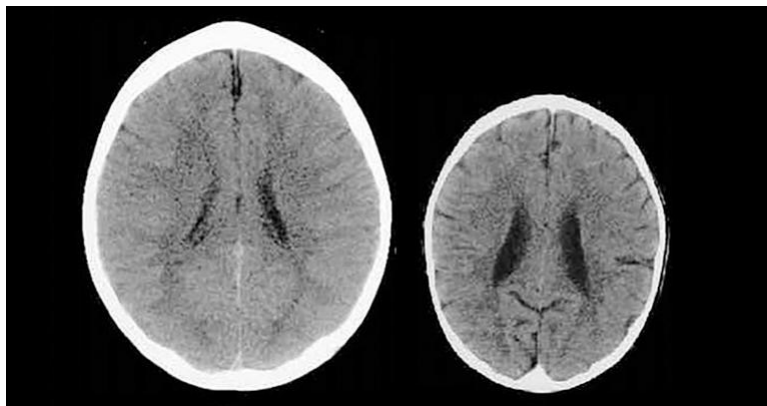
MENTAL HEALTH

52



Copyright 2026 Dr. Monika Buerger. All rights reserved.

53



The CT scan on the left is an image from a healthy 3-year-old with an average head size. The image on the right is from a 3-year-old child suffering from severe sensory-deprivation neglect.

Brain and Mind · April 2002
Bruce Duncan Perry, M.D., Ph.D.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

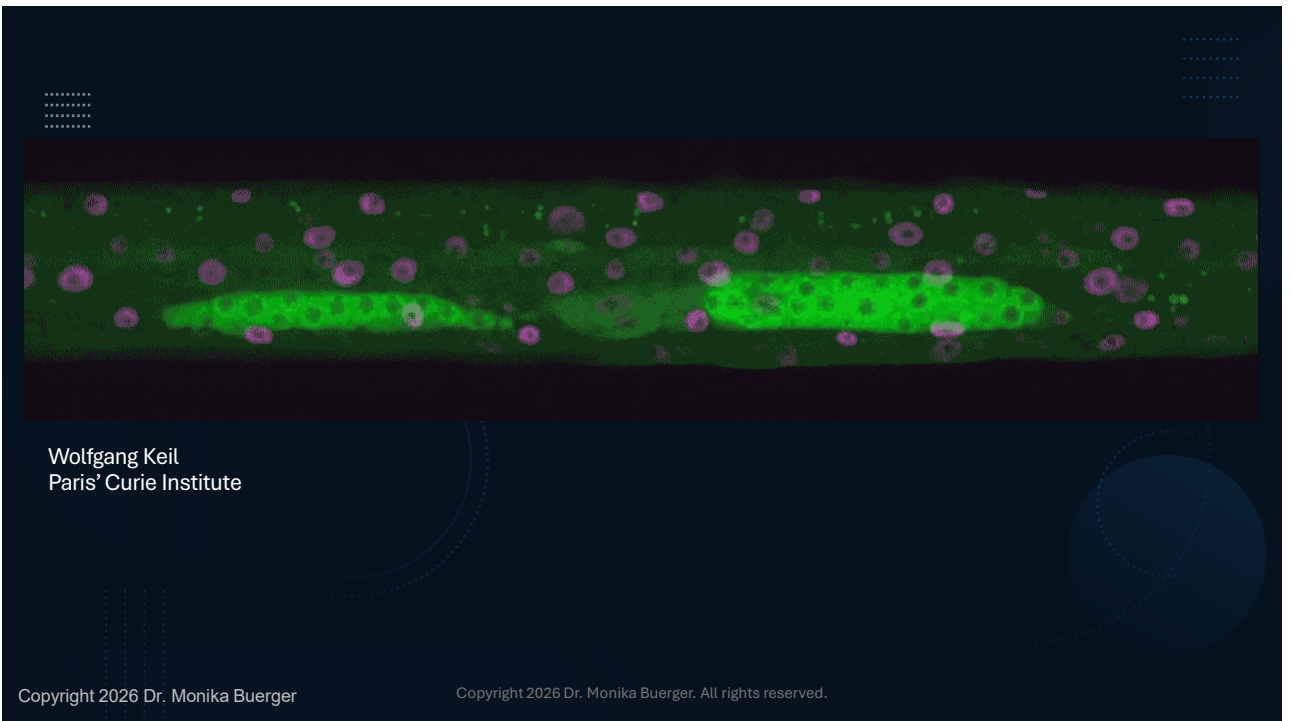
54



Copyright 2026 Dr. Monika Buerger.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

55



Wolfgang Keil
Paris' Curie Institute

Copyright 2026 Dr. Monika Buerger

Copyright 2026 Dr. Monika Buerger. All rights reserved.

56

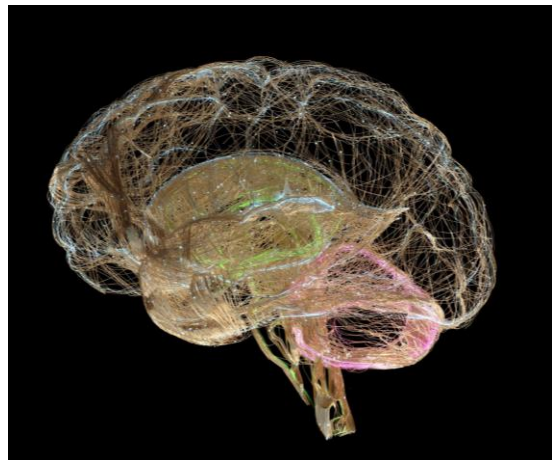
Developmental Neuroplasticity

The **first 1,000 days**- fetal development through the first two years postnatal- are considered the **“Critical Window”** of neurodevelopment



57

The autonomic nervous system (ANS) is essential for not only maintaining physiologic functions involving cardiovascular, respiratory, and gastrointestinal systems, but is also **intricately connected to higher brain systems involved in the emotional and psychological aspects of life that make us uniquely human**. In the mature brain, the central ANS maintains a background level of functioning with connections to the brains' limbic structures that are involved in mood, memories, and emotional state regulation. Differences in child and adult psychological morbidity and stress resilience may be related to differences in central ANS function. **Disturbed integration between central autonomic and limbic systems play a role in the development of childhood neuropsychiatric disorders. In fact, epigenetic factors in the early pre-conception and intrauterine periods begin to shape the development of the ANS**



[Pediatric Research](#) volume 85, pages120–126 (2019)

Copyright 2026 Dr. Monika Buerger, All rights reserved.

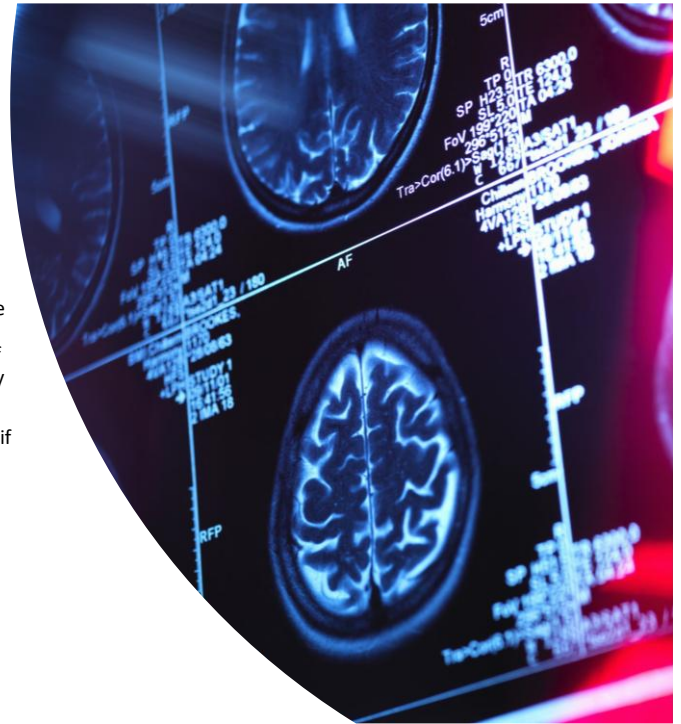
58

Prenatal Stress Impacts Brain Connectivity of an Unborn Baby

- For this study, Thomason and colleagues conducted fetal resting-state fMRI scans of 47 human fetuses between the 30-37th week of gestation. To gauge various stress levels, the researchers recruited a cohort of pregnant mothers who resided in a low-resource, high-stress urban setting. Many of these expecting mom's reported high levels of stress, anxiety worry, and depression.
- The fetal fMRI neuroimaging scans were framed to evaluate if there was a link between high levels of maternal prenatal stress and the global efficiency of the fetal neural connectome while a baby was still in the womb

Source:
Cognitive Neuroscience Society
March 26, 2018

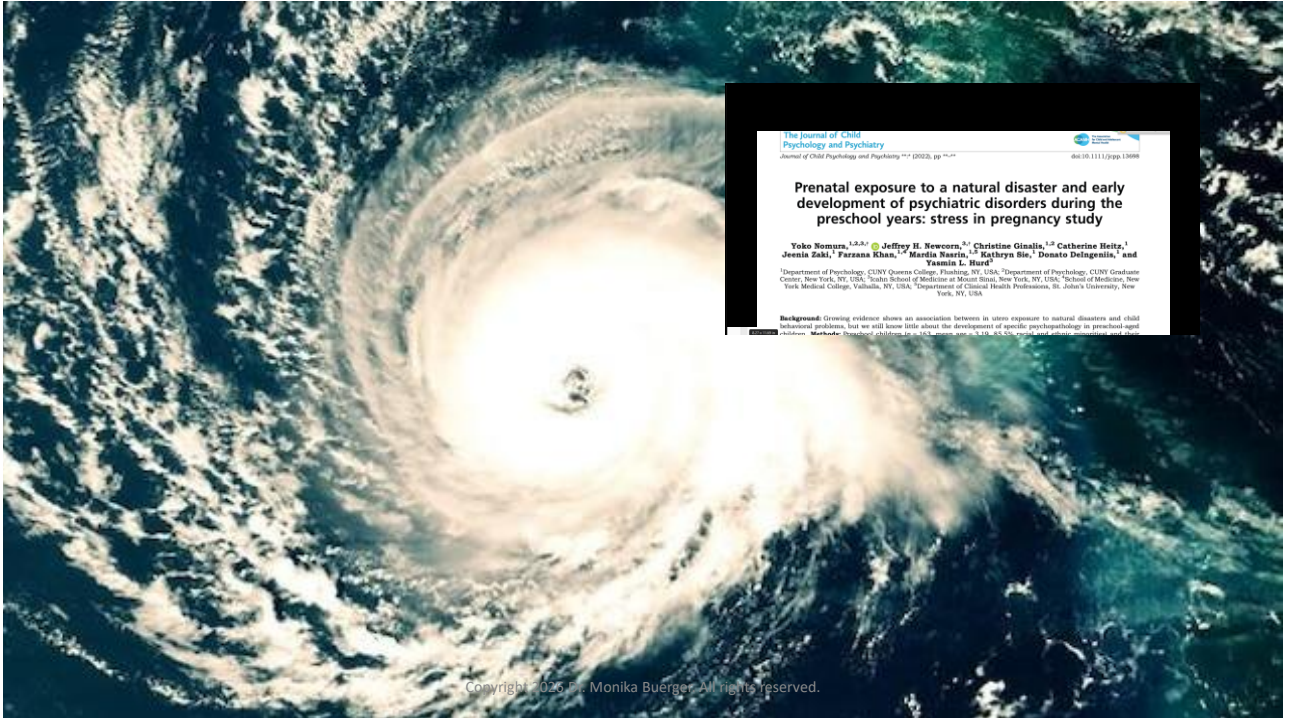
Copyright 2026 Dr. Monika Buerger. All rights reserved.



59

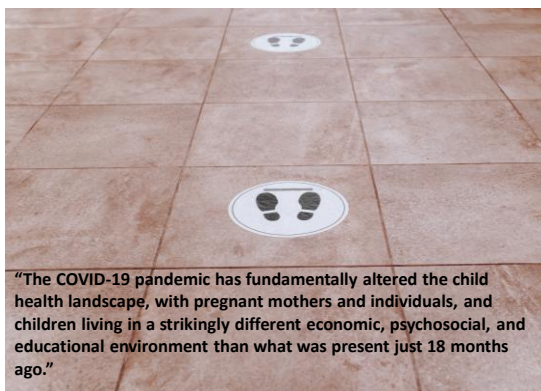


60



61

291 children under 1 year of age who were born before January 2019 (i.e., their prenatal and first postnatal year of development occurred before the pandemic) to 118 children born after July 2020 (i.e., at least one term of pregnancy and the first postnatal year occurred during the pandemic)



Impact of the COVID-19 Pandemic on Early Child Cognitive Development: Initial Findings in Longitudinal Observational Study of Child Health

Sean CL Deoni^{1,2,3}, Jennifer Beauchemin¹, Alexandra Volpe¹, Viren D'Sa^{1,2}, and the RESONANC Consortium

- 1 Advanced Baby Imaging Lab, Rhode Island Hospital, Providence RI, USA
2 Department of Pediatrics, Warren Alpert Medical School at Brown University, Providence RI, USA
3 Department of Diagnostic Radiology, Warren Alpert Medical School at Brown University, Providence RI, UI

Address Correspondence to: Sean Deoni
Advanced Baby Imaging Lab
Rhode Island Hospital
Warren Alpert Medical School at Brown University
Email: sean_c_deoni@brown.edu

Running Title: The COVID-19 Pandemic and Child Cognitive Development

Copyright 2026 Dr. Monika Buerger. All rights reserved.

62

Childhood cognitive scores in 2020 and 2021 vs. the preceding decade, 2011-2019.

- Children born during the pandemic have significantly reduced **verbal, motor, and overall cognitive performance** compared to children born pre-pandemic.
- Males and children in lower socioeconomic families have been most affected.
- Results highlight that even in the absence of direct SARS-CoV-2 infection and COVID-19 illness, the environmental changes associated COVID-19 pandemic is significantly and negatively affecting infant and child development.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

63

“We found increased maternal stress and depression in women pregnant during the pandemic compared to those pregnant before the pandemic. The volume of some areas of the fetal brain decreased, and there was a delay in the development of the brain folds in the fetuses of the distressed mothers.”



Maternal psychological distress during the COVID-19 pandemic and structural changes of the human fetal brain

Yuan-Chiao Lu^{1,6}, Nickie Andescavage^{1,2,6}, Yao Wu¹, Kushal Kapse¹, Nicole R. Andersen¹, Jessica Quistorff¹, Haleema Saeed³, Catherine Lopez², Diedra Henderson¹, Scott D. Barnett¹, Gilbert Vezina¹, David Wessel⁴, Adre du Plessis⁵ & Catherine Limperopoulos^{1,2,6}

Abstract

Background Elevated maternal psychological distress during pregnancy is linked to adverse outcomes in offspring. The potential effects of intensified levels of maternal distress during the COVID-19 pandemic on the developing fetal brain are currently unknown.

Methods We prospectively enrolled 202 pregnant women: 65 without known COVID-19 exposures during the pandemic who underwent 92 fetal MRI scans, and 137 pre-pandemic controls who had 182 MRI scans. Multi-plane, multi-phase single shot fast spin echo T2-weighted images were acquired on a GE 1.5 T MRI Scanner. Volumes of six brain tissue types were calculated. Cortical folding measures, including brain surface area, local gyrification index, and sulcal depth were determined. At each MRI scan, maternal distress was assessed

Plain language summary

We investigated whether the mental health of pregnant mothers influenced the brain development of their fetuses during the COVID-19 pandemic. We imaged the brains of fetuses before and during the COVID-19 pandemic and asked the mothers questions about any distress experienced during pregnancy. We found increased maternal stress and

Copyright 2026 Dr. Monika Buerger. All rights reserved.

64

Prenatal maternal distress during the COVID-19 pandemic and its effects on the infant brain

<https://doi.org/10.1101/2021.10.04.21264536>



- “We found significant relationships between prenatal maternal distress and infant amygdala-prefrontal microstructural and functional connectivity and demonstrate for the first time that social support moderates this relationship.
- Our findings suggest a potentially long-lasting impact of the COVID-19 pandemic on children and show that social support acts as a protective factor not just for pregnant individuals, but also for their developing infants. These findings provide timely evidence to inform clinical practice and policy surrounding the care of pregnant individuals and highlight the importance of social support.”

Copyright 2026 Dr. Monika Buerger. All rights reserved.

65

International Journal of Women's Health

Dovepress

open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Risk of Global Developmental Delay in Infants Born from Mothers with COVID-19: A Cross-Sectional Study

Pedro Ykaro Fialho Silva¹, Maria Clara Lima da Cruz¹, Ingrid Guerra Azevedo², Rafaela Silva Moreira³, Klayton Galante Sousa⁴, Silvana Alves Pereira¹

¹Physical Therapy Department, Universidade Federal do Rio Grande do Norte, Natal, Rio Grande do Norte, Brazil; ²Dirección de Investigación, Universidad Católica de Temuco, Temuco, La Araucanía, Chile; ³Physical Therapy Department, Universidade Federal de Santa Catarina, Araranguá, Santa Catarina, Brazil; ⁴Physical Therapy Department, Faculdade de Ciências da Saúde do Trairi, Universidade Federal do Rio Grande do Norte, Santa Cruz, Rio Grande do Norte, Brazil

Correspondence: Silvana Alves Pereira, Universidade Federal do Rio Grande do Norte, Physical Therapy Department, Campus Universitário - Lagoa Nova, Natal, Rio Grande do Norte, 59078-970, Brazil, Tel +55 84 99181 8144, Email silvana.alves@ufrn.edu.br

Purpose: To investigate the risk of global developmental delay in infants born from mothers with COVID-19.

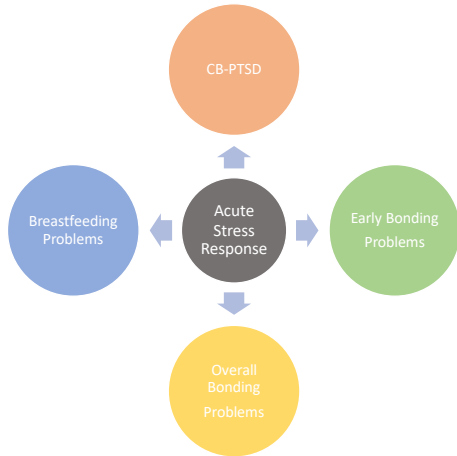
Patients and Methods: A cross-sectional study was conducted between March and November 2021, with 54 infants of both sexes aged between 1 and 12 months. Twenty-seven infants born from mothers diagnosed with COVID-19 during pregnancy composed the COVID-19 group, whereas infants born from mothers not exposed to COVID-19 composed the control group. Medical records and child health booklets provided neonatal and prenatal data. The Survey of Wellbeing of Young Children screened the risk of global developmental delay during a phone interview or home visit. Chi-squared, Mann-Whitney test, and binary logistic regression were applied.

Results: The risk of motor developmental delay was identified in 15 infants (12 in the COVID-19 group), while 36 were at risk of behavioral alteration (22 in the COVID-19 group). The COVID-19 group presented a 6.3-fold risk of motor developmental delay. Motor developmental delay was also significantly associated with socioemotional alterations (odds ratio = 6.4, p = 0.01). Regarding families of infants in the COVID-19 group, 63% of the mothers presented risk of depression, 51.9% risk of substance abuse, 40.7% risk of food insecurity, and 7.4% risk of domestic violence. The inflexibility subscale of the survey was a statistically relevant variable for the socioemotional domain.

Conclusion: Infants born from mothers with COVID-19 were at high risk of motor developmental delay and socioemotional alterations. Although, this study fills an important gap in the literature regarding the influence of maternal exposure to COVID-19 on infant development, new studies screening families with infants at risk of developmental delay may significantly impact maternal

Conclusion: Infants born from mothers with COVID-19 were at high risk of motor developmental delay and socioemotional (behavioral) alterations.

66



Copyright 2026 Dr. Monika Buerger. All rights reserved.

67

Foundations of Neurodevelopment: Six Pillars

*The most successful
 Certification Program uniquely founded
 on subluxation-based principles.*

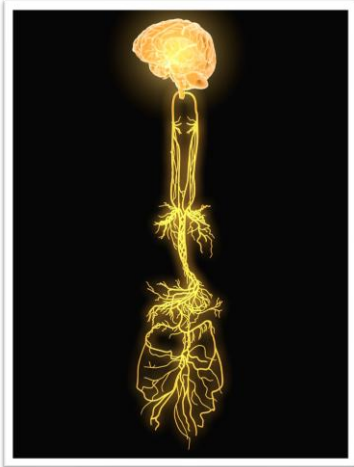
Coupon Code: DRB100



Copyright 2026 Dr. Monika Buerger. All rights reserved.

68

Setting the Tone.....



Stress



Pain



Trauma



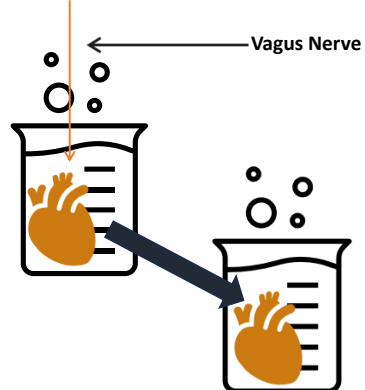
Inflammation

Copyright 2026 Dr. Monika Buerger. All rights reserved.

69

Otto Loewi's Experiment

Electrical Stimulator



Acetylcholine

- Muscle movement
- Thinking & Memory
- Organ function
- Pupil dilation
- Sweating & salivation
- Erections

Copyright 2026 Dr. Monika Buerger. All rights reserved.

70

Poly Vagal Theory

Polyvagal theory focuses on the **structural** and **functional** changes in the mammalian autonomic nervous system that relate to human **experiences**.

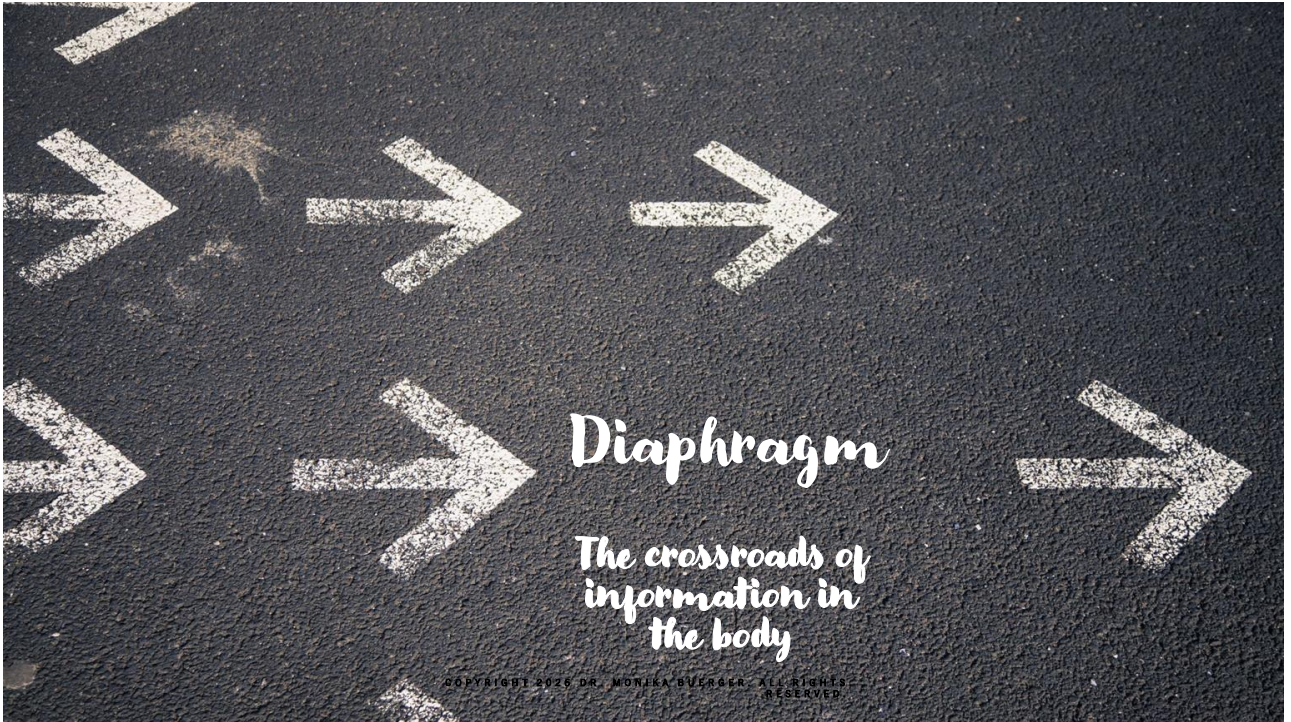


71

Dorsal Vagus
vs
Ventral Vagus
=
Polyvagal



72



73



Polyvagal Principles

Copyright 2026 Dr. Monika Buerger. All rights reserved.

74

Principle 1

Autonomic state functions as an *intervening* variable

Flexibility: the capacity to respond, process, and **RECOVER**

Neuroadapability

75

Principle 2

Three neural circuits form a phylogenetically ordered response hierarchy that regulate autonomic state adaptation to safe, dangerous, and life-threatening environments

A neurophysiological basis to explain the mechanisms through which the ANS support different behaviors and **experiences**

Neuroadapability

76

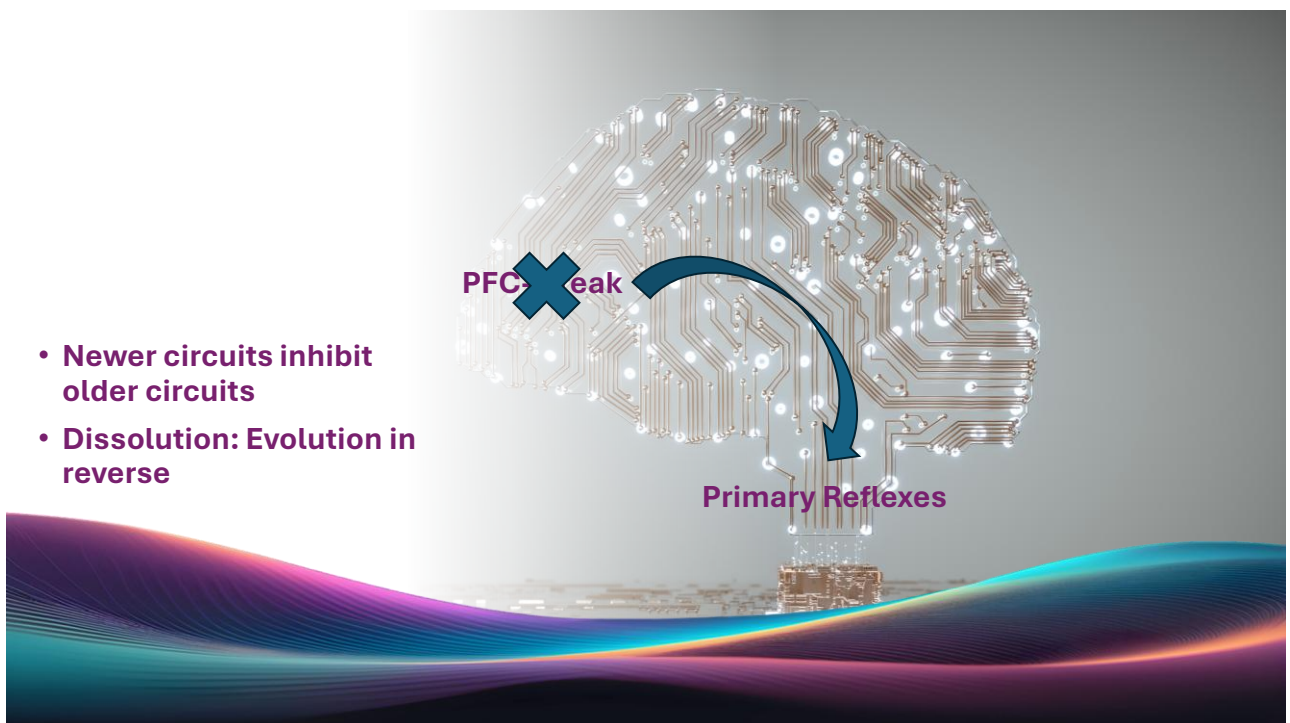
Principle 3

In response to a challenge, the ANS shifts to states regulated by circuits that evolved earlier consistent with the Jacksonian principles of dissolution, a guiding principle in neurology

Psychological constructs of stress and anxiety as physiological states that support defense. Stress, anxiety, or any threat related experience as a disruption in homeostatic function.

Neuroadaptability

77



78

Principle 4

Ventral migration of cardioinhibitory neurons leads to an integrated brainstem circuit (ventral vagal complex) that enable the coordination of suck-swallow-breath-vocalization, a circuit that forms the neurophysiological substrate for an integrated social engagement system

The core mechanisms that enable mammals to co-regulate and to communicate with others

Neuroadaptability

79



Ventral vagus = the great neural adaptor



Fosters engagement and disengagement with the environment



Maintains homeostasis = health, growth, restoration and sociality

80

Principle 5

Neuroception: reflexive detection of risk triggers adaptive autonomic state to optimize survival

Autonomic signatures related to navigating in contexts that are safe, dangerous, or life threatening are basically reflexive brainstem scripts. These scripts reside in the brainstem areas that regulate foundational survival mechanisms. **By being reflexive these processes are unimpeded by intentionality and cognitive appraisal.** Adaptively, if they were, decisions would be slow and potentially tentative, and survival might be compromised.

Neuroadaptability

81

Principle 1

Autonomic state functions as an **intervening** variable

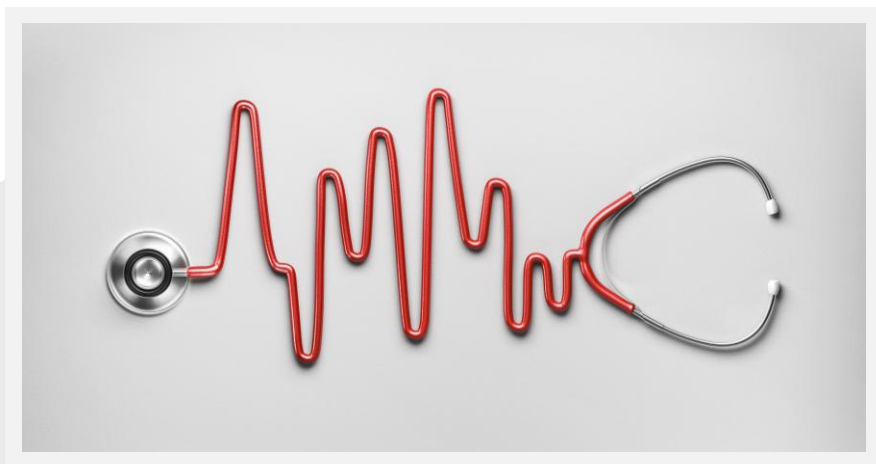
Flexibility: the capacity to respond, process, and **recover**

Neuroadaptability

82



83



Vagal Tone

Both protective and life-threatening

Copyright 2026 Dr. Monika Buerger. All rights reserved.

84

NICU & Apparent Life-Threatening Events (ALTE)

BRUES

American Journal of Respiratory and Critical Care Medicine
Volume 194 Number 3 | August 1 2016



Copyright 2026 Dr. Monika Buerger. All rights reserved.

85



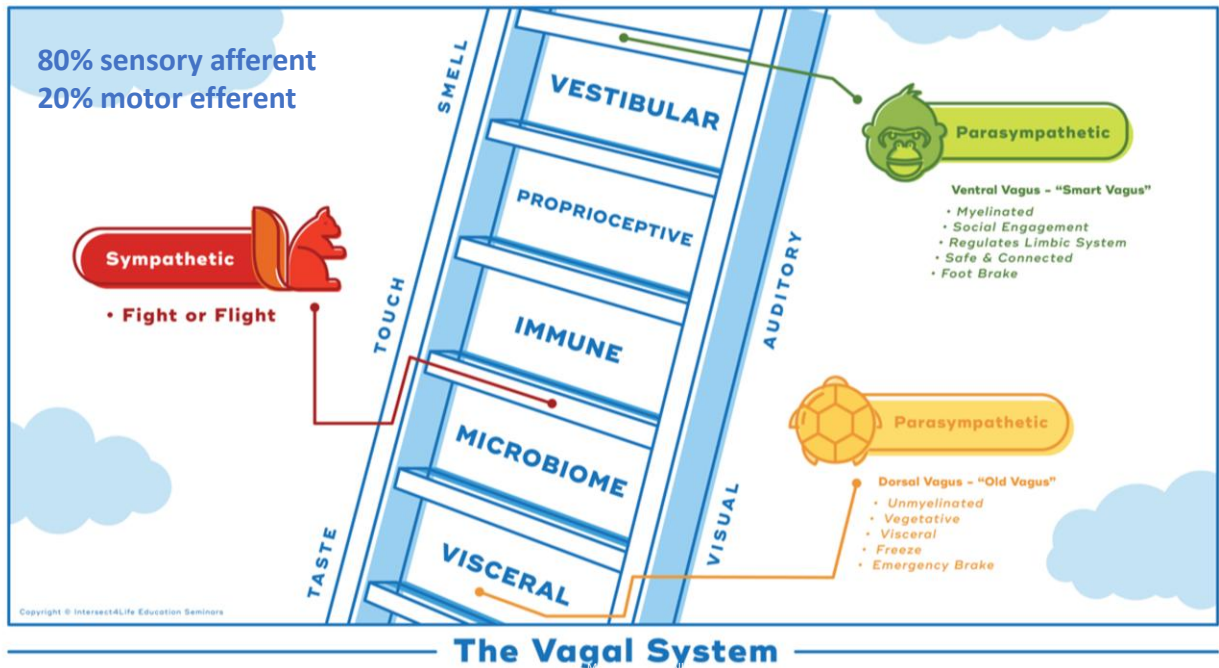
86

Input = Output



Processing by the Nervous System

Copyright 2026 Dr. Monika Buerger. All rights reserved.



87

Emotional Competence

Ross Buck

Physiological Changes

Emotional Display

Subjective Experience

88

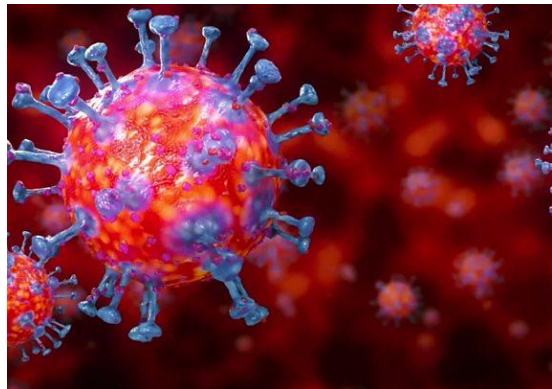


89

Stress & Immune System

- Activation of the sympathetic nervous system halts leukocyte locomotion in tissues
- Noradrenaline induces adrenergic receptor signaling to reduce lymph node blood flow
- Decreased tissue oxygenation induces calcium signaling to control leukocyte motility
- Disruption of leukocyte motility contributes to impaired immune responses

Devi et al., Adrenergic regulation of the vasculature impairs leukocyte interstitial migration and suppresses immune responses, *Immunity* (2021)



Copyright 2026 Dr. Monika Buerger. All rights reserved.

90



Copyright 2026 Dr. Monika Buerger. All rights reserved.

CHIROPRACTIC and the BRAIN

91

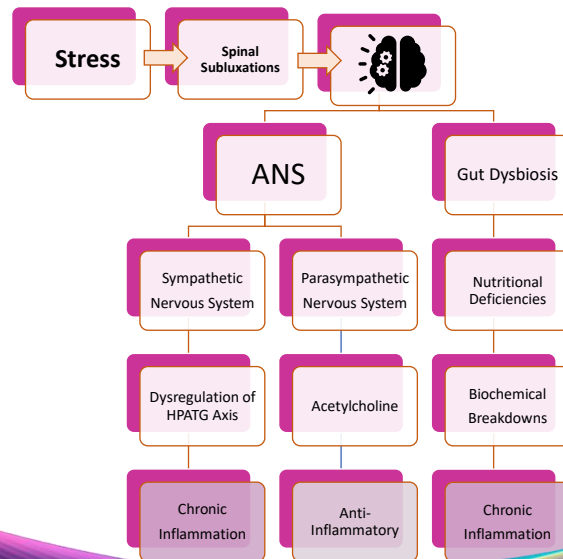


92





93



Copyright 2026 Dr. Monika Buerger

94

12 Weeks of Chiropractic Care

12 Weeks

- Increase in IL-6
- Increase salivary cortisol
- **Increase BDNF**
- Decrease TNF-alpha
- No change in CRP

16 Weeks

- IL-6 no change
- Increased serum cortisol
- BDNF- no statistical sig
- Decreased TNF-alpha
- No change in CRP



95



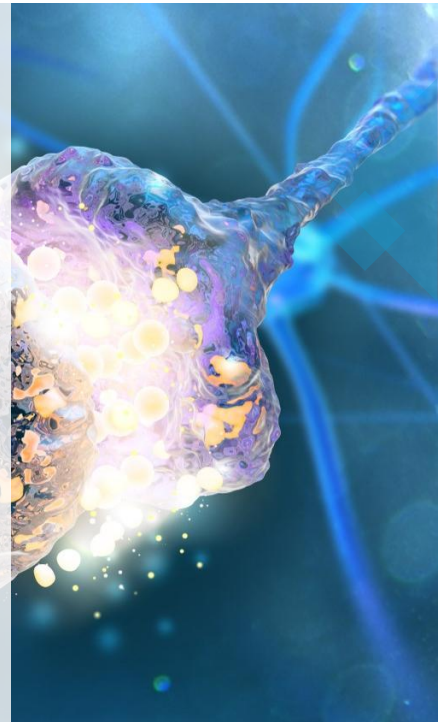
96

Journal *Neural Plasticity* study indicated that spinal adjustments impact the function of the prefrontal cortex.

“This is solid scientific evidence that adjusting the spine changes the way the prefrontal cortex of the brain is processing information from the arm. It demonstrates we change the way the brain works and shows that spinal function impacts brain function. One of the most interesting things about the changes we observed was that the prefrontal cortex is responsible for behaviour, goal directed tasks, decision making, memory and attention, intelligence, processing of pain and emotional response to it, autonomic function, motor control, eye movements and spatial awareness.”

Heidi Haavik

Lelic, D, Niazi, IK, Holt, K, Jochumsen, M, Dremstrup, K, Yielder, P, Murphy, B, Drewes, A and Haavik, H (2016), “Manipulation of dysfunctional spinal joints affects sensorimotor integration in the prefrontal cortex: A brain source localization study,” *Neural Plasticity*, Volume 2016 (2016). [Online.](#)



Copyright 2026 Dr. Monika Buerger. All rights reserved.

97

**Adjusting
subluxations vs
non-subluxated
segments**

www.nature.com/scientificreports

scientific reports

OPEN **A randomized controlled trial comparing different sites of high-velocity low amplitude thrust on sensorimotor integration parameters**

Imran Khan Niazi^{1,2,3,4,5,6,7}, Muhammad Samran Navid^{1,4,5,9}, Christopher Merkle^{1,5}, Imran Amjad^{1,4}, Nitika Kumari¹, Robert J. Trager^{7,8}, Kelly Holt² & Heidi Haavik^{1,10}

Increasing evidence suggests that a high-velocity, low-amplitude (HVLA) thrust directed at a dysfunctional vertebral segment in people with subclinical spinal pain alters various neurophysiological measures, including somatosensory evoked potentials (SEPs). However, it is unclear whether an HVLA thrust applied to a clinician chosen vertebral segment (HVLA-CC) or a randomly chosen vertebral segment (HVLA-R) is more effective in reducing sensorimotor integration parameters associated with vertebral dysfunction, in short, segment considered as dysfunctional.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

98

1 in 11 people will be diagnosed with
PTSD in their lifetime

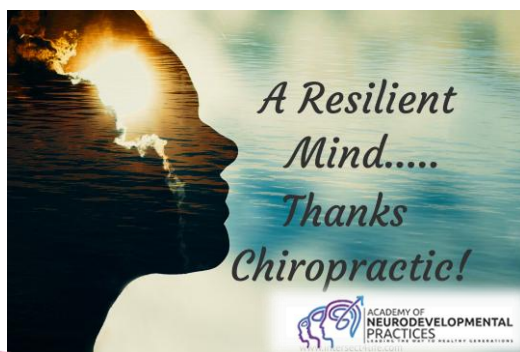
The lifetime prevalence of **PTSD** in
adolescents **ages 13 -18** is **8%**



Copyright 2026 Dr. Monika Buerger. All rights reserved.

99

Neuroadaptation

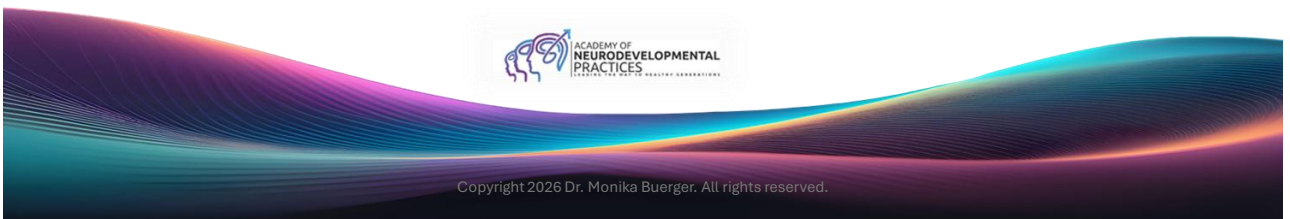


Copyright 2026 Dr. Monika Buerger. All rights reserved.

100

Chronic pain **21%**

High-impact chronic pain (HICP) **8%**



101

- **Chronic pain 52.4 cases/1,000** persons per year
- **Hypertension 45.3 cases/1,000** persons per year
- **Depression 15.9 cases/1,000** persons per year
- **Diabetes 7.1 cases/1,000** persons per year



102



Chronic Pain & the Brain....

a sensory, emotional and cognitive "experience"

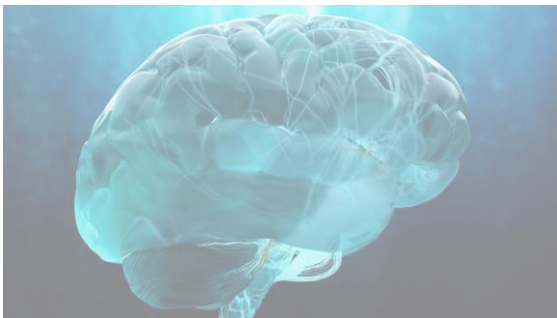
Monika Buerger



Copyright 2026 Dr. Monika Buerger. All rights reserved.

103

“SMT might modulate the aversiveness of performing back-straining maneuvers through disruption of the association between these (exteroceptive and proprioceptive) sensations and fear/pain. Future studies should address the effect of therapies such as SMT on motivational aspects and avoidance behavior....”



HHS Public Access
 Author manuscript
 Published in final edited form as:
 J Pain. 2018; November ; 19(11): 1352-1365. doi:10.1016/j.jpain.2018.05.012.

Brain mechanisms of anticipated painful movements and their modulation by Manual Therapy in chronic Low Back Pain

Dan-Mikael Ellingsen¹, Vitaly Nagatow², Ekaterina Protsenko^{1,2}, Ishiting Mawa^{1,3}, Matthew H. Kowalski⁴, David Swensen⁵, Deanna O'Dwyer-Swensen⁶, Robert R. Edwards⁷, Norman Kettner⁸, and Marco L. Loggia¹

¹A. A. Martinos Center for Biomedical Imaging, Department of Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA
²School of Medicine, University of California, San Francisco CA, USA
³Neuroscience Graduate Program, University of Michigan Medical School, Ann Arbor MI, USA
⁴Other Integrative Care Center, Brigham and Women's Hospital, Boston, MA, USA
⁵Melrose Family Chiropractic & Sports Injury Centre, Melrose, MA, USA
⁶Department of Anesthesiology, Harvard Medical School, Brigham & Women's Hospital, Boston MA, USA.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

104



The effect of manual therapy and neuroplasticity education on chronic low back pain: a randomized clinical trial

Adriaan Louw^a, Kevin Farrell^b, Merrill Landers^c, Martin Barclay^a, Elise Goodman^a, Jordan Gillund^b, Sara McCaffrey^c and Laura Timmerman^d

^aInternational Spine and Pain Institute, Story City, IA, USA; ^bDepartment of Physical Therapy Education, Residency Program, St. Ambrose University, Davenport, IA, USA; ^cDepartment of Physical Therapy, School of Allied Health Sciences, University of Nevada, Las Vegas, NV, USA

What you tell
your patient
matters!



www.chiroshub.com

ABSTRACT

Objective: To determine if a neuroplasticity educational explanation for a manual therapy technique will produce a different outcome compared to a traditional mechanical explanation.
Methods: Sixty-two patients with chronic low back pain (CLBP) were recruited for the study. Following consent, demographic data were obtained as well as pain ratings for low back pain (LBP) and leg pain (Numeric Pain Rating Scale), disability (Oswestry Disability Index), fear-avoidance (Fear-Avoidance-Beliefs Questionnaire), forward flexion (fingertips-to-floor), and straight leg raise (SLR) (inclinometer). Patients were then randomly allocated to receive one of two explanations (neuroplasticity or mechanical), a manual therapy technique to their lumbar spine, followed by post-intervention measurements of LBP, leg pain, forward flexion, and SLR.
Results: Sixty-two patients (female 35 [56.5%]), with a mean age of 60.1 years and mean duration of 9.26 years of CLBP participated in the study. There were no statistically significant interactions for LBP ($p = .325$), leg pain ($p = .172$), and trunk flexion ($p = .218$) between the groups, but SLR showed a significant difference in favor of the neuroplasticity explanation ($p = .041$). Additionally, the neuroplasticity group were 7.2 times (95% confidence interval = 1.8–28.6) more likely to improve beyond the MDC on the SLR than participants in the mechanical group.
Discussion: The results of this study show that a neuroplasticity explanation, compared to a traditional biomechanical explanation, resulted in a measureable difference in SLR in patients with CLBP when receiving manual therapy. Future studies need to explore if the increase in SLR correlated to changes in cortical maps of the low back.

KEYWORDS

Pain; brain; plasticity; education; manual therapy; straight leg raise; remapping

Discussion: The results of this study show that a **neuroplasticity explanation**, compared to a **traditional biomechanical explanation**, resulted in a measureable difference in SLR in patients with CLBP when receiving manual therapy.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

Louw, A., Farrell, K., Landers, M., Barclay, M., Goodman, E., Gillund, J., . . . Timmerman, L. (2017). The effect of manual therapy and neuroplasticity education on chronic low back pain: a randomized clinical trial. *Journal of Manual & Manipulative Therapy*, 25(5), 227-234.

105

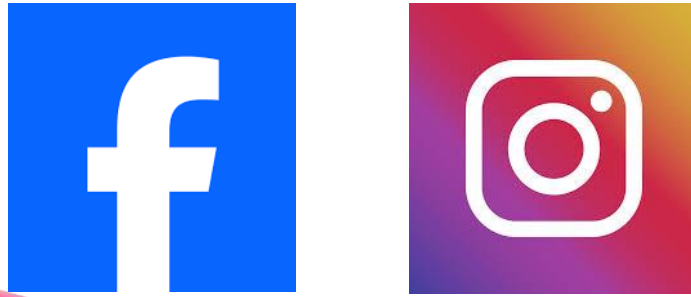


Copyright 2026 Dr. Monika Buerger. All rights reserved.



106

Academy of Neurodevelopmental Practices

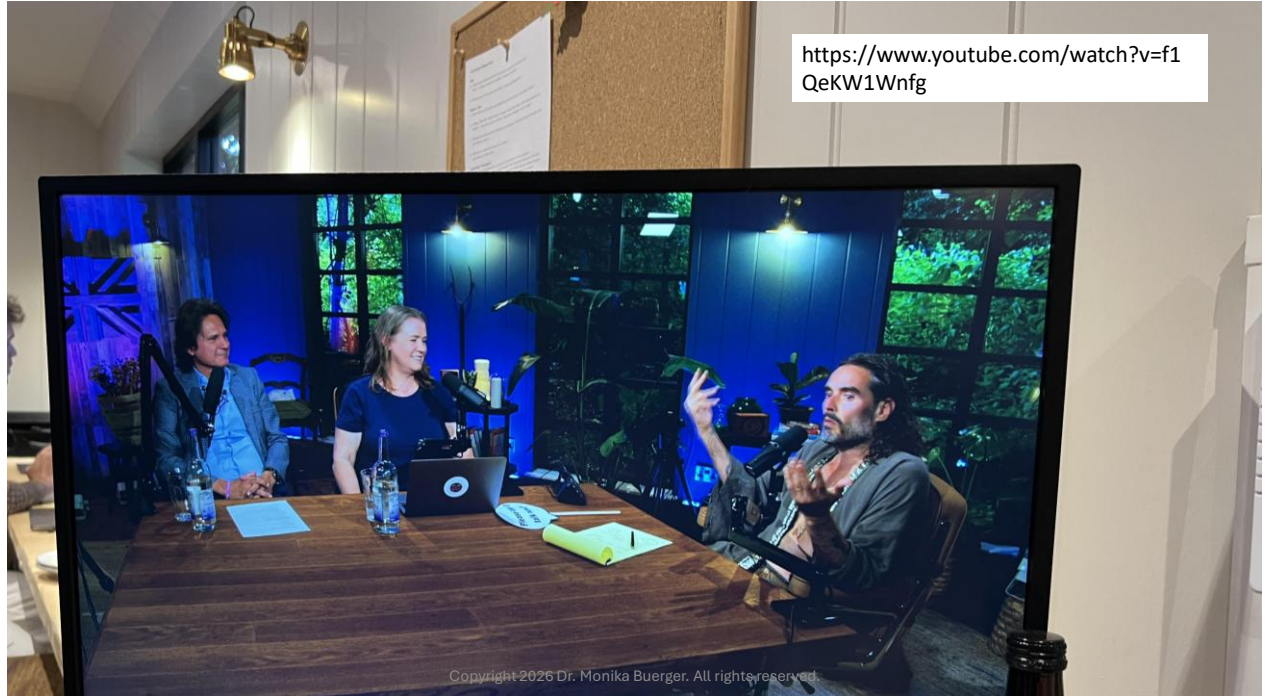


107

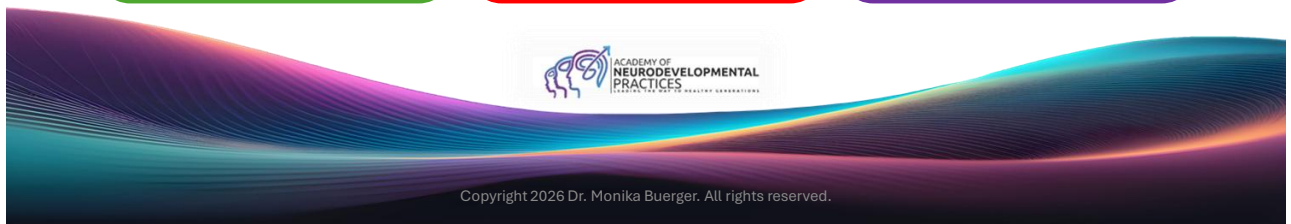
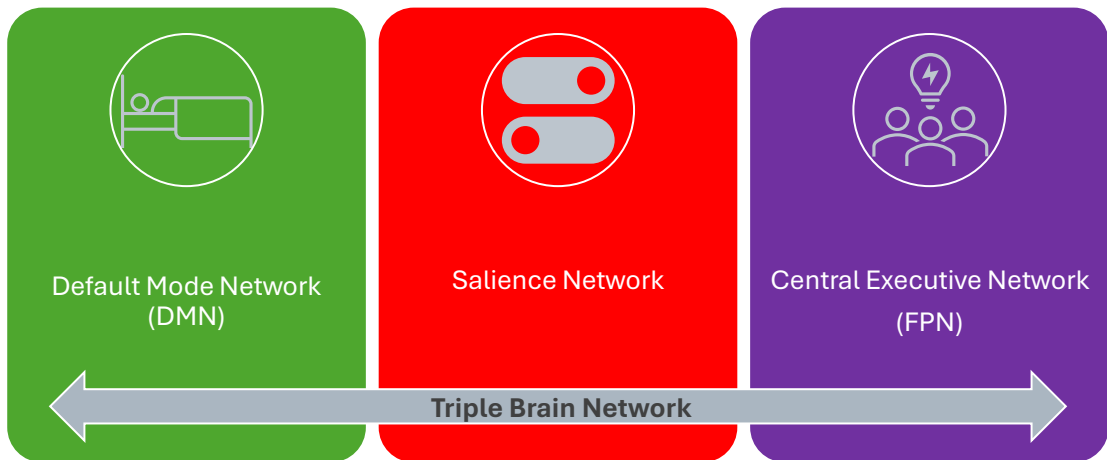


Copyright 2026 Dr. Monika Buerger. All rights reserved.

108



109

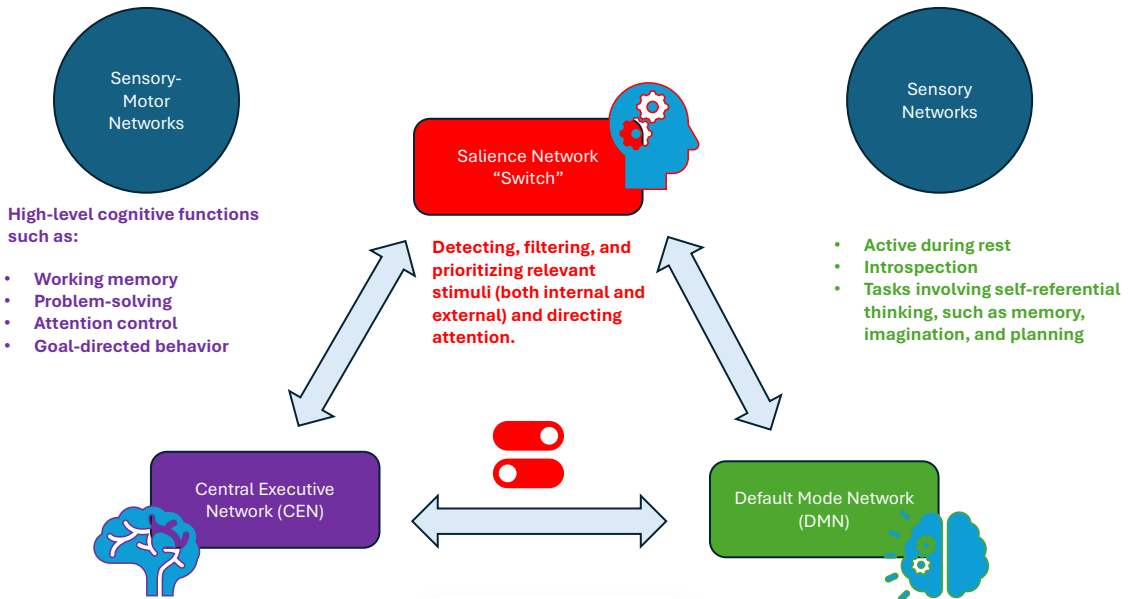


110



Copyright 2026 Dr. Monika Buerger. All rights reserved.

111



ACADEMY OF NEURODEVELOPMENTAL PRACTICES
 Copyright 2026 Dr. Monika Buerger. All rights reserved.

DeRidder et al., 2022; Haavik Research, 2024

112

Saliience Network



- Focused attention
- Emotional engagement
- Interoception (awareness of internal bodily states).



Copyright 2026 Dr. Monika Buerger. All rights reserved.

113

Default Mode Network



THE DMN IS INVOLVED IN **SELF-AWARENESS, EMOTION REGULATION, AND CREATIVITY.**



DYSFUNCTION IN THE DMN HAS BEEN LINKED TO DISORDERS LIKE **DEPRESSION, ANXIETY, AND ADHD.**



EXERCISES THAT ENGAGE THE DMN CAN IMPROVE **MENTAL HEALTH, FOSTER CREATIVE THINKING, AND ENHANCE PROBLEM-SOLVING SKILLS.**



Copyright 2026 Dr. Monika Buerger. All rights reserved.

114

DMN



- Medial PFC
- **Precuneus**
- **Hippocampus** & Parahippocampus
- Inferior Posterior Parietal lobe
- **Cerebellum**



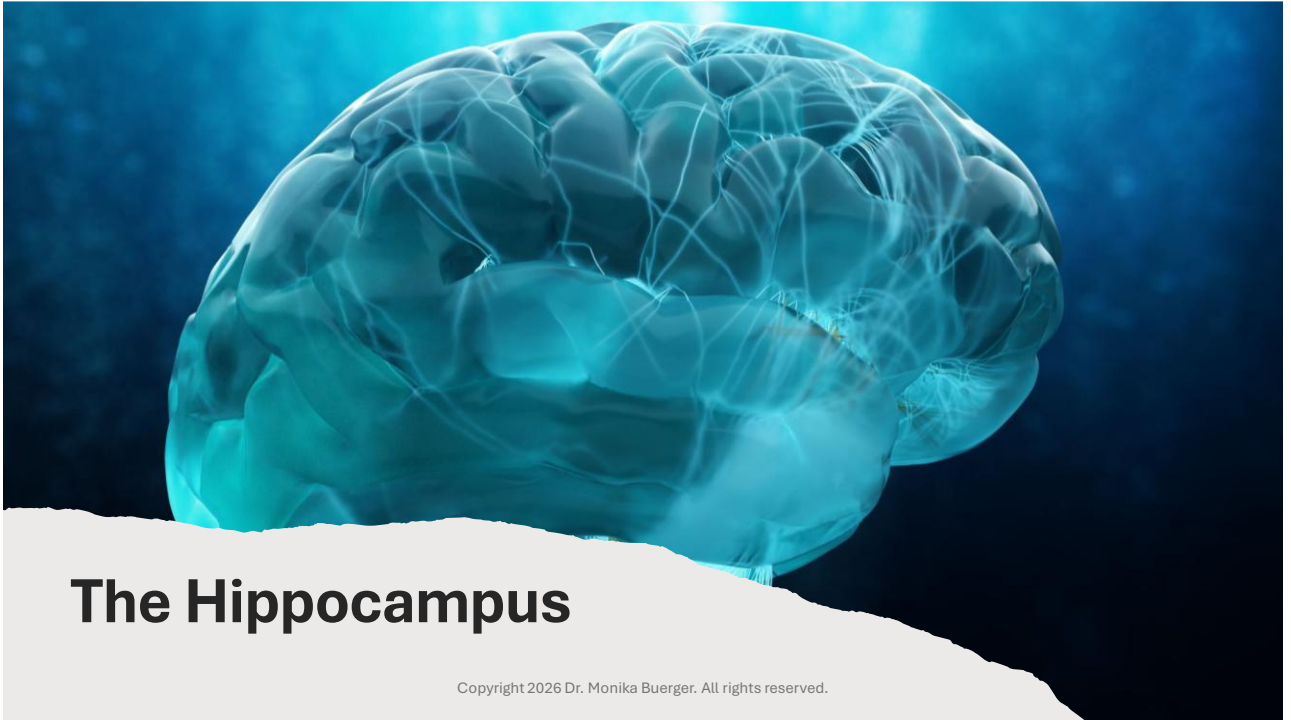
Copyright 2026 Dr. Monika Buerger. All rights reserved.

115

Neurogenesis



116



The Hippocampus

Copyright 2026 Dr. Monika Buerger. All rights reserved.

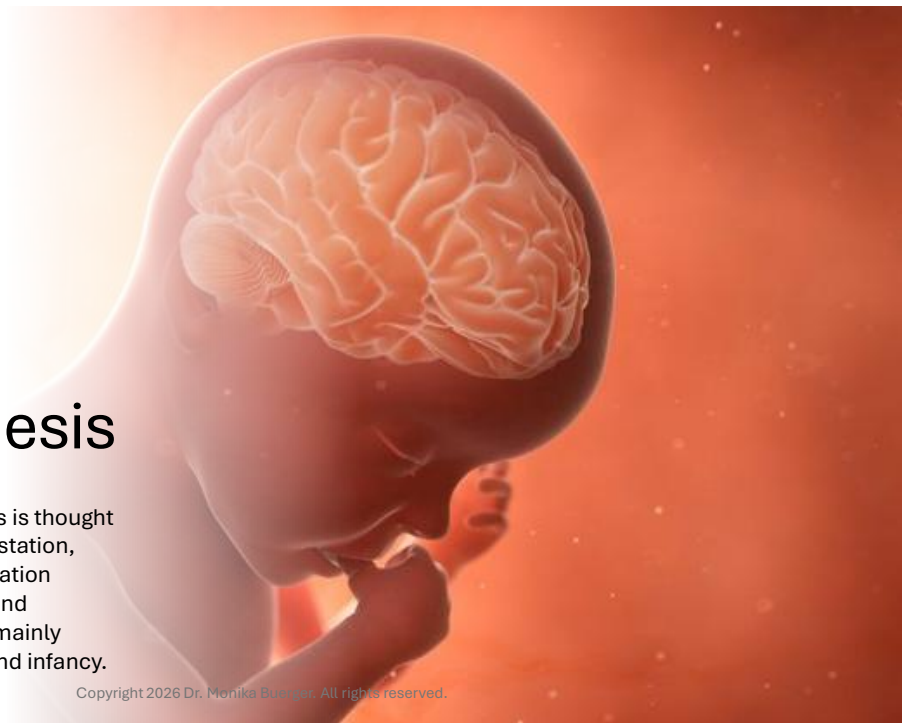
117

Prenatal Neurogenesis

Hippocampal neurogenesis is thought to be completed by mid-gestation, with the subsequent maturation involving dendritogenesis and synaptogenesis occurring mainly during the third trimester and infancy.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

118

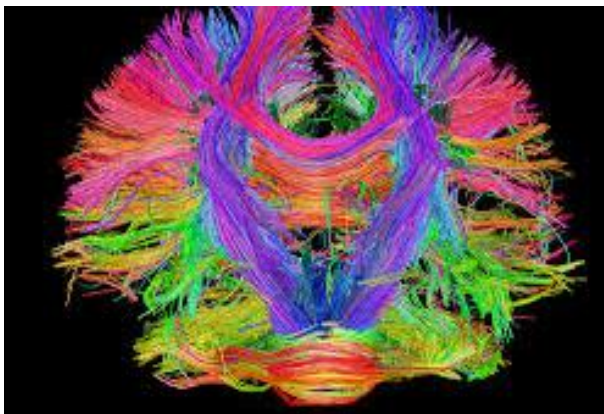


Neurogenesis

- Exercise
- VNS
- Sleep
- Chronic pain
- Hormones
- Nutrition



119



Article

Functional Connectivity Analysis on Resting-State Electroencephalography Signals Following Chiropractic Spinal Manipulation in Stroke Patients

Toby Steven Waterstone¹, Imran Khan Niazi^{1,2,3}, Muhammad Samran Navid^{1,2,3}, Imran Amjad^{2,4}, Muhammad Shafique⁴, Kelly Holt², Heidi Haavik² and Afshin Samani^{1,*}

¹ Department of Health Science and Technology, Aalborg University, 9000 Aalborg, Denmark;

tobywaterstone@gmail.com (T.S.W.); imran.niazi@nzchiro.co.nz (I.K.N.); m.navid@rn.dk (M.S.N.)

² Centre for Chiropractic Research, New Zealand College of Chiropractic, Auckland 1060, New Zealand;

imran.amjad@nzchiro.co.nz (I.A.); kelly.holt@nzchiro.co.nz (K.H.); Heidi.Haavik@nzchiro.co.nz (H.H.)

³ Faculty of Health & Environmental Sciences, Health & Rehabilitation Research Institute, AUT University, Auckland 1010, New Zealand

⁴ Faculty of Rehabilitation and Allied Sciences & Faculty of Engineering and Applied Sciences, Riphah International University, Islamabad 44000, Pakistan; muhammad.shafique@riphah.edu.pk

* Correspondence: afsamani@hst.aau.dk; Tel: +45-9940-2411



Copyright 2026 Dr. Monika Buerger. All rights reserved.

120

Autism and Alzheimer's Disease



121

Central Executive Network



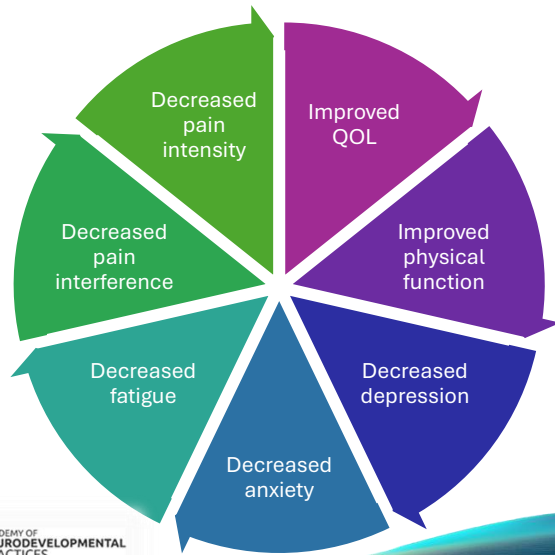
- Sustained attention
- Reasoning
- Decision-making
- Focused mental effort
- Planning
- Adaptation to changing demands



Copyright 2026 Dr. Monika Buerger. All rights reserved.

122

Results of UK Chiro Study



Copyright 2026 Dr. Monika Buerger. All rights reserved.

123



Copyright 2026 Dr. Monika Buerger. All rights reserved.

124

Neurodevelopment

- Highly sensitive to PNSE
- Networks are incomplete and divided and birth
- Functional connectivity increases during the first 2 years
- Significant increase in both intra- and inter-network RSFC from the 30th to the 46th week postmenstrual age (TBN)



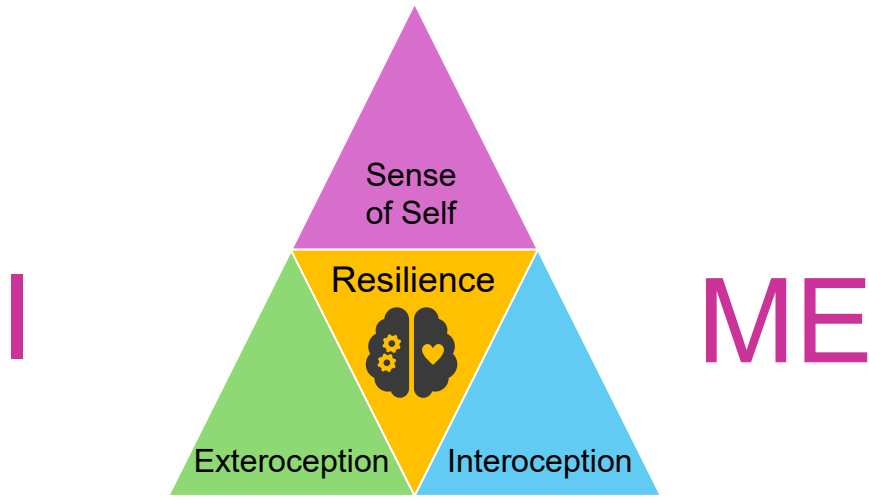
Copyright 2026 Dr. Monika Buerger. All rights reserved.

125

Foundations of Neurodevelopment

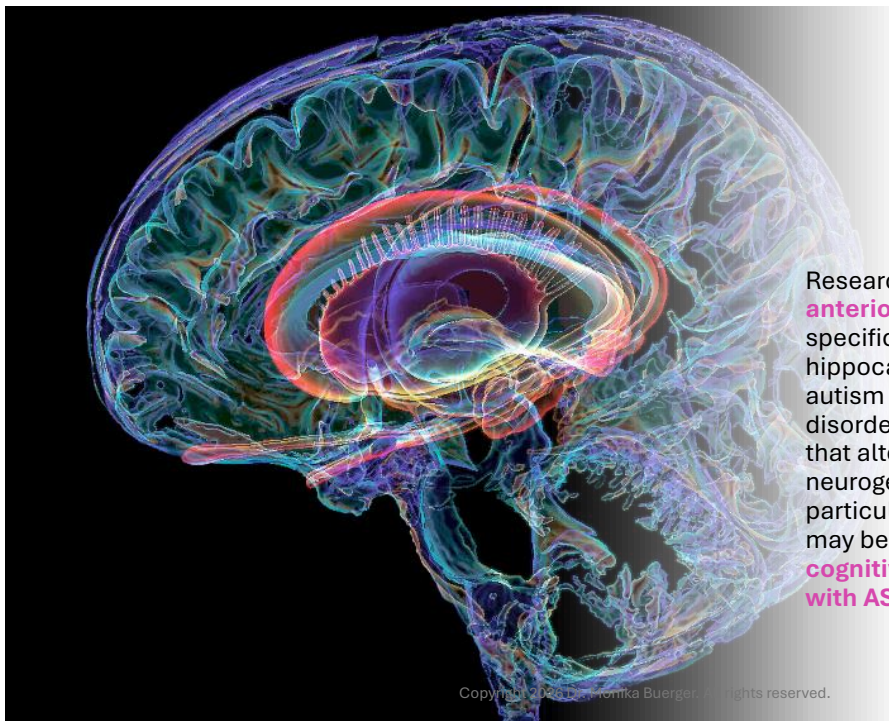


126



Copyright 2026 Dr. Monika Buerger. All rights reserved.

127



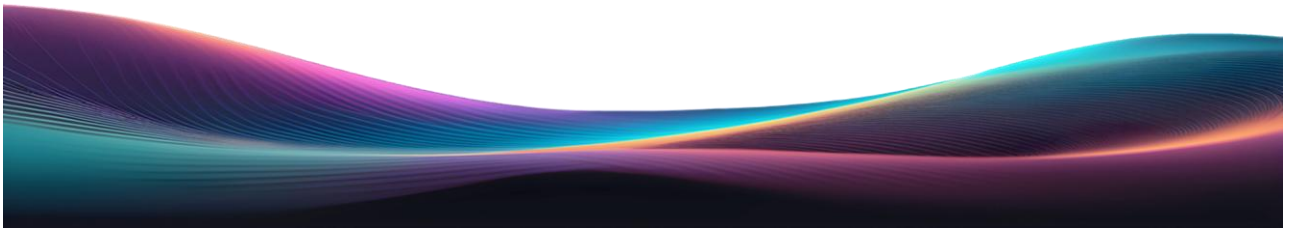
Research suggests that the **anterior hippocampus**, a specific region of the hippocampus, may play a role in autism spectrum disorder (ASD). Studies indicate that altered hippocampal neurogenesis and connectivity, particularly in the anterior region, may be **linked to social and cognitive deficits associated with ASD**.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

Kember et al. (2024)

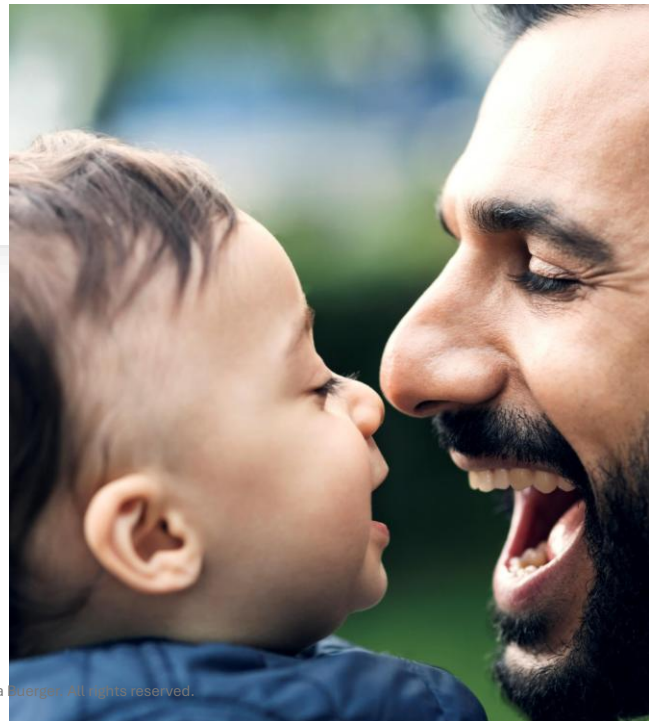
128

Proceedings of the National Academy of Sciences found that children of nurturing mothers had **hippocampal volumes 10 percent larger** than children whose mothers were not as nurturing.



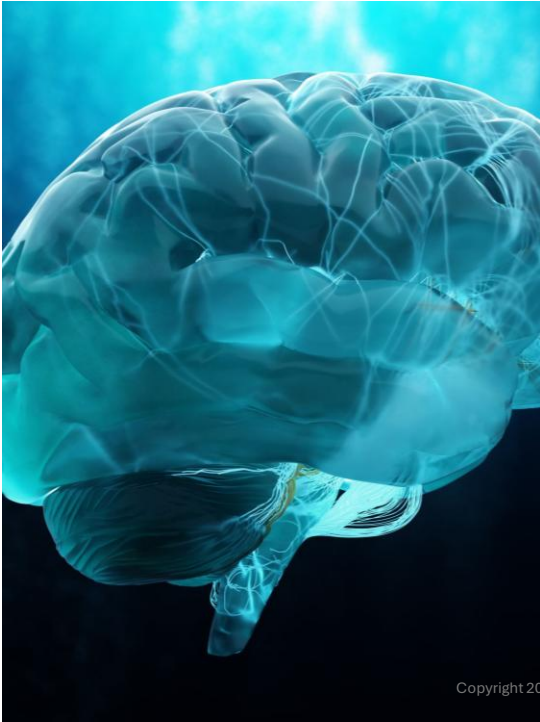
129

Serve & Return Play



Copyright 2026 Dr. Monika Buerger. All rights reserved.

130



Copyright 2026 Dr. Monika Buerger. All rights reserved.

Suarez et al., 2018

Consistent with a role for vagal signaling in memory function, **vagus nerve** stimulation **enhances** memory, facilitates **HPC neurogenesis**, and increases HPC expression of brain-derived neurotrophic factor (BDNF).

131

Brain Building & Bonding



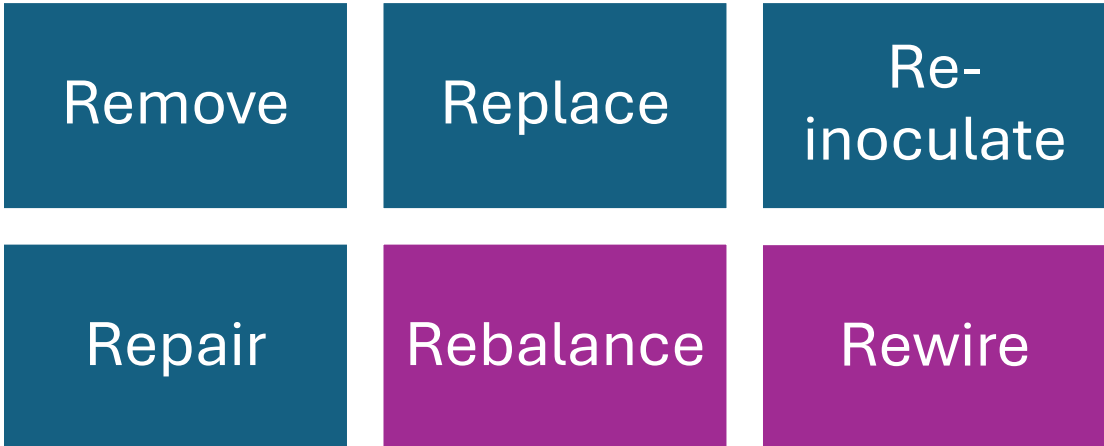
132



Management Strategies

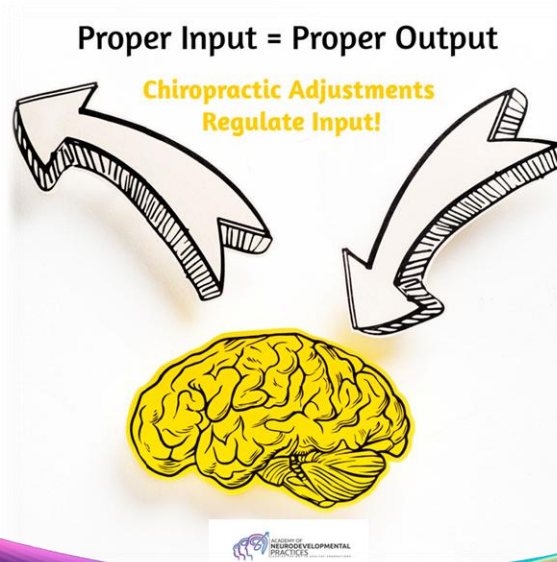
Copyright 2026 Dr. Monika Buerger. All rights reserved.

133



Copyright 2026 Dr. Monika Buerger. All rights reserved.

134

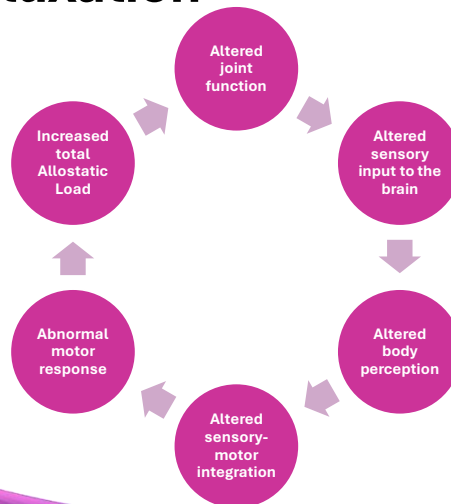


Copyright 2025 Dr. Monika Buerger

Copyright 2026 Dr. Monika Buerger. All rights reserved.

135

Vertebral Subluxation



Copyright 2026 Dr. Monika Buerger

136

OPEN **Comparison of corticomuscular coherence under different balance paradigms in individuals with and without forward head posture**

Ghydaa Anwar¹, Ibrahim M. Moustafa^{1,2,3}, Iman Khowailed¹, Monica Raja Kumari Raghunathan^{1,2}, Rabah Al abdi^{4,5} & Deed E. Harrison^{6,7}

A prospective case control investigation was conducted to assess corticomuscular coherence (CMC) under different balance conditions in order to identify alterations that may arise due to forward head posture (FHP). Sixty-four participants (between the ages of 18–25) were recruited for this study. Participants were free from any musculoskeletal symptoms and matched for relevant demographic variables. Participants were assessed for FHP using the craniovertebral angle (CVA) and separated into either the normal head posture (NHP) group by CVA > 50° or the FHP group by CVA < 50°. Participants were evaluated using the Biodex balance system while both EEG and EMG signals which were acquired simultaneously to investigate CMC. Balance was investigated under four conditions increasing in challenge: (1) standing with eyes open, (2) standing with eyes closed, (3) unstable standing with eyes open with the Biodex set on level 8, and (4) unstable standing with eyes closed with the Biodex at level 8. In addition to recording delta, beta, theta, alpha, and gamma waves, we calculated both peak and average coherence values from the CMC analysis. Statistically significant differences were identified for the FHP group vs. the NHP group for both peak ($p < .001$) and average CMC values ($p < .001$) and for the interaction of balance difficulty (stage 1 vs. stage 4), $p < .01$. Similarly, all brain waves (delta, beta, theta, alpha, and gamma) demonstrated statistically significant differences between the NHP and FHP groups ($p < .001$) and for increasing balance difficulty across the four stages, $p < .05$. This study demonstrates that FHP is associated with a significant elevation of CMC, a unique compensatory burden on the brain, particularly during physically challenging balance tasks.

137

Article

Effect of Forward Head Posture on Resting State Brain Function

Ju-Yeon Jung¹, Yeong-Bae Lee^{2,3,*,†} and Chang-Ki Kang^{1,2,4,*,†}

¹ Institute for Human Health and Science Convergence, Gachon University, Incheon 21565, Republic of Korea; 9955me@gachon.ac.kr

² Neuroscience Research Institute, Gachon University, Incheon 21565, Republic of Korea

³ Department of Neurology, Gil Medical Center, Gachon University College of Medicine, Incheon 21565, Republic of Korea

⁴ Department of Radiological Science, College of Medical Science, Gachon University, Incheon 21936, Republic of Korea

* Correspondence: yeongbaelee@gachon.ac.kr (Y.-B.L.); ck kang@gachon.ac.kr (C.-K.K.); Tel: +82-32-820-4110 (C.-K.K.)

† These authors contributed equally to this work.

Abstract: Forward head posture (FHP) is a common postural problem experienced by most people. However, its effect on brain activity is still unknown. Accordingly, we aimed to observe changes in brain waves at rest to determine the effect of FHP on the nervous systems. A total of 33 computer users (Male = 17; Female = 16; age = 22.18 ± 1.88) were examined in both FHP and neutral posture. For each session, brain waves were measured for 5 min, and then muscle mechanical properties and cranio-vertebral angle (CVA) were measured. Changes in brain waves between the neutral posture and FHP were prominent in gamma waves. A notable increase was confirmed in the frontal and parietal lobes. That is, eight channels in the frontal lobe and all channels in the parietal lobe showed a significant increase in FHP compared to neutral posture. Additionally, FHP changes were associated with a decrease in CVA ($p < 0.001$), an increase in levator scapulae tone (Right, $p = 0.014$; Left, $p = 0.001$), and an increase in right sternocleidomastoid stiffness ($p = 0.002$), and a decrease in platysma elasticity (Right, $p = 0.039$; Left, $p = 0.017$). The change in CVA was found to have a negative correlation with the gamma activity (P7, $p = 0.044$; P8, $p = 0.004$). Therefore, increased gamma wave activity in FHP appears to be related to CVA decrease due to external force that was applied to the nervous system and cervical spine.

Keywords: forward head posture; neutral head posture; cranio-vertebral angle; FHP

138

The Severity of Attention Deficit Hyperactivity Disorder Symptoms and Neck Posture in Children

Adnan Faris Naufal^{1*}, Anida Azkia Fitri¹, Farid Rahman¹, Orwan Buranuk²

¹Physiotherapy Study Program, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta, Indonesia

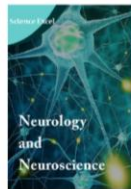
²School of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University, Thailand

Abstract. Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterised by attention deficits, impulsivity, and hyperactivity, often accompanied by sensorimotor disorders that affect body posture. This study aims to analyse the relationship between the severity of ADHD symptoms and neck posture, particularly forward head posture, in children aged 6–12 years. The study employed a cross-sectional design involving 200 primary school children as participants. ADHD severity was measured using the Copeland Symptom Checklist, while neck posture was assessed via Cramiovertebral Angle (CVA) using the Quick Angle Physio application. Statistical analysis utilized Spearman's correlation test and linear regression with a significance level of $p < 0.05$. Results showed a significant negative correlation between ADHD scores and CVA ($r = -0.537$, $p = 0.000$), indicating that higher ADHD scores are associated with a greater tendency for children to exhibit forward head posture. Attention deficits, hyperactivity, unintegrated primitive reflexes, and gadget usage duration are suspected to contribute to this postural disorder. These findings underscore the importance of physiotherapy interventions, including postural exercises, reflex integration, ergonomic education, and monitoring of gadget use, as early preventive measures to improve postural control and quality of life in children with ADHD.

139

Neurology & Neuroscience

Short Communication



Scroll, Stress, Repeat: The Neuroscience of Trauma in a Digital World

Zoe Wyatt

Neurocon Conference 2025

Introduction – Scroll, Stress, Repeat

In contemporary society, digital platforms have become primary mediators of sensory and emotional experience [1]. The human stress response - evolved to react to immediate, tangible threats - is now increasingly activated by algorithmically curated streams of information [2]. Recommendation systems, optimised for sustained engagement, have been shown to selectively amplify emotionally salient material, including content that elicits fear, outrage, or distress [3]. This shaping of the user's information environment alters not only attentional priorities but also perceived threat probability and the brain's capacity for emotional regulation [4].

In this context, "digital trauma" can be understood as a spectrum of neurobiological

often unpredictable presentation of distressing material [8]. Unlike direct traumatic events, such exposures may occur at high frequency with minimal recovery intervals, increasing the likelihood of alterations in neural systems implicated in threat detection, salience attribution, and autobiographical memory [9]. Of particular relevance are the Default Mode Network (DMN), which integrates self-referential processing and memory consolidation; the anterior cingulate cortex (ACC), which mediates conflict monitoring and affect regulation; and predictive coding mechanisms, which generate and update threat-related expectations [10,11]. Alterations in these systems can fundamentally reshape how the brain encodes, anticipates, and recovers from perceived threats [10].

*Correspondence
Dr Zoe Wyatt
Neurocon Conference 2025

Received Date: 30 Aug 2025



140



Contents lists available at ScienceDirect

International Journal of Pediatric Otorhinology

journal homepage: www.elsevier.com/locate/ijporl



Short lingual frenulum and head-forward posture in children with the risk of obstructive sleep apnea

Eliza Brożek-Mądry^{a,*}, Zofia Burska^b, Zuzanna Steć^a, Marcin Burghard^c, Antoni Krzeski^a

^a Department of Otorhinology, Medical University of Warsaw, Poland

^b Czerniakowski Hospital, Warszawa, Poland

^c Medical Center in Ostrołęka, Poland

ARTICLE INFO

ABSTRACT

Keywords:

Background: Recent studies have shown that a short lingual frenulum is a potential risk factor for obstructive



141

European Archives of Oto-Rhino-Laryngology
<https://doi.org/10.1007/s00405-025-09534-2>

MISCELLANEOUS



Postural and cervical proprioceptive implications in adult humans with ankyloglossia: an observational study

Alessandro Micarelli^a, Martina Arena^a, Adriano Di Benedetto^a, Fabio Scarpa¹, Riccardo Xavier Micarelli¹, Marco Alessandrini^a

Received: 17 March 2025 / Accepted: 17 June 2025
 © The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2025

Abstract

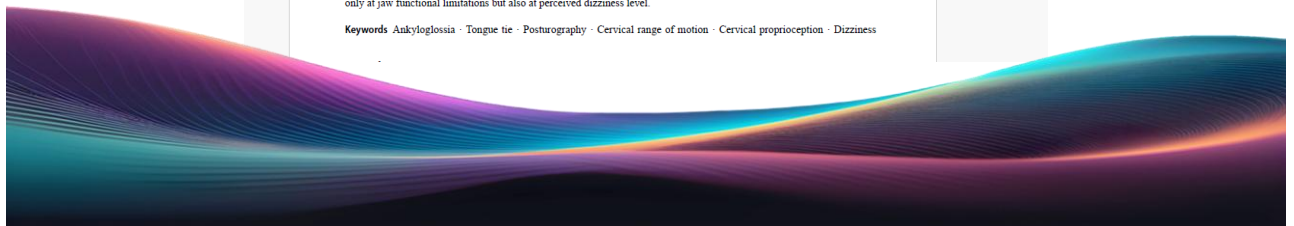
Purpose To evaluate how tongue tie could impact on neck performance and posturographic testing as well as on subjective consequences on dizziness and jaw functionality, when comparing adult participants with different degrees of ankyloglossia (ANK) according to Kotlow classification with a group of healthy subjects, serving as control group (CG).

Methods ANK and CG participants have been studied by means of quantitative tongue evaluations (including Mouth Opening with Tongue Tip to incisive papilla, MOTTIP, and Maximal Interincisal Mouth Opening, MIO), posturography testing, cervical range of motion (CROM), cervical relocation tests (CRT) and subjective testing (Dizziness Handicap Inventory, DHI, and Jaw Functional Limitations Scale 20, JFLS-20).

Results 96 ANK participants demonstrated to have significant ($p < 0.01$) higher values in length and in area parameters when compared with 98 CG participants. A significant increase in power spectra values was found within the middle-/high-frequency interval ANK when compared to CG. ANK participants demonstrated significant reduced cervical spine mobility and higher values in all CRT positions as well as significant higher values along DHI and JFLS-20 sub-item and total score. Multiple significant ($p < 0.05$) correlations were found in ANK participants between tongue measures, cervical mobility, postural parameters and subjective testing.

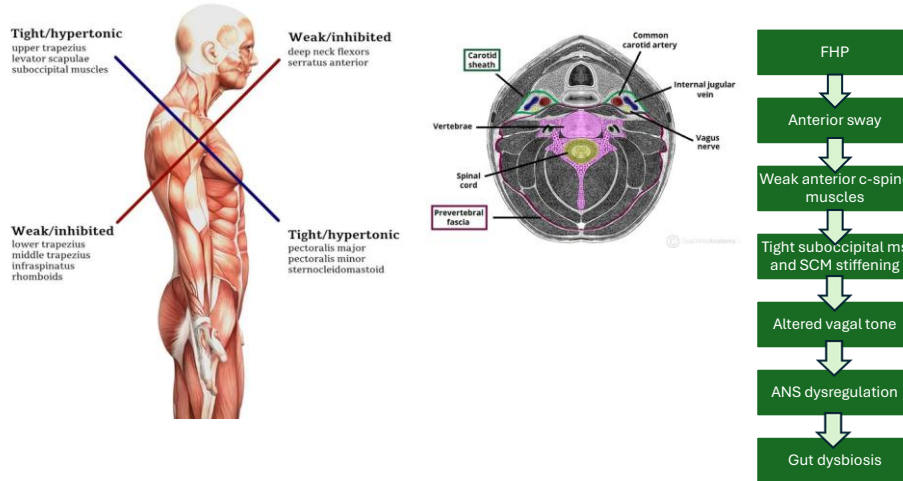
Conclusion The present study for the first time demonstrated that the tongue tie may actively participate in postural derangement possibly mediated by a wide span of anatomical and functional sequelae in the cervical spine, with consequences not only at jaw functional limitations but also at perceived dizziness level.

Keywords Ankyloglossia · Tongue tie · Posturography · Cervical range of motion · Cervical proprioception · Dizziness



142

Upper Crossed Syndrome



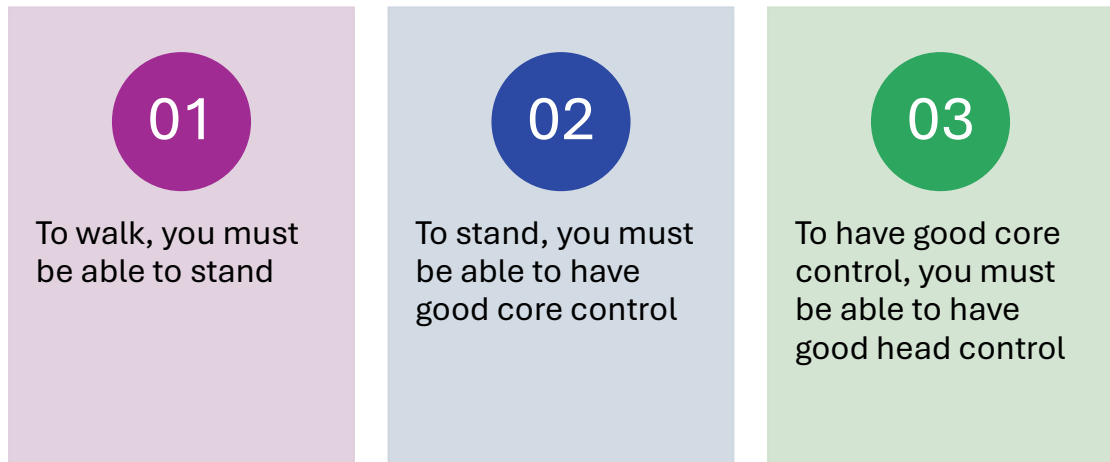
Copyright 2026 Dr. Monika Buerger. All rights reserved.

143



Copyright 2026 Dr. Monika Buerger. All rights reserved.

144



Copyright 2026 Dr. Monika Buerger. All rights reserved.

145



Head Control

Necessary for:

- Stability of the trunk and arms
- Body control
- Visual focusing
- Learning more complex movements and behaviors



Copyright 2026 Dr. Monika Buerger. All rights reserved.

146



Where the head,
neck, and eyes
go, the body goes!

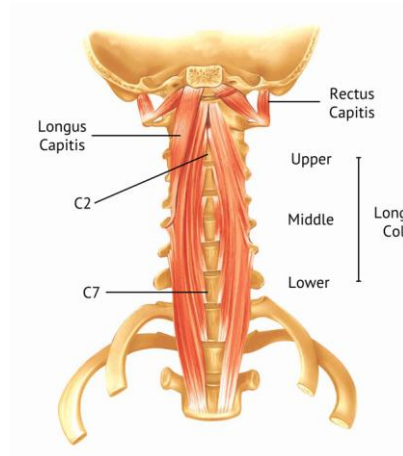
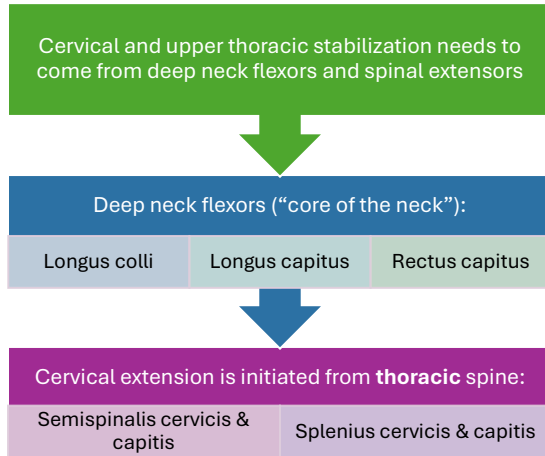
Copyright 2026 Dr. Monika Buerger. All rights reserved.

147



Copyright 2026 Dr. Monika Buerger. All rights reserved.

148



Copyright 2026 Dr. Monika Buerger. All rights reserved.

149



Establishing a healthy vestibular system is critical to an infant’s motor development as equilibrium dysfunction may result in delayed infant head control and a lag in achieving crawling and walking

Copyright 2026 Dr. Monika Buerger. All rights reserved.

150



- Infant positioning in daily life, particularly in relation to active neck and back muscles, may affect spinal development, psychosocial progression, and motor milestone achievement.
- The objective of this study was to evaluate neck and back muscle activity of healthy infants in common positions and baby devices.
- Caregivers reported that infants spent 12% of daily awake time prone, 43% in supine-lying baby gear, and 44% held in-arms or upright in a baby carrier. Infants exhibited highest erector spinae activity when prone, and lowest cervical paraspinal muscle activity in the car seat.
- No differences were found between in-arms carrying and babywearing.
- This first evaluation of the muscle activity of healthy infants supports the **importance of prone time in infants' early spinal development because it promotes neck and back muscle activity. Carrying babies in-arms or in baby carriers may also be beneficial to neck muscle development, while prolonged time spent in car seats or containment devices may be detrimental to spinal development.**

J Biomech. 2020 May 07; 104: 109741

Copyright © 2026 Dr. Monika Buerger. All rights reserved.

151

Tummy time was positively associated with:

- Gross motor and total development
- Reduction in the BMI-z score
- Prevention of brachycephaly
- The ability to move while prone, supine, crawling, and rolling.

An indeterminate association was found for:

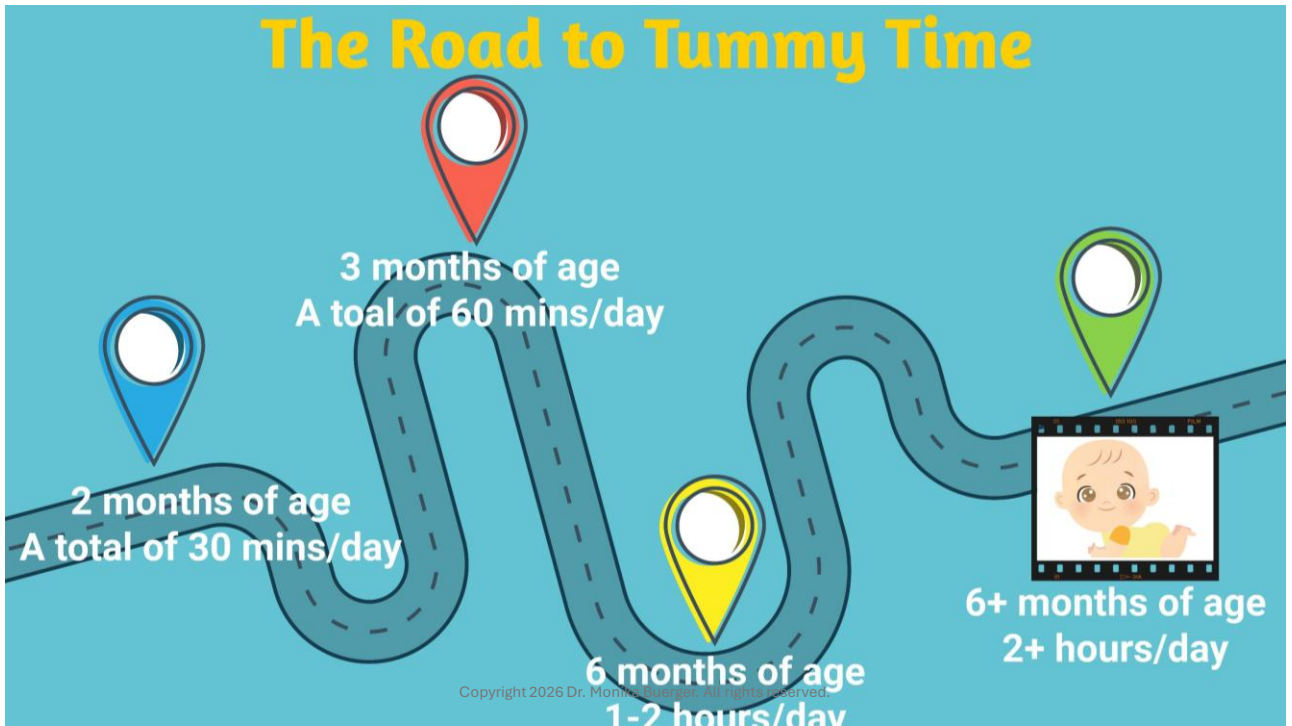
- Social and cognitive domains
- Plagiocephaly
- Walking, standing, and sitting.

<https://doi.org/10.1542/peds.2019-2168>



Copyright 2026 Dr. Monika Buerger. All rights reserved.

152

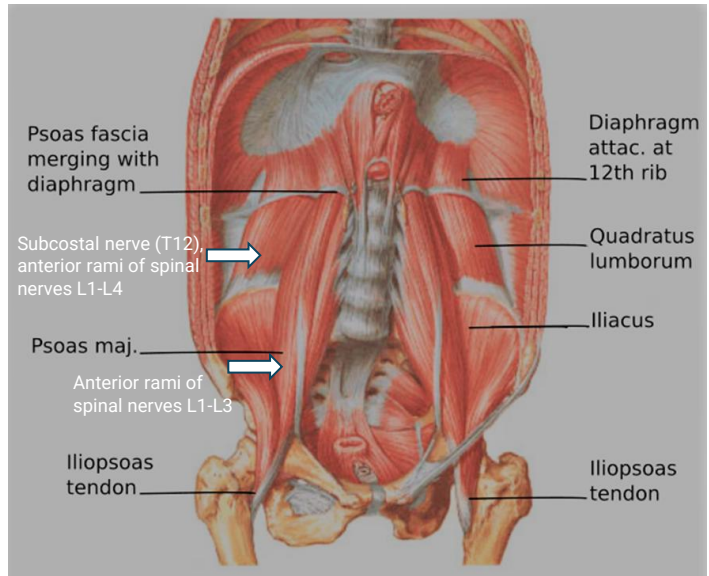


153



154

- Vestibular load
- Gut dysbiosis
- Moro
- TOTS
- C-spine and upper T-spine
- T/L spine (T9-L2) w/weight shifting



Copyright 2026 Dr. Monika Buerger. All rights reserved.

155

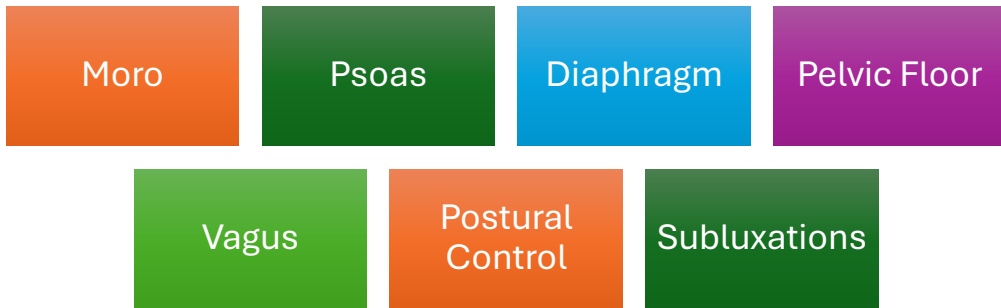
Supine flexion supports infants core development primarily via:

- Cervical musculature
- Lumbar musculature
- Glutes
- Abdominals (pelvic floor)
- Hamstrings
- Quads



Copyright 2026 Dr. Monika Buerger. All rights reserved.

156



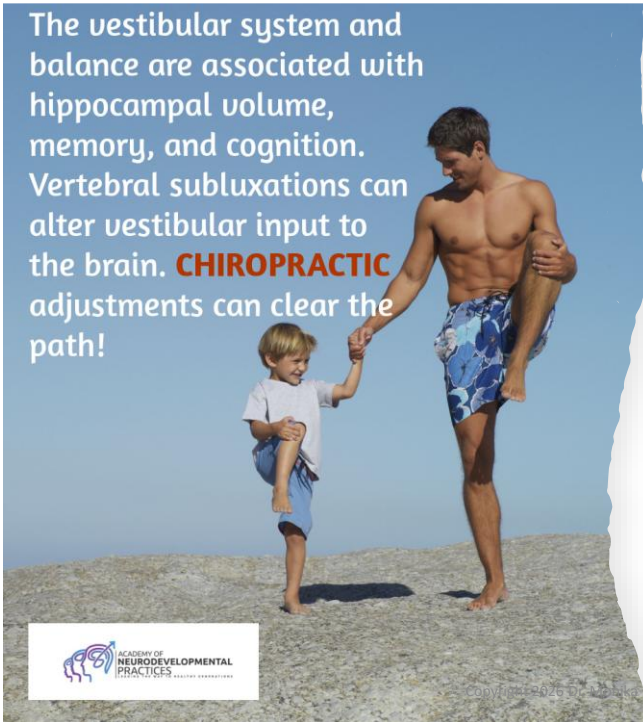
Copyright 2026 Dr. Monika Buerger. All rights reserved.

157




158

The vestibular system and balance are associated with hippocampal volume, memory, and cognition. Vertebral subluxations can alter vestibular input to the brain. **CHIROPRACTIC** adjustments can clear the path!



A photograph of a man and a young boy standing on a large, flat rock. The man is shirtless, wearing blue patterned shorts, and is balancing on one leg while holding the boy's hand. The boy is also balancing on one leg. The background is a clear blue sky.



ACADEMY OF
NEURODEVELOPMENTAL
PRACTICES

Copyright 2026 Dr. Monika Buerger. All rights reserved.

159

Coming Back to Center



A photograph of a woman and a young girl practicing yoga in a room. They are standing in front of a large window with a view of mountains. Both have their arms raised in a prayer position. The woman is wearing a grey tank top and black leggings, and the girl is wearing a white shirt and black pants.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

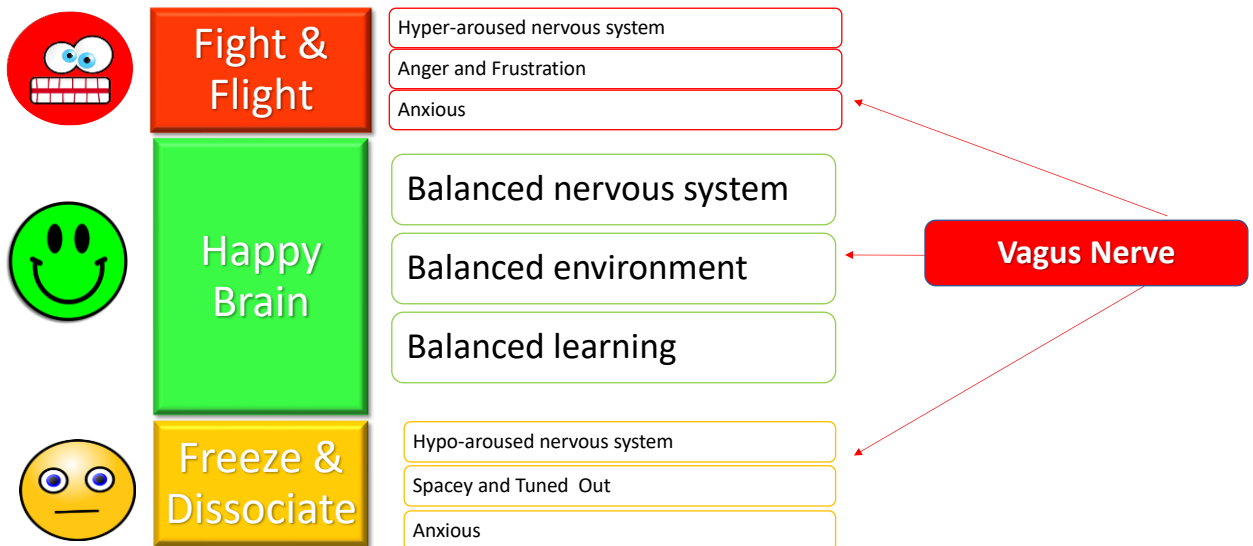
160

The Six “I’s” to Building New Neural Pathways.....

- Identify
- Interrupt
- Increase
- Interoception
- Intrinsic
- Intensity



161



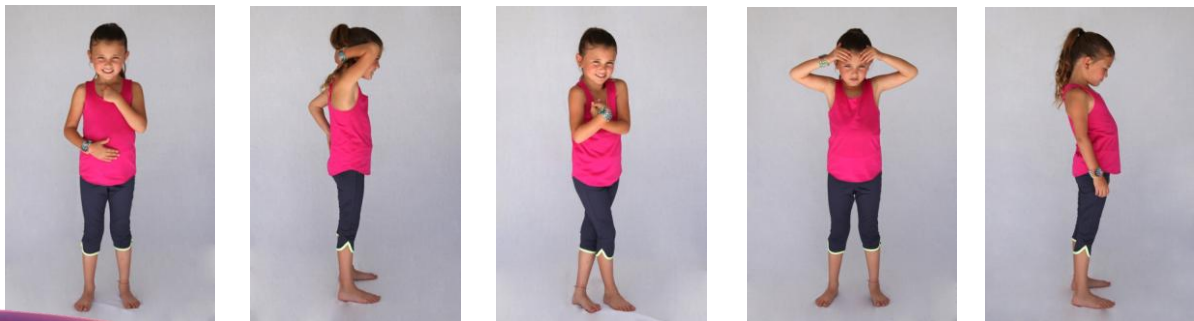
Copyright 2026 Dr. Monika Buerger. All rights reserved.

162

Supporting Vagal Modulation

- Chiropractic care
- Neurofeedback
- Vagal Nerve stimulator
- Rezzimax Tuner
- Lumiceutical Photomodulation
- Humming/Singing
- Diaphragmatic breathing
- Yoga
- Mindfulness Meditation

163



164

Recognizing the Total Toxic Burden

Chemical
Physical
Emotional
Mental
Electrical



Copyright 2026 Dr. Monika Buerger. All rights reserved.

165



Understanding Health Trends to **GROW** your practice!

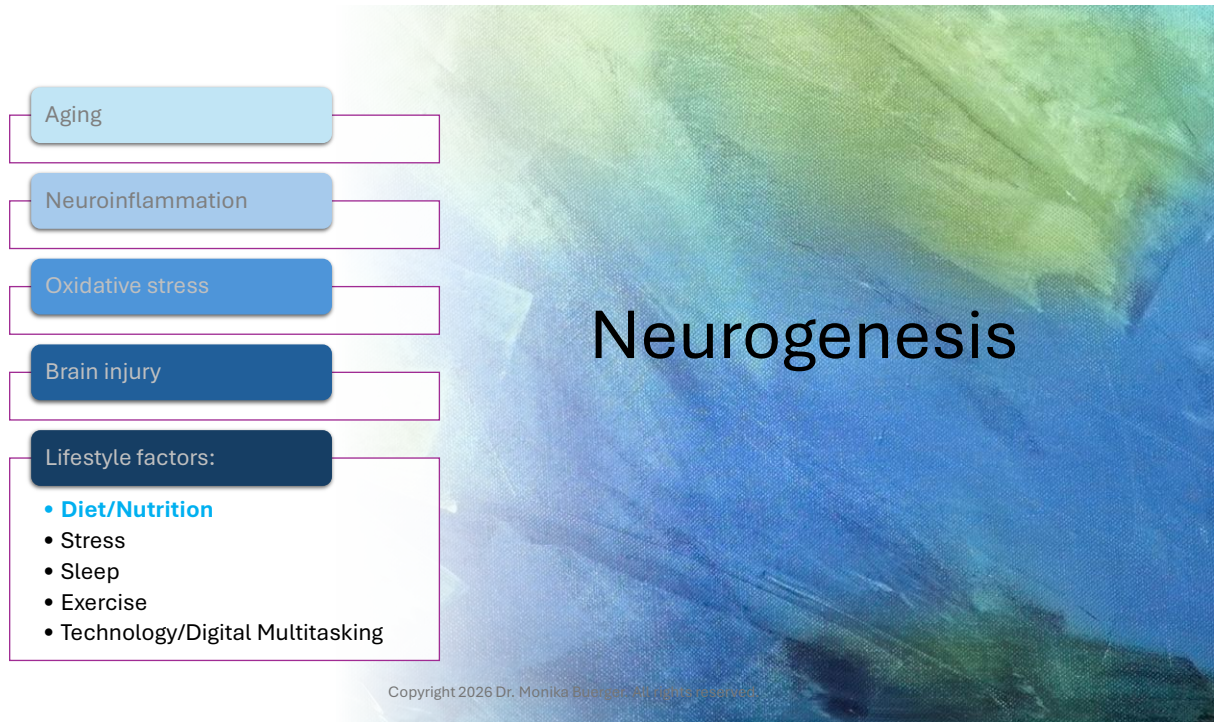
- As the wellness landscape evolves, **cognitive and mental health** have become central to how consumers approach self-care and overall quality of life:
- **80% of consumers** prioritize their physical and **mental health** equally
- **52% find mood-enhancing** claims on food and drinks appealing
- **57%** say they have looked to **improve their mental well-being** over the past year



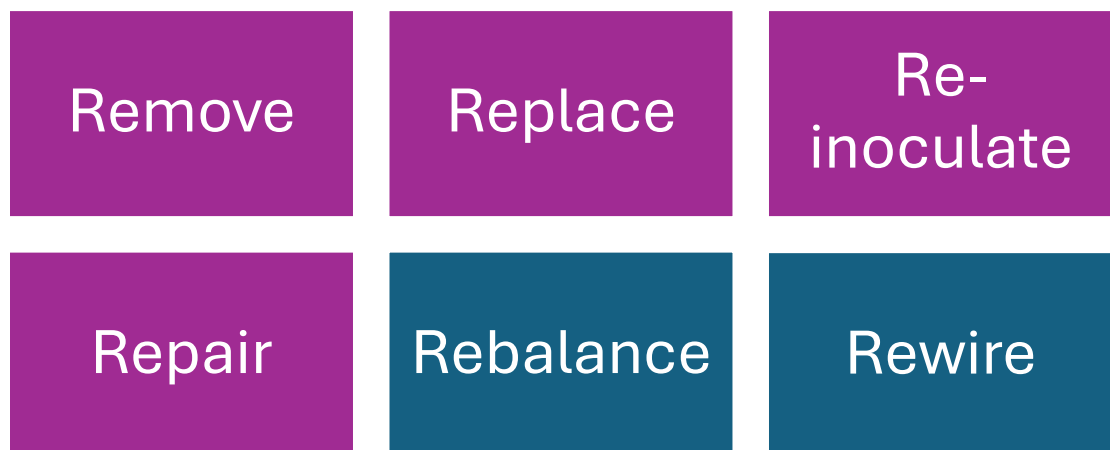
Copyright 2026 Dr. Monika Buerger. All rights reserved.



166

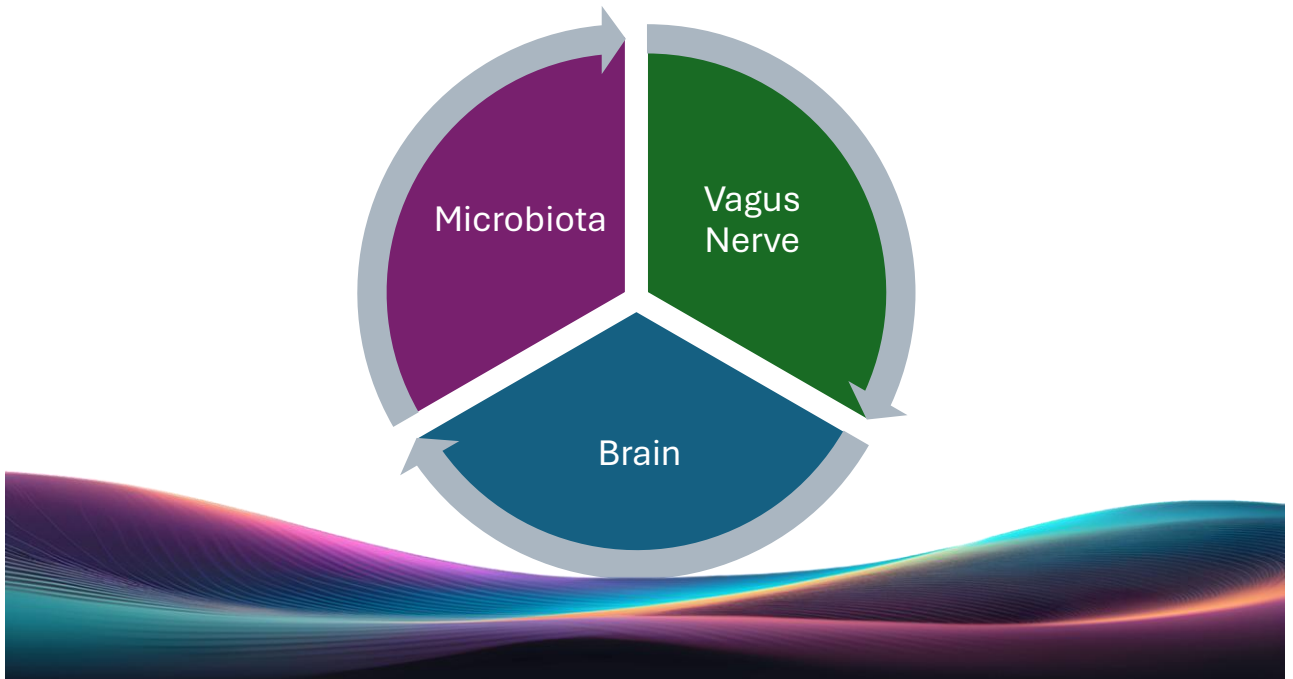


167

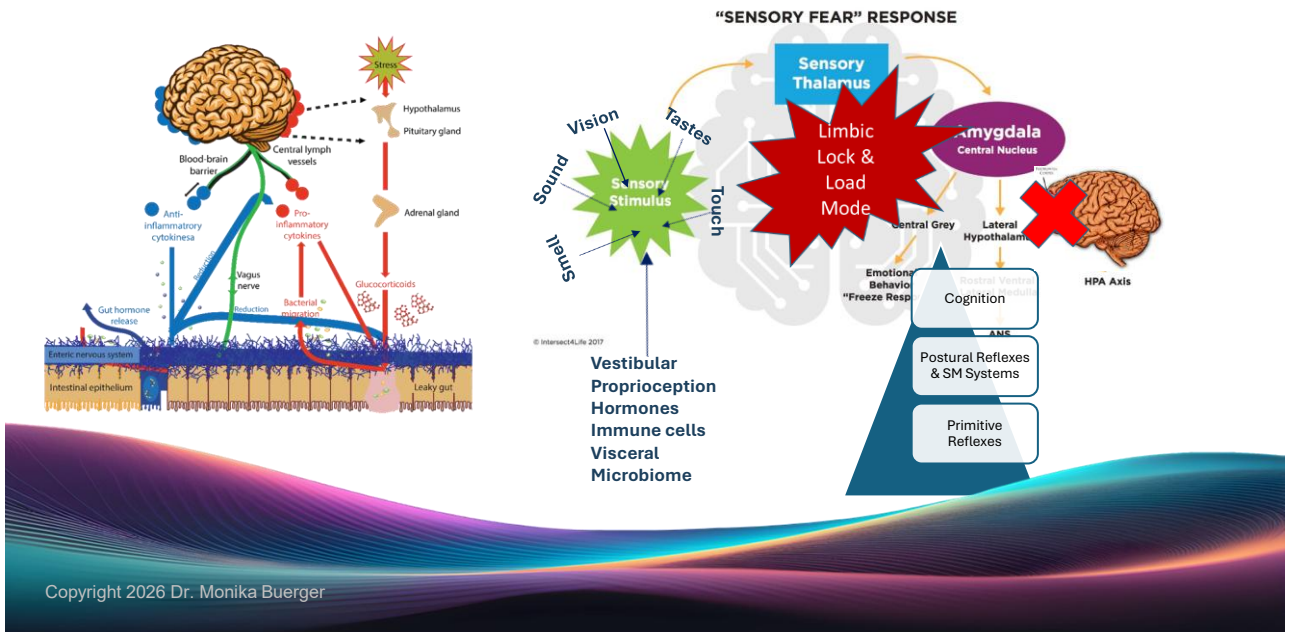


Copyright 2026 Dr. Monika Buerger. All rights reserved.

168



169

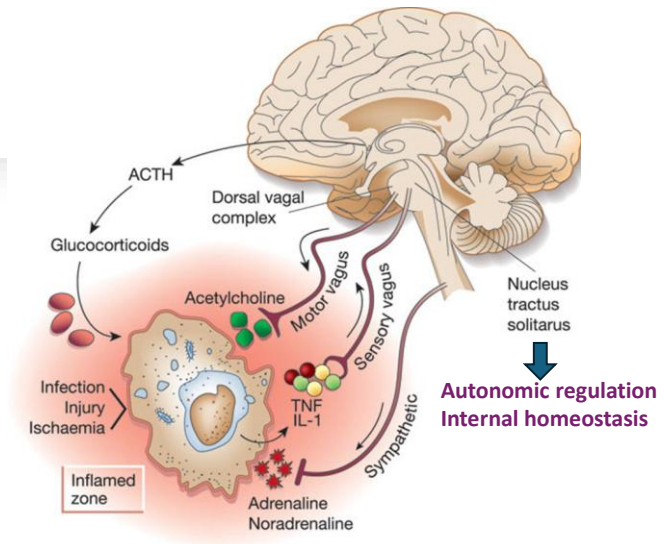


170

Copyright 2026 Dr. Monika Buerger

The immune system and Vagus Nerve are intricately connected via the “**Cholinergic Anti-Inflammatory Pathway**”

The efferent vagus nerve inhibits pro-inflammatory cytokine release and protects against systemic inflammation



Copyright 2026 Dr. Monika Buerger. All rights reserved.

171

- Prebiotics
- Probiotics
- Postbiotics



Copyright 2026 Dr. Monika Buerger. All rights reserved.

172



Genes



Species



Strains

L. Rhamnosus R0011
L. Reuteri R0052, PBS072
B. Longum R1714, R0175



Copyright 2026 Dr. Monika Buerger. All rights reserved.

173

Psychobiotics



Probiotics, such as

- *Lactobacillus paracasei*,
- *Lactobacillus acidophilus*,
- *Lactobacillus casei*,
- *Lactobacillus fermentum*,
- *Lactobacillus helveticus*,
- *Lactobacillus rhamnosus*,
- *Bifidobacterium bifidum*,
- *Bifidobacterium longum*,
- *Bifidobacterium breve* and
- *Bifidobacterium infantis*

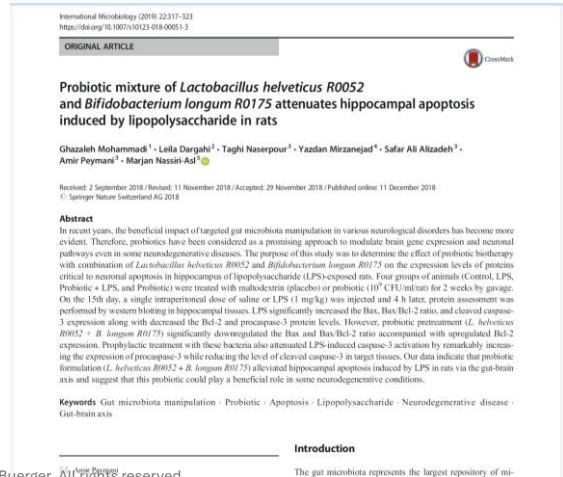
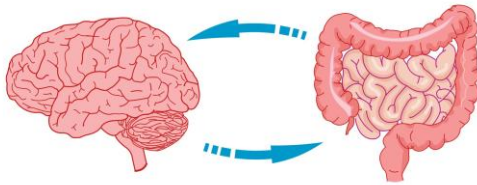
improve the central expression of BDNF, N-methyl-D-aspartic acid (NMDA) receptor and other neuroactive peptides involved in synaptic and neural plasticity to enhance memory, cognition and behavior, and reduce microglial activation in a wide range of neurological illness including anxiety and depression



Copyright 2026 Dr. Monika Buerger. All rights reserved.

174

Psychobiotics

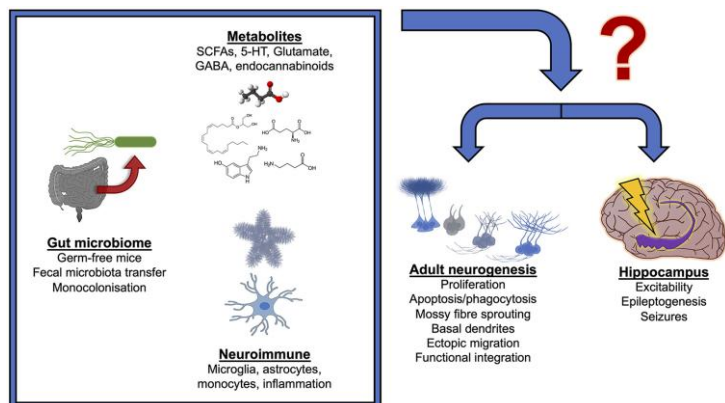


Copyright 2026 Dr. Monika Buerger. All rights reserved.

175

The gut microbiome and adult hippocampal neurogenesis: A new focal point for epilepsy?

The subgranular zone (SGZ) of the hippocampus, the vagus nerve (VN), and the gut microbiome are interconnected parts of a complex system that plays a crucial role in brain function and overall health.

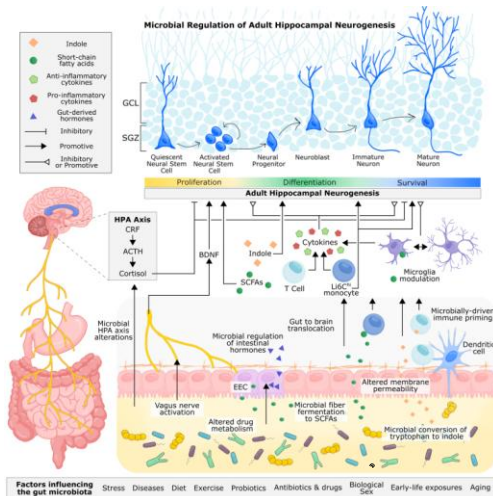


Copyright 2026 Dr. Monika Buerger. All rights reserved.

Dohm-Hansen (2022)

176

The microbiota's influence on hippocampal neurogenesis



Gut-Microbiota-Brain Axis

Guzzetta et al. (2022)

Copyright 2026 Dr. Monika Buerger. All rights reserved.



177

A psychobiotic formula to modulate the gut-brain-immune axis.



178

Effects of a Psychobiotic Supplement on Serum Brain-derived Neurotrophic Factor Levels in Depressive Patients: A *Post Hoc* Analysis of a Randomized Clinical Trial

Eight-week supplementation with *B. longum* and *L. helveticus* in depressive patients improved depression symptoms, possibly by increasing BDNF levels.



179

Neuropharmacology 195 (2021) 108682



ELSEVIER

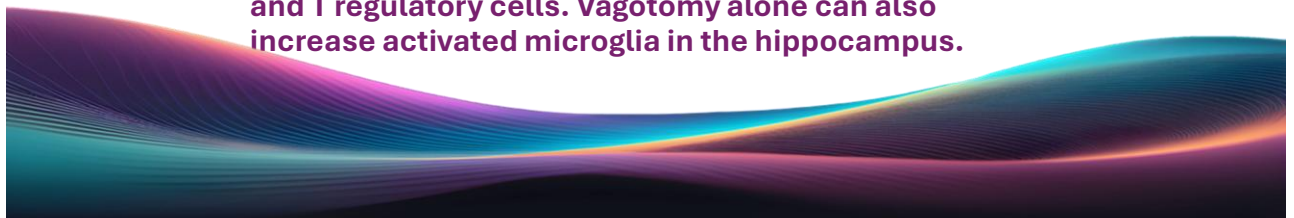
Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Neuropharmacology

journal homepage: www.elsevier.com/locate/neuropharm

Loss of vagal integrity disrupts immune components of the microbiota-gut-brain axis and inhibits the effect of *Lactobacillus rhamnosus* on behavior and the corticosterone stress response

Vagotomy, or cutting the vagus nerve, can prevent the effects of *L. rhamnosus* on anxiety, the HPA axis, and T regulatory cells. Vagotomy alone can also increase activated microglia in the hippocampus.



180

ELS and Adult Anxiety

OPEN

Citation: *Transl Psychiatry* (2016) 6, e823; doi:10.1038/tp.2016.94
www.nature.com/tp

ORIGINAL ARTICLE

The effects of a probiotic formulation (*Lactobacillus rhamnosus* and *L. helveticus*) on developmental trajectories of emotional learning in stressed infant rats

CSM Cowan¹, BL Callaghan^{1,2,3} and R Richardson¹

Recently, scientific interest in the brain-gut axis has grown dramatically, particularly with respect to the link between gastrointestinal and psychiatric dysfunction. However, the role of gut function in early emotional dysregulation is yet to be examined, despite the prevalence and treatment resistance of early-onset psychiatric disorders. The present studies utilized a developmental rodent model of early-life stress (ELS) to explore this gap. Rats were exposed to maternal separation (MS) on postnatal days 2–14. Throughout MS, dams received either vehicle or a probiotic formulation (previously shown to reduce gastrointestinal dysfunction) in their drinking water. Replicating past research, untreated MS infants exhibited an adult-like profile of long-lasting fear memories and fear relapse following extinction. In contrast, probiotic-exposed MS infants exhibited age-appropriate infantile amnesia and resistance to relapse. These effects were not mediated by changes in pups' or dams' anxiety at the time of training, nor by maternal responsiveness. Overall, probiotics acted as an effective and non-invasive treatment to restore normal developmental trajectories of emotion-related behaviors in infant rats exposed to ELS. These results provide promising initial evidence for this novel approach to reduce the risk of mental health problems in vulnerable individuals. Future studies are needed to test this treatment in humans exposed to ELS and to elucidate mechanisms for the observed behavioral changes.

Transl Psychiatry (2016) 6, e823; doi:10.1038/tp.2016.94; published online 31 May 2016

181

Lower CRP & Depression

RESEARCH ARTICLE

Probiotics Decrease C-Reactive Protein Levels in Depression Depending on Metabolic Syndrome Presence or Antidepressant Treatment – Secondary Results of a Randomized Clinical Trial

Oliwia Gawlik-Kotelnicka^{1,†}, Adam Wysokiński², Agata Gajewska³, Karolina Czarnačka-Chrebelska⁴, Karolina Kopacz², Anna Skowrońska¹, Ewa Pikus¹, Ewa Brzezińska-Lasota⁴, and Dominik Strzelecki¹

¹Department of Affective and Psychotic Disorders, Medical University of Lodz, Czechoslawicka Street 8/10, 92-216 Lodz, Poland; ²Department of Old Age Psychiatry and Psychotic Disorders, Medical University of Lodz, Czechoslawicka Street, 92-216 Lodz, Poland; ³Faculty of Medicine, Medical University of Lodz, Kosciuszki Avenue 4, 90-419 Lodz, Poland; ⁴Department of Biomedicine and Genetics, Medical University of Lodz, Poland; Mazowiecka Street 5, 92-215 Lodz, Poland; ⁵Dynamo Lab[™] Academic Laboratory of Movement and Human Physical Performance, Medical University of Lodz, Pomorska Street 251, 92-213 Lodz, Poland

© 2018 The Author(s). Published by Stratim Science Publishers. This is an open access article published under CC BY 4.0 <https://creativecommons.org/licenses/by/4.0/legalcode>

Abstract: Introduction: There is a need to search for new treatment options not only for depression but also for its concomitant diseases. Particularly, depression and metabolic health abnormalities often coexist, while inflammation and microbiota imbalance may play a part in their pathophysiology. Thus, trials of interventions targeting the microbiota may result in establishing a safe and effective treatment. This secondary analysis aimed to assess the effect of a probiotic formulation in adult patients with depressive disorders depending on baseline

The intake of probiotics by people with depression may offer some improvement in **lowering CRP levels, especially in patients with comorbid MetS, liver abnormalities, or the use of antidepressants**. The future potential of probiotic supplementation in the management of depression seems to be targeted at individuals with comorbidities of metabolic diseases, particularly suspected liver steatosis. **Furthermore, patients treated with antidepressants may gain additional advantages from probiotic use, not only in terms of alleviating depression but also in decreasing inflammation.**

182

A psychobiotic formula to modulate the gut-brain-immune axis.



183

OMEGA-3
FISH OIL WITH
EPA + DHA

SUPPORTS:
Cognitive Function*
Heart Health*
Vision Longevity*
Skin Nourishment*

2300 mg

Bioligent

DIETARY SUPPLEMENT
120 CAPSULES | 30 DAY SUPPLY

SUPPLEMENT FACTS
Serving Size: 4 Capsules
Servings Per Container: 30

Amount per serving	% Daily Value
Omega 3 Fish Oil Concentrate	2300 mg
Total Omega-3 Fatty Acids as TG	1470 mg
Eicosapentaenoic Acid (EPA as TG)	820 mg
Docosahexaenoic Acid (DHA as TG)	650 mg

† Daily value not established

Other Ingredients: Veggie Capsule (Hydroxypropylmethyl Cellulose), Tocopherol, Silicon Dioxide

Contains: Fish (Anchovies, Mackerel, Sardines)

Caution: Those who are pregnant, breastfeeding, or who may have a known medical condition should consult a physician prior to taking a new supplement. Store in a cool, dry place.

Manufactured by: Bioligent LLC, South Falls, NY 13303 USA - Bioligent.com

Made in USA with variation of foreign and domestic materials

Suggested Use:
Adults take 4 capsules daily.

GLUTEN FREE
DAIRY FREE
NON-GMO

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

The developing brain or hippocampal neurons can synthesize and take up DHA and incorporate it into membrane phospholipids, especially phosphatidylethanolamine, resulting in enhanced neurite outgrowth, synaptogenesis and neurogenesis. **Exposure to n-3 fatty acids enhances synaptic plasticity by increasing long-term potentiation and synaptic protein expression to increase the dendritic spine density, number of c-Fos-positive neurons and neurogenesis in the hippocampus** for learning memory processing.

184

Berberine

- The data indicated that berberine ameliorated behavioral deficiency in transient middle cerebral artery occlusion rats through modulating microglia polarization and neuroinflammation depending on microbiota.
- **Berberine-induced H₂S production was responsible for vagus nerve stimulation**
- Enhanced vagus nerve activity following berberine treatment was blocked by antibiotic cocktails, capsazepine, or sodium molybdate, respectively.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

185

Received: 2 September 2023 | Revised: 8 March 2024 | Accepted: 19 April 2024
DOI: 10.1002/jbm.b.1496

RESEARCH ARTICLE

WILEY

Vagus nerve stimulated by microbiota-derived hydrogen sulfide mediates the regulation of berberine on microglia in transient middle cerebral artery occlusion rats

Sai-Jia Ni¹ | Zeng-Ying Yao¹ | Xiaotang Wei¹ | Xia Heng² | Shu-Yue Qu² | Xin Zhao² | Yi-Yu Qi² | Ping-Yuan Ge² | Cai-Ping Xu³ | Nian-Yun Yang² | Yi Cao⁴ | Hua-Xu Zhu⁵ | Rui Guo⁶ | Qi-Chun Zhang⁶

¹ Jiangsu Key Laboratory for Pharmacology and Safety Evaluation of Chinese Materia Medica, School of Pharmacy, Nanjing University of Chinese Medicine, Nanjing, China
² Jiangsu Key Laboratory for High Technology Research of TCM Formulae, Nanjing University of Chinese Medicine, Nanjing, China
³ Nanjing Shengli Biotech Co., Ltd., Nanjing, China
⁴ Institute of Literature in Chinese Medicine, Nanjing University of Chinese Medicine, Nanjing, China

Abstract
Amelioration of neuroinflammation via modulating microglia is a promising approach for cerebral ischemia therapy. The aim of the present study was to explore gut-brain axis signals in berberine-modulating microglia polarization following cerebral ischemia. The potential pathway was determined through analyzing the activation of the vagus nerve, hydrogen sulfide (H₂S) metabolism, and cysteine peroxylsides of transient receptor potential vanilloid 1 (TRPV1) receptor. The cerebral microenvironment feature was explored with a metabolomics assay. The data indicated that berberine ameliorated behavioral deficiency in transient middle cerebral artery occlusion rats through modulating



ELSEVIER

Contents lists available at ScienceDirect

Biomedicine & Pharmacotherapy

journal homepage: www.elsevier.com/locate/bioph



Effects of berberine and metformin on intestinal inflammation and gut microbiome composition in db/db mice

Wang Zhang^{a,b}, Ji-Hao Xu^a, Tao Yu^a, Qi-Kui Chen^{a,*}

^a Department of Gastroenterology, Sun Yat-Sen Memorial Hospital, Sun Yat-Sen University, 107 Yan Jiang Xi Road, Guangzhou, Guangdong, 510120, PR China

^b Department of Gastroenterology, The Second Affiliated Hospital of Guangzhou University of Chinese Medicine, 111 Da De Road, Guangzhou, Guangdong, 510120, PR China



ARTICLE INFO

Keywords:

Berberine
Metformin
Intestinal inflammation
Intestinal barrier
Gut microbes

ABSTRACT

Berberine and metformin, both established pharmaceutical agents with herbal origins, have incidental beneficial effects on multiple diseases, including diabetes. These effects have been speculated to occur via the gut microbiome. In this study, we administered either berberine or metformin to db/db mice and investigated changes in body weight, food intake, and blood glucose levels. Fresh stool samples were analyzed using 16S rDNA high-throughput sequencing to evaluate the gut microbiome. Short-chain fatty acids (SCFA) in the stool were quantified using gas chromatography. The expression of NF-κB signaling pathway and tight junction (ZO1 and occludin) proteins in the intestinal epithelium was determined using qPCR and western blotting. The intestinal

186



HORMONE SUPPORT

Modulates androgen to estrogen levels

CHOLESTEROL REGULATION

Improves the absorption of cholesterol

WEIGHT MANAGEMENT

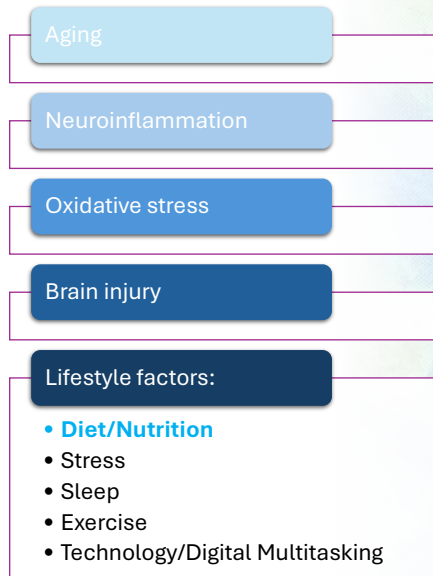
Promotes thermogenesis

BLOOD SUGAR BALANCE

Regulates insulin sensitivity



187



Copyright 2026 Dr. Monika Buerger. All rights reserved.

188

Targeted Neuronutrition

- Acetylcholine modulation
- Specific strain probiotics
- Microglia modulators

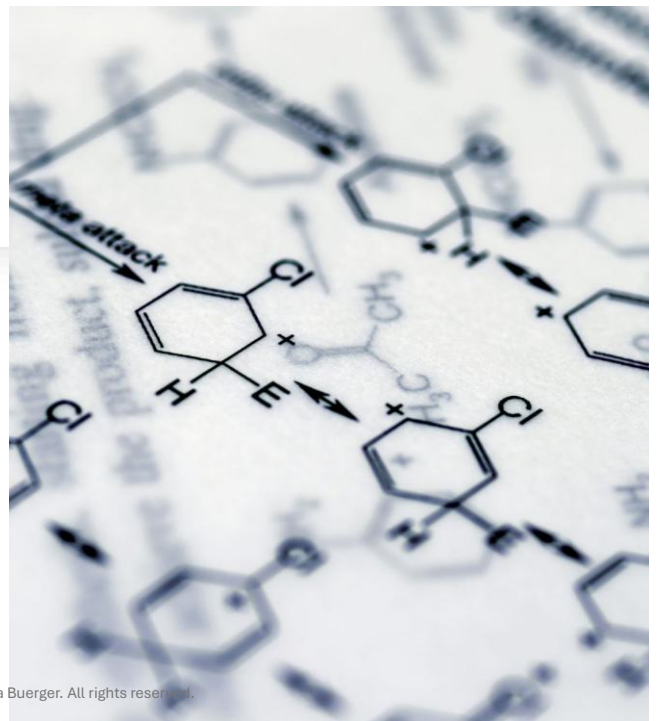


Copyright 2026 Dr. Monika Buerger. All rights reserved.

189

Acetylcholine Modulation

- Choline
- Huperzine A
- BSO (Thymoquinone)



Copyright 2026 Dr. Monika Buerger. All rights reserved.

190

BSO (Thymoquinone)



INHIBITION OF ACHE: INHIBITS ACHE, AN ENZYME FOUND IN SYNAPTIC GAPS AND NEUROMUSCULAR JUNCTIONS.



REVERSING ANTIBIOTIC-INDUCED ACHE
DYSREGULATION: REVERSES CHRONIC ANTIBIOTIC-INDUCED ACHE DYSREGULATION.



POTENTIAL TREATMENT FOR MEMORY DYSFUNCTION: MAY BE A POTENTIAL TREATMENT FOR MEMORY DYSFUNCTION.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

191

Thymoquinone (Black Seed Oil)

KNOWN AS A NEUROPROTECTANT AND MODULATOR OF THE CHOLINERGIC ANTI-INFLAMMATORY PATHWAY!



IMMUNE DEFENSE
POWERFUL ANTI-OXIDANT & ANTIMICROBIAL

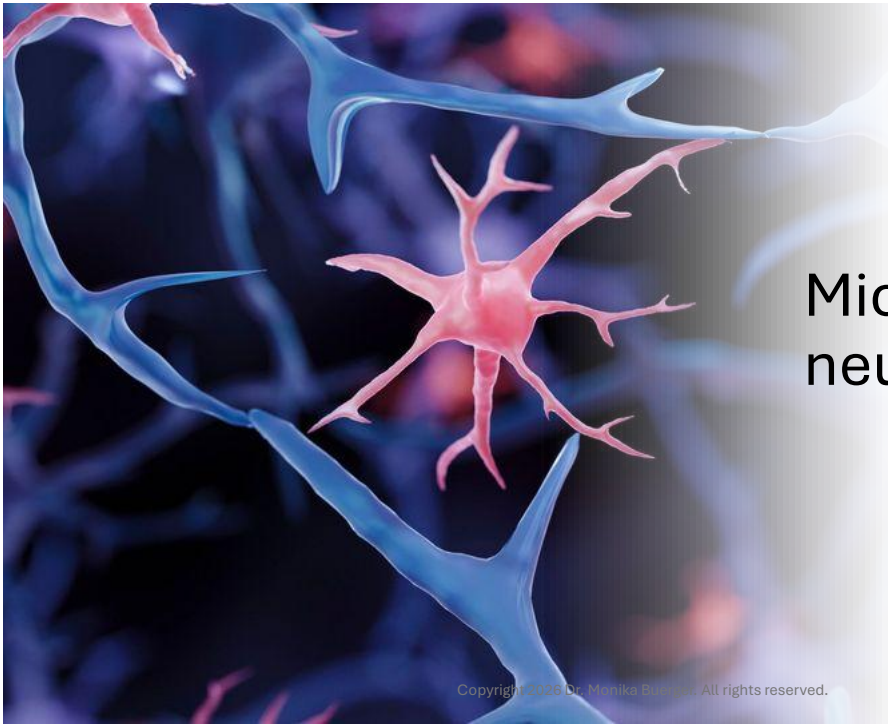
INFLAMMATION RELIEF
SUPPORTS THE CHOLINERGIC ANTI-INFLAMMATORY SYSTEM

METABOLIC SUPPORT
OPTIMIZES BLOOD SUGAR REGULATION

DIGESTIVE AID
EFFECTIVE FOR A VARIETY OF DIGESTIVE TRACT CONDITIONS

Copyright 2020 Dr. Monika Buerger. All rights reserved.

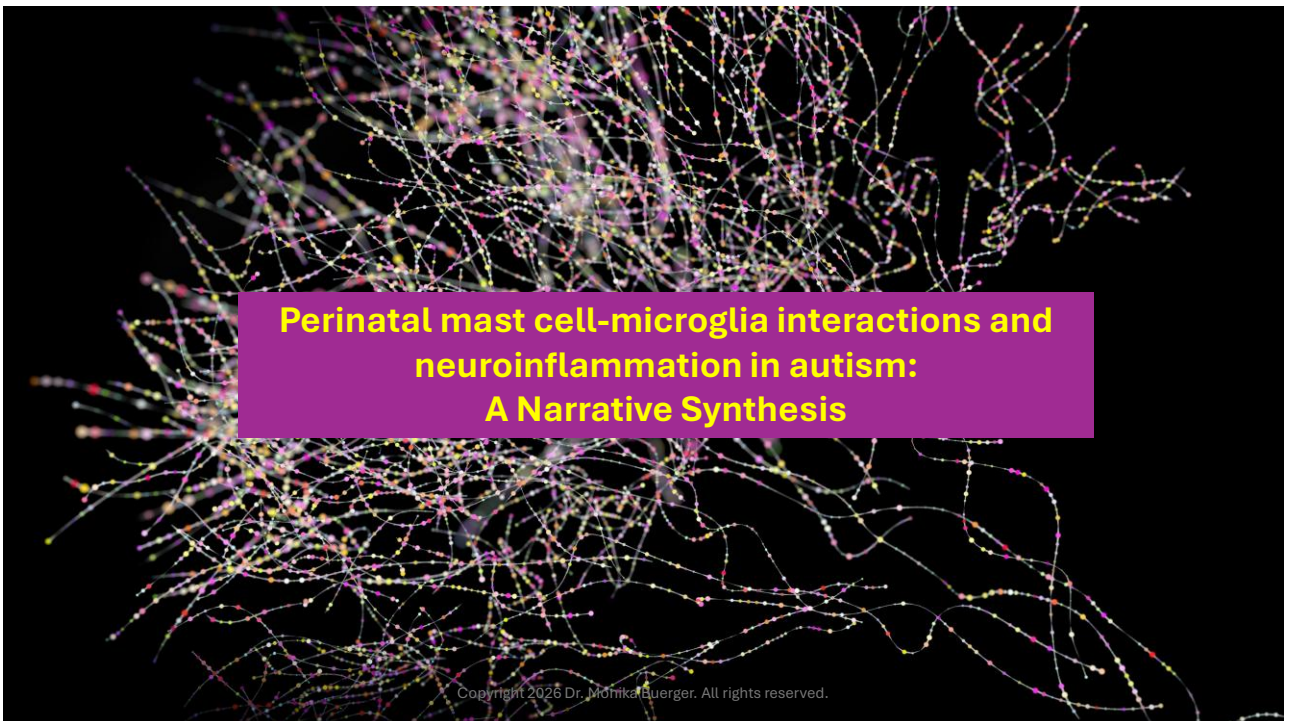
192



Microglia and neurogenesis

Copyright 2026 Dr. Monika Buerger. All rights reserved.

193

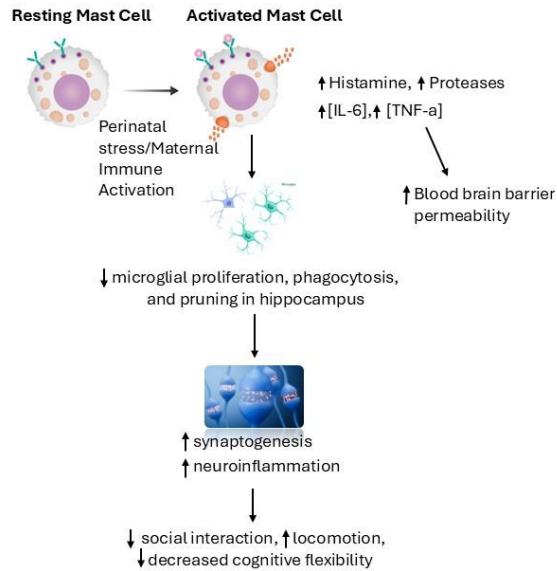




Perinatal mast cell-microglia interactions and neuroinflammation in autism: A Narrative Synthesis

Copyright 2026 Dr. Monika Buerger. All rights reserved.

194

Potential Pathogenic Mechanism of Mast Cell Activation and Autism



 = phagocytic microglia
 = proliferating microglia

M. Buerger (2025)

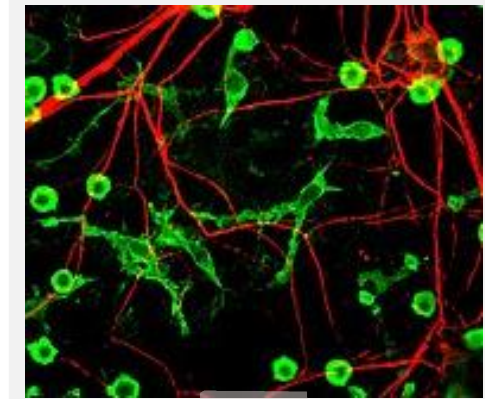
195

Neuroglia

Microglia (M1 & M2)

Astrocytes

Oligodendrocytes



Copyright 2026 Dr. Monika Buerger. All rights reserved.

196



Vagus nerve stimulation mediates microglia M1/2 polarization via inhibition of TLR4 pathway after ischemic stroke

Liping Zhang^{a,1}, Yilin Liu^{a,1}, Sanrong Wang^a, Lu Long^a, Qianwen Zang^a, Jingxi Ma^{b,c},
Lehua Yu^a, Gongwei Jia^{a,*}

^a Department of Rehabilitation, The Second Affiliated Hospital of Chongqing Medical University, Chongqing, 400010, China

^b Department of Neurology, Chongqing General Hospital, University of Chinese Academy of Sciences, Chongqing, 400010, China

^c Chongqing Key Laboratory of Neurodegenerative Diseases, Chongqing, 400013, China



ARTICLE INFO

Article history:
Received 21 August 2021

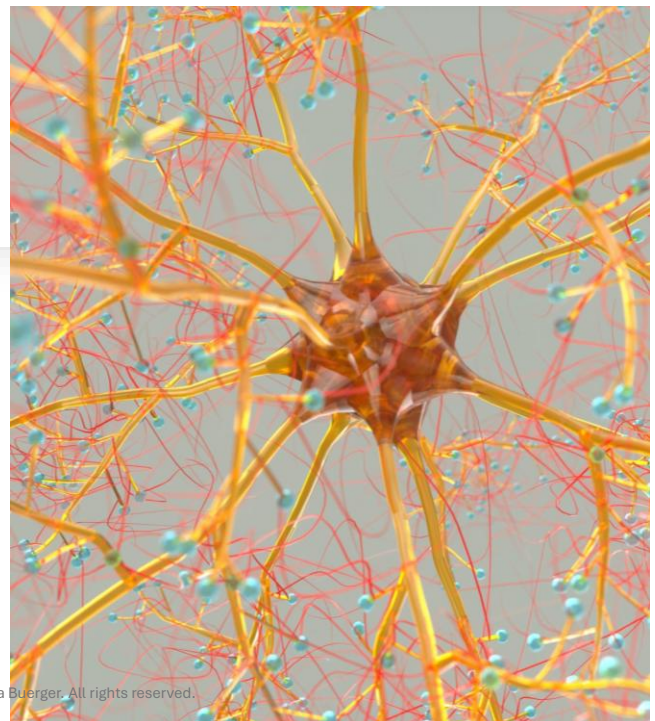
ABSTRACT

Ischemic stroke is the leading cause of death and disability. Microglia are polarized toward the pro-inflammatory M1 phenotype and neuroprotective M2 phenotype after stroke and play an important role in
Copyright 2026 Dr. Monika Buerger. All rights reserved.

197

Microglia Modulators

- Thymoquinone (BSO)
- Andrographolide
- Sulforaphane
- Resveratrol
- Curcumin
- Oregano
- N-Acetylcysteine



Copyright 2026 Dr. Monika Buerger. All rights reserved.

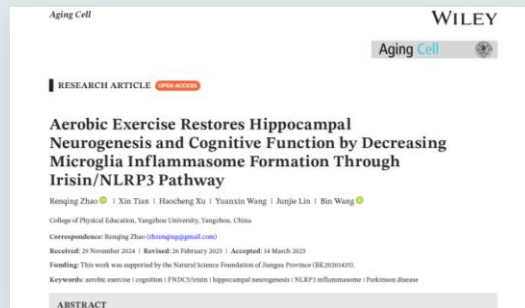
198

Exercise & Cellular Energy



Copyright 2026 Dr. Monika Buerger. All rights reserved.

199



Copyright 2026 Dr. Monika Buerger. All rights reserved.

200

Mitochondria



201

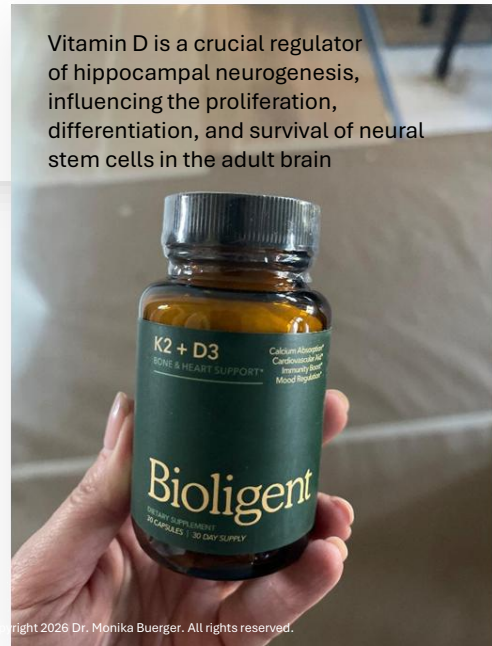
Hormones



202

Higher serum levels of 25-hydroxyvitamin D in midlife were tied to lower levels of subsequent tau pathology, an Alzheimer's disease biomarker.

Neurology, June 2026



Copyright 2026 Dr. Monika Buerger. All rights reserved.

203

Estrogen

Estrogen plays a significant role in regulating the stress response, particularly through its influence on neurogenesis in the ventral hippocampus. **Estrogen's impact on the ventral hippocampus**, a brain region involved in emotional processing and stress regulation, is linked to its ability to modulate neuroplasticity and influence the way the brain responds to stress.

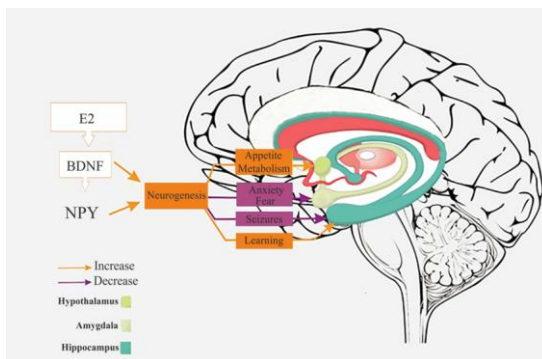
Copyright 2026 Dr. Monika Buerger. All rights reserved.

204

Estrogen significantly impacts choline metabolism, primarily by inducing the enzyme phosphatidylethanolamine N-methyltransferase (PEMT), which is crucial for synthesizing phosphatidylcholine, a major source of choline.

Copyright 2026 Dr. Monika Buerger. All rights reserved.

205



The **estrous cycle affects hippocampus-dependent behaviors, including ventral hippocampus-dependent anxiety indices and performance in dorsal hippocampus-dependent learning and memory tasks.**

Experiments leveraging hormone administration demonstrate that estrogen acts as an anxiolytic, and the bulk of evidence indicates that estrogen also facilitates improvements in learning and memory tasks. Importantly, the observation that intra-hippocampal manipulations of ovarian hormones in rodents can affect indices of anxiety and learning and memory suggests that the cycling ovarian hormones impact hippocampus-dependent behaviors through their local actions on hippocampal cells.

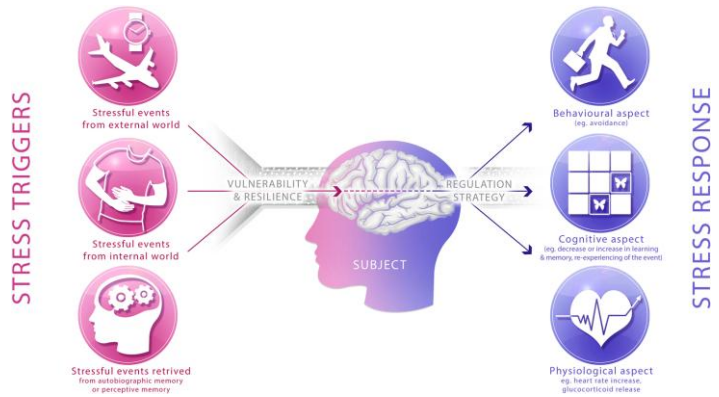
Copyright 2026 Dr. Monika Buerger. All rights reserved.

Rock & Kundakovic (2022)

206

Progesterone

- Progesterone can modulate the stress response by reducing anxiety.
- The ventral hippocampus is particularly important in regulating stress and emotion.
- Chronic stress has been shown to reduce adult hippocampal neurogenesis, particularly in the ventral hippocampus.
- Progesterone's ability to normalize the levels of cell proliferation and cell death in the dentate gyrus after TBI suggests a role in maintaining neurogenic homeostasis in the hippocampus following stress or injury.

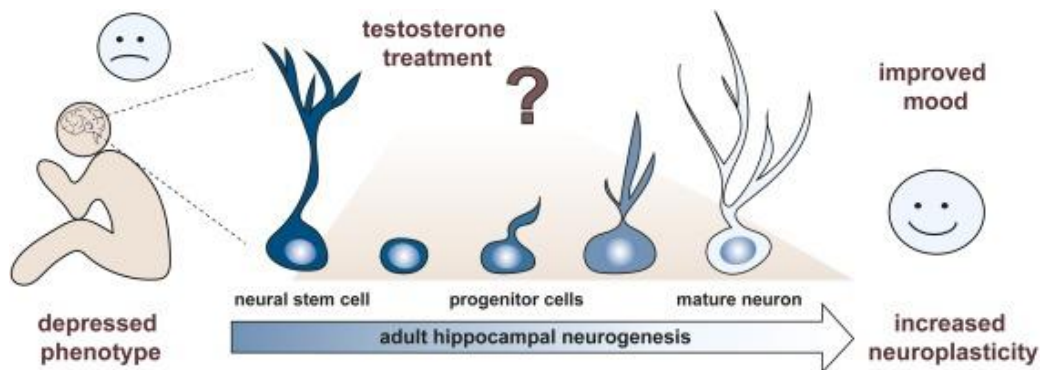


Copyright 2026 Dr. Monika Buerger. All rights reserved.

207

Testosterone

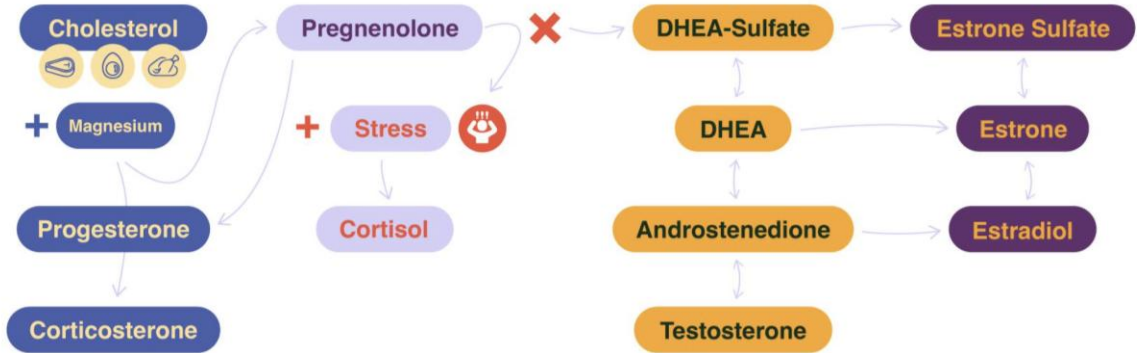
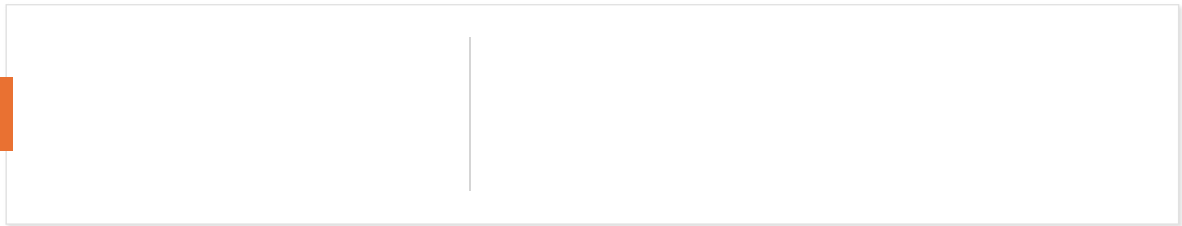
Testosterone increases adult neurogenesis within the dentate gyrus region of the hippocampus through an androgen-dependent pathway. Most evidence indicates that androgens selectively enhance the survival of newly generated neurons, while having little effect on cell proliferation.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

Spritzer & Roy (2020)

208



Copyright 2026 Dr. Monika Buerger. All rights reserved.

209



SLEEP AND SELF-REGULATION



EMOTIONS AND MENTAL HEALTH



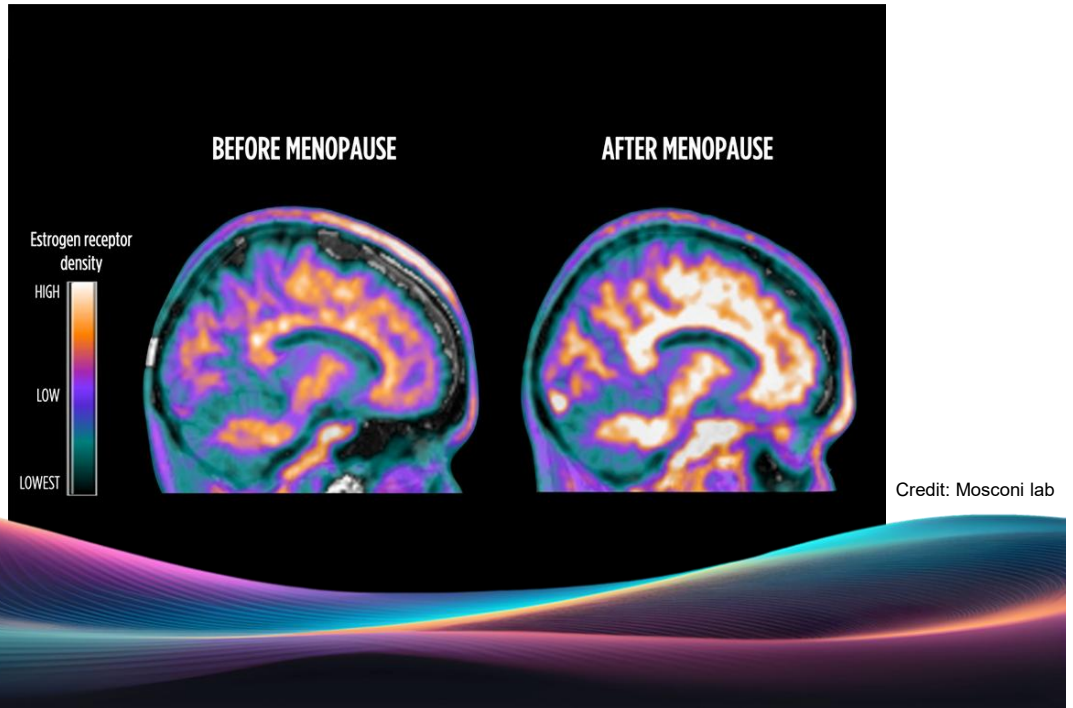
ALTERED PAIN PERCEPTION



HEIGHTENED SENSORY PERCEPTION

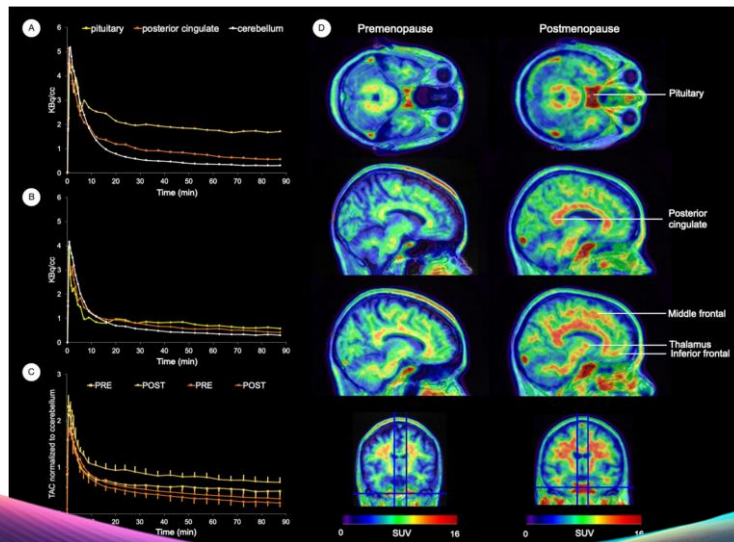


210



211

Scientific Reports (Sci Rep) ISSN 2045-2322 (online)



212

Stress Support & Histamine Support a Blended Duo

SUPPLEMENT FACTS	
Serving Size: 3 Capsules	
Servings Per Container: 30	
Amount per serving	% Daily Value
Pantothenic Acid (as Calcium Pantothenate)	100 mg 2000%
Magnesium (as Magnesium Bisglycinate)	100 mg 24%
Eleutherococcus Extract (Eleutherococcus senticosus) (root)	200 mg †
Holy Basil (Ocimum sanctum) Extract 10:1 (leaf)	200 mg †
Lemon Balm (Melissa officinalis) Extract 4:1 (Aerial)	100 mg †
Passion Flower (Passiflora incarnata) Extract (Aerial)	100 mg †
Rhodiola rosea Extract (root) (Std. for 3% Salidroside & 1% Rosavins)	50 mg †


† Daily value not established

Other Ingredients: White Rice Flour, Vegetable Capsule (Hypromellose), Stearic Acid, Silicon Dioxide

Caution: Those who are pregnant, breastfeeding, or who may have a known medical condition should consult a physician prior to taking a new supplement. Store in a cool, dry place

Manufactured for: Bioligent LLC, Idaho Falls, ID 83404 USA - Bioligent.com

Made in USA with variation of foreign and domestic materials




TRACEABLE
INGREDIENTS



BIOAVAILABLE
FORMULAS



NO HIDDEN
POTCHAS



MADE IN
THE USA



213

Saffron

Therapeutic effects of saffron (*Crocus sativus* L) on female reproductive system disorders: A systematic review

Fatemeh Saeed Hacheimtrab^{1,2} | Maryam Azimi³ | Mahboobeh Ranjandeh⁴

Abstract
The effect of Crocus sativus on several disorders has been discussed in great detail. Due to the efficacy of this herb on the female reproductive system, we have been well-informed in this regard. This systematic review comprehensively discussed the efficacy of C. sativus and its phytochemical compounds on the female reproductive system and its disorders for the first time. In this systematic review, scientific evidence, including PubMed, Web of Science, Google Scholar, Scopus, and Science Direct, Informative Database, were explored thoroughly. In vitro, cell, and human studies published until the end of June 2020, which had investigated the pharmacological properties of C. sativus, crocin, crocetin, safranal, or picrocrocin on the female reproductive system, were selected. A total of 20 studies conducted on the effect of C. sativus on the female reproductive system were analyzed. These studies confirmed the efficacy of C. sativus on the male reproductive system. In several aspects of the female reproductive system, including regulation of sex hormones, follicular cell, ovulation, and protection of the ovary and uterus against ovarian oxidative stress. Several clinical studies indicated that this herb can also relieve the severe forms of patients suffering from dysmenorrhea, premenstrual syndrome, menopause, uterine artery blood flow (UAE), and sexual dysfunction. Furthermore, it is a promising candidate for future studies in even more significant medical and clinical cases. This review concludes that C. sativus can improve the symptoms of several female reproductive system disorders, which is particularly due to the presence of phytochemical compounds such as crocin, crocetin, and safranal.

KEY WORDS:
Crocus sativus, Crocus sativus, Female reproductive system, systematic review.



214





HORMONE SUPPORT
Modulates androgen to estrogen levels

CHOLESTEROL REGULATION
Improves the absorption of cholesterol

WEIGHT MANAGEMENT
Promotes thermogenesis

BLOOD SUGAR BALANCE
Regulates insulin sensitivity



215



Reduces Cravings & Food Noise



Supports Healthy Blood Sugar & Energy



Boosts Natural GLP-1 Production



Targets Metabolism from Multiple Angles

Copyright 2026 Dr. Monika Buerger. All rights reserved.

216

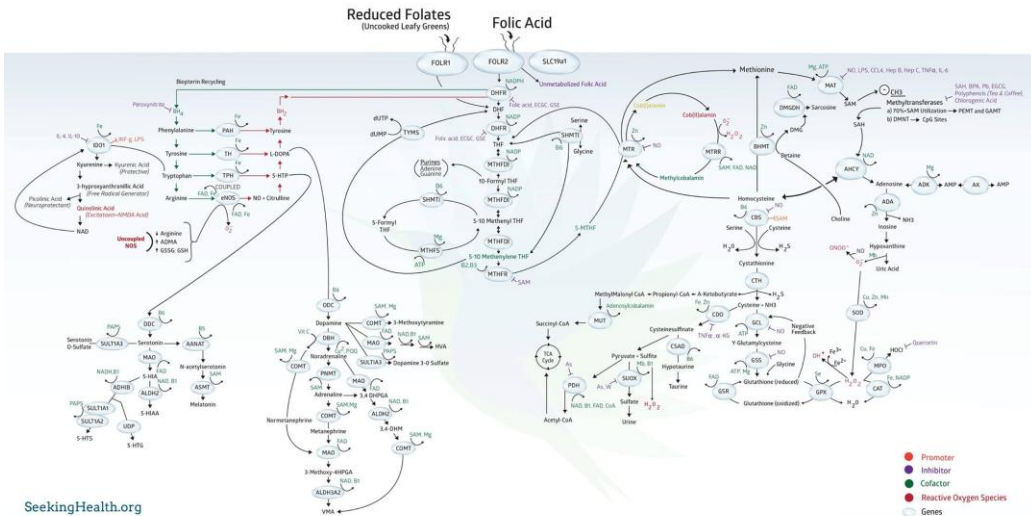


Copyright 2026 Dr. Monika Bueger. All rights reserved.

217



Pathway Planner



SeekingHealth.org

Copyright 2026 Dr. Monika Bueger. All rights reserved.

218

Daily multivitamin may slow biological aging



219



220

It's time to CHANGE the CONVERSATION



221

READY. SET. GO!



222



Copyright 2026 Dr. Monika Buerger. All rights reserved.

#1

CHIROPRACTIC and the BRAIN

Own the Connection
& Conversation!



223

#2

Providing care from a
trauma-informed lens

A **whole-person** approach to health care that acknowledges the impact of trauma on health and is inherently **patient-centered**. Past experiences can trigger a **PTSD-like response**, factoring into how an individual responds to care.



Copyright 2026 Dr. Monika Buerger. All rights reserved.

224



Give the gift of **PURPOSE**....

#3

Live a life of purpose, **ON PURPOSE!**

Copyright 2026 Dr. Monika Buerger. All rights reserved.



225

Come **Passion**




Copyright 2026 Dr. Monika Buerger

226

The Elite Retreat **BIOLOGY** IN **ACTION**

LEARN:

- FUNCTIONAL LAB VALUES
- EASY FUNCTIONAL NUTRITION PROTOCOLS
- NERVOUS SYSTEM REGULATION TECHNIQUES
- MORE!



12 hours of CE Credit*

Trainings by Dr. Monika Buerger

Registration Coming Soon!

*SEE REGISTRATION SITE FOR DETAILS

Copyright 2026 Dr. Monika Buerger. All rights reserved.

227

Foundations of Neurodevelopment: Six Pillars

*The most successful
Certification Program uniquely founded
on subluxation-based principles.*

Coupon Code: DRB100



r. All rights reserved.

228



229



230