Platinum Live Zoom August 2025

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Chiropractic Care, Depression and Anxiety

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The neurobiology of stress: Vulnerability, resilience, and major depression

“The Second Pandemic

Over the past few years, the perceived level of psychological stress has risen dramatically across the globe due to a combination of events including the long-lasting Covid-19 pandemic, civil unrest, escalation of political instability across the globe, and climate change that has triggered major environmental and economic perturbations. The consequences of this broad-scale increase in stress are only beginning to be appreciated, but evidence suggests that we are facing a second pandemic of mood and anxiety disorders, including major depression, anxiety, and posttraumatic stress disorder (PTSD).”

(Akil and Nestler 2023)

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Depression

- Major depressive disorder (MDD) is one of the leading contributors to disability worldwide and affects 1 in 7 people during their lifetime.
- MDD is the most common psychiatric diagnosis in people who die by suicide.
- Up to 30% of people with MDD do not respond to first line treatments, highlighting the need for novel treatment options.
- In particular, co-morbid anxiety disorder is relatively common in MDD and is associated with poorer functional outcomes, increased suicidality, and greater illness chronicity, as well as greater resistance to current treatments

(Briley, Webster et al. 2022

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Anxiety

- Anxiety disorders comprise some of the most common mental health conditions
- An estimated 4.05% of the global population has an anxiety disorder
- The number of persons affected has increased by more than 55% from 1990 to 2019.
- Portugal has the highest prevalence (8,671 cases per 100,000), followed by Brazil, Iran, and New Zealand.
- Women are 1.66 times more likely to be affected by anxiety disorders than men.

(Javaid, Hashim et al. 2023)

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Outline

- Clinical research about chiropractic care for people with depression and/or anxiety
  - i.e. studies that can help us know if chiropractic care helps people who suffer with anxiety or depression to feel better
- Basic science research about chiropractic care for people with depression and/or anxiety
  - i.e. how might chiropractic care actually be able to help someone with anxiety or depression?

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Different Research Methodologies are like different rooms in a house

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Basic Science Research
Exploring how an intervention might impact physiology and/or a condition
E.g. why or how might chiropractic adjustments improve depression or anxiety symptoms

Clinical Research
Testing the safety and efficacy of an intervention for a condition
E.g. how safe and effective is chiropractic care at helping those with depression/anxiety feel better

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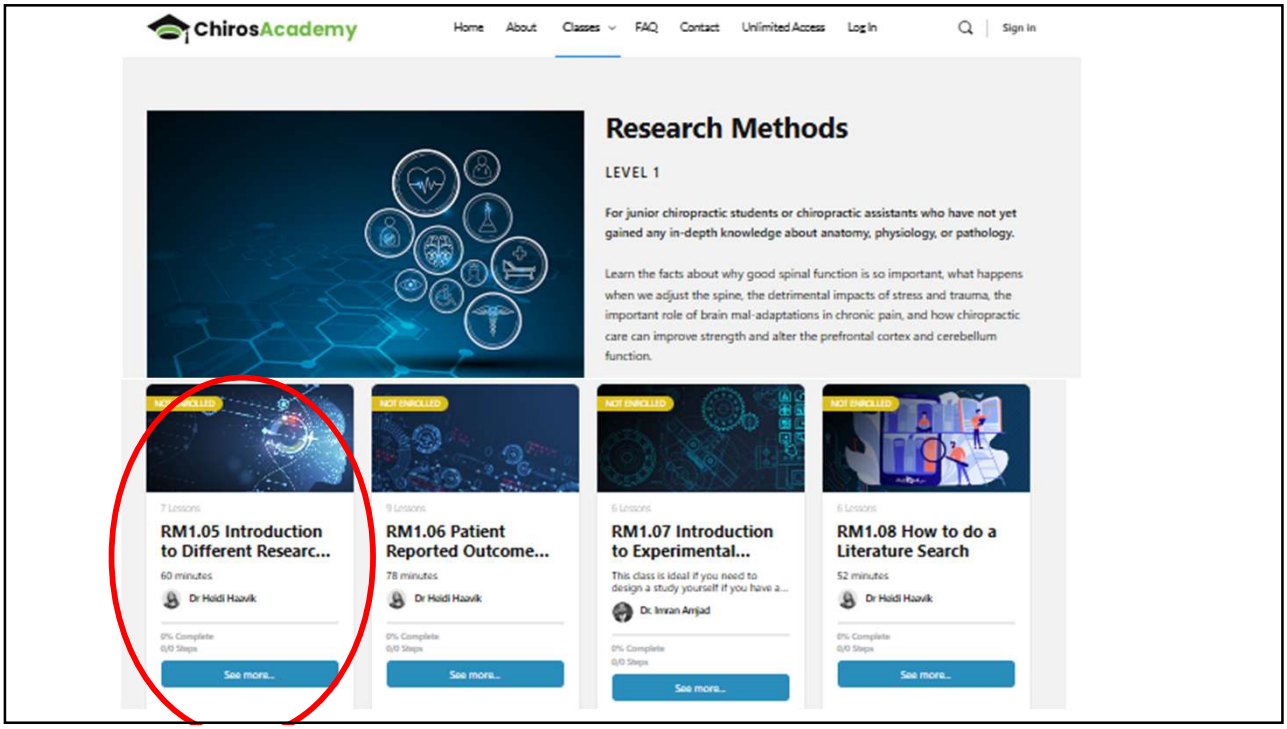

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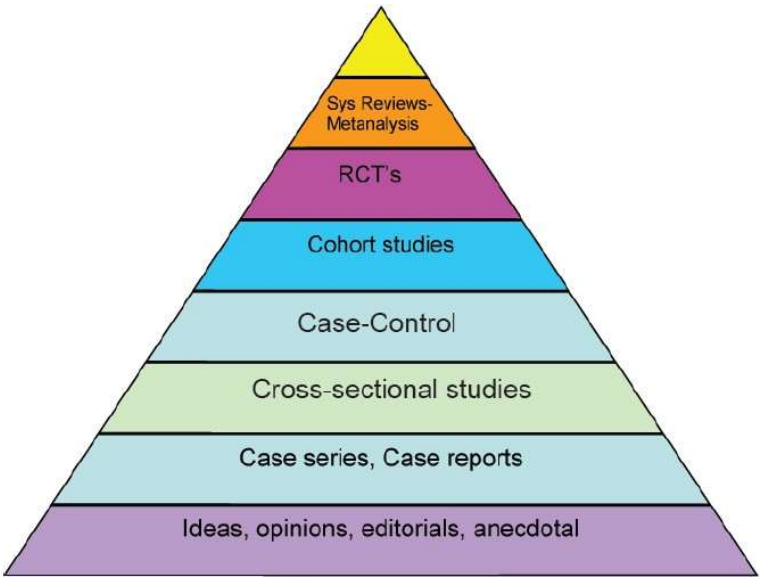
The Hierarchy of CLINICAL research evidence



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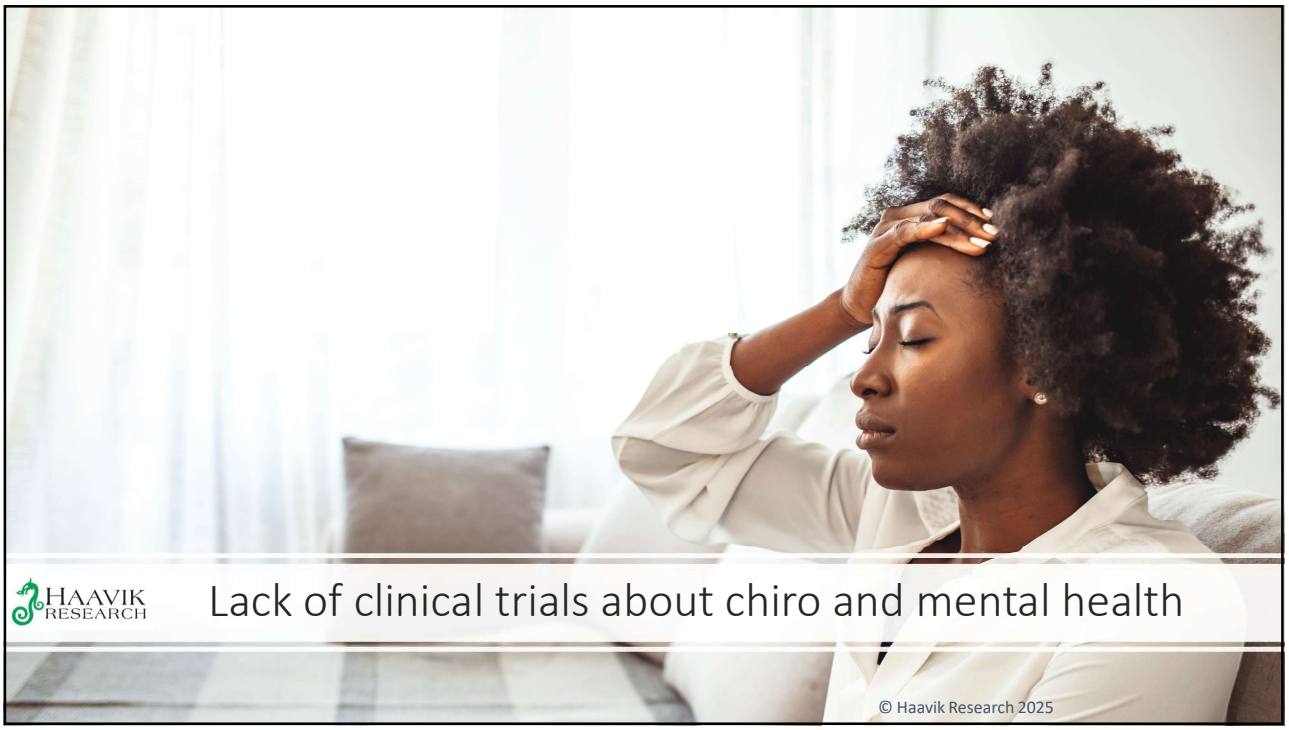

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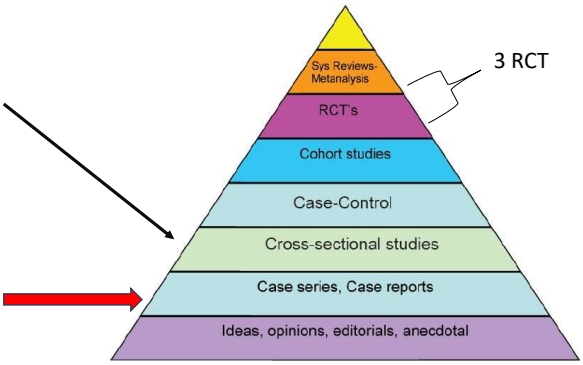
Chiropractic Care and Mental Health

- Most of the published literature centers around case reports or series.
- 3 RCTs in chronic pain populations:
  - 2 sig changes in mental health – 1 not
- One large Survey (i.e. cross sectional)
- One prospective observational study



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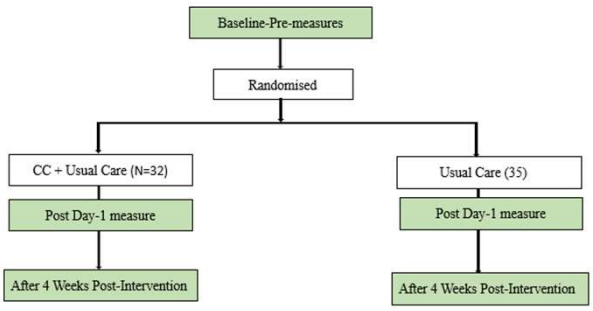
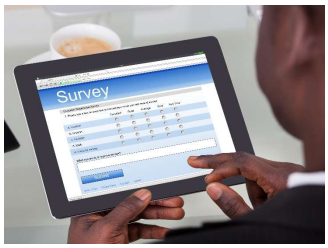
4 week Randomised Controlled Trial

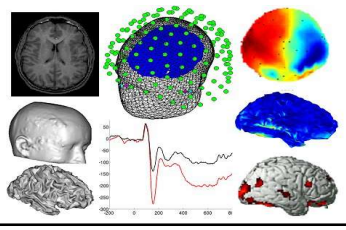


PROMIS-29 v2.0 profile



HR, HRV, Sleep, Activity

64 channel EEG



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The Research Team

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NZCC

Dr Samran Navid, PhD
NZCC

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Questionnaire Results

Control Group

NO significant changes at all

Chiropractic Group

- Improved QOL overall
- Improved Physical function
- Less Depression
- Less anxiety
- Less Fatigue
- Less pain interference
- Less pain intensity

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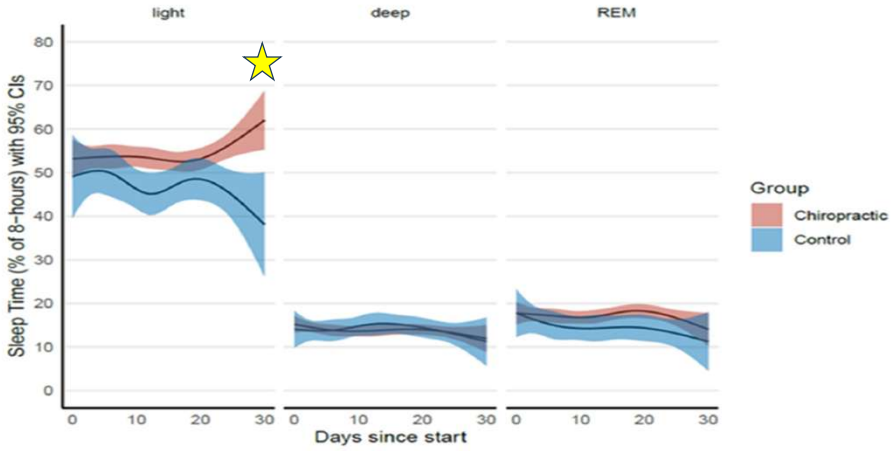
Fitbit Results



- Fitbit data revealed that the light sleep stage significantly increased in duration in the chiropractic group over the four weeks of this study.

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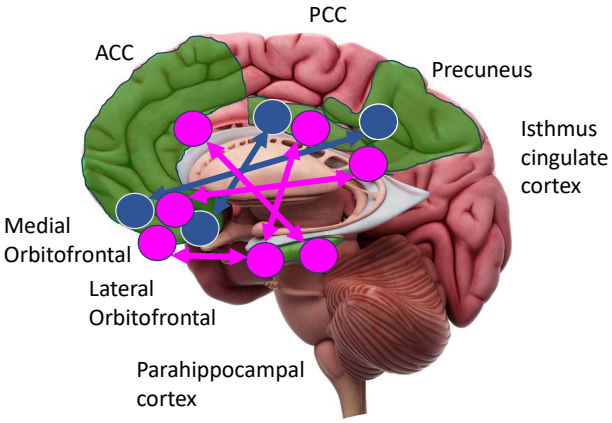
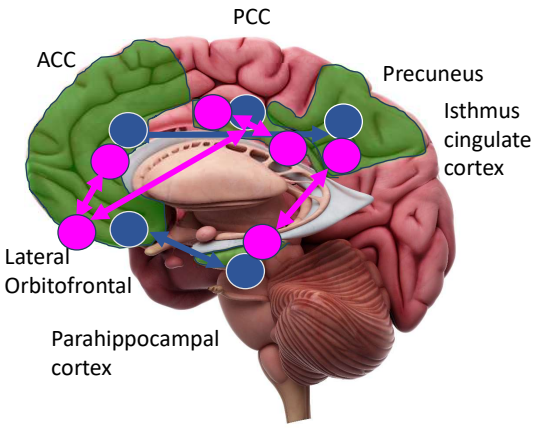
DMN changes after Chiro Care

Pre and Post Chiro



Pre and Post 4 weeks Chiro



(Haavik et al 2024, Brain Sciences)

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Health-related quality of life among United States service members with low back pain receiving usual care plus chiropractic care vs usual care alone: Secondary outcomes of a pragmatic clinical trial

- All aspects of HRQOL measured in this study (**including physical function, pain interference, sleep disturbance, anxiety, depression, and satisfaction with social role**) were significantly improved with chiropractic care compared to usual care only.
- The largest effects were for pain (pain interference, worst pain intensity in the past 24hours, pain composite, and pain intensity item).
- While the positive effects found with mental health measures (in chiro group) were statistically significant, the differences between groups were small and below the minimally important difference estimated for similar PROMIS measures
  - (e.g., at 12weeks post-baseline depression and anxiety scale scores differed by about 1T-score point)

(Hays, Shannon, Long, Spritzer, Vining, Coulter, Pohlman, Walter, Goertz, 2022)

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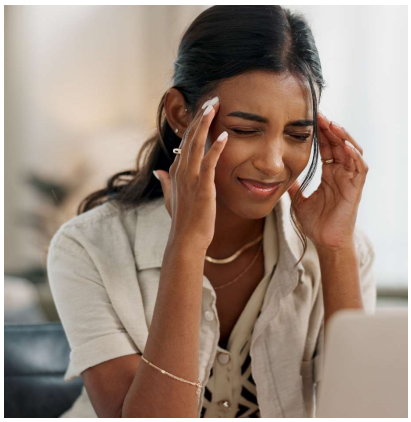
Efficacy of manual therapy on anxiety and depression in patients with tension-type headache. A RCT

- This study tested whether different kinds of manual therapy could help reduce anxiety and depression in patients with tension-type headaches (TTH)
- 84 people with tension-type headaches; 4 groups; soft tissue technique, articulatory technique, both soft tissue and articulatory technique and control
- Treatments over 4 weeks → assessed right after treatment and again 1 month later.
- Looked at changes in anxiety (trait and state) and depression

Results: All treatments resulted in a 'moderate' reduction of psychological symptoms associated with TTH

Conclusion: Treatments including an articulatory technique showed a greater efficacy than a soft tissue technique, or a combination of both, for the reduction of TTH-related anxiety and depression levels in these participants.



(Espí-López, López-Bueno et al. 2016)

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Efficacy of manual therapy on anxiety and depression in patients with tension-type headache. A RCT

- "The *suboccipital technique* (ST) aims to relieve affected sub-occipital muscle dysfunction associated with tension-type headaches as these structures may contribute to mobility dysfunction of the occiput-atlas-axis joint"
- "The *articulatory technique* (AT) was administered to correct and restore the mobility of joints between occiput, atlas and axis. This technique was conducted in the same position as the ST technique (supine position), bilaterally and in two phases that lasted 5 min in all. First, a gentle cephalic decompression as described by Espı´-Lo´pez et al.23 was applied, followed by small circumduction searching for the joint barrier in rotation through selective tension. Second, a high-velocity thrust manipulation in occiput-atlas-axis (OAA) was conducted, performing a cranially directed rotation towards the same side as the circumduction and around a vertical axis passing through the axis, without cervical flexion or extension and minimal side-bending"

(Espí-López, López-Bueno et al. 2016)

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Group and Individual-level Change on Health-related Quality of Life in Chiropractic Patients with Chronic Low Back or Neck Pain

- **Prospective observational study:** To evaluate group-level and individual-level change in health-related quality of life among persons with chronic low back pain or neck pain receiving chiropractic care in the United States
- A 3-month longitudinal study of 2,024 patients with chronic low back pain or neck pain receiving care from 125 chiropractic clinics at 6 locations throughout the United States was conducted
- Chiropractic care was associated with significant improvements on all PROMIS-29 v2.0 measures *except emotional distress* in this sample of patients with chronic low back pain or neck pain.
- The largest mean improvements were observed for **pain, sleep disturbance**, the PROMIS-29 v2.0 **mental health summary score** (weighted combination of fatigue, emotional distress, ability to participant in social roles and activities and sleep disturbance), **social health**, and **fatigue**.
- These improvements over 3 months are consistent with prior estimates of minimally important group-level differences of about 2–3 points for PROMIS measures

(Hays, Spritzer et al. 2019)

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The Prevalence, Patterns, and Predictors of Chiropractic Use Among US Adults

- Cross-sectional data from the 2012 National Health Interview Survey (n¼34,525) were analyzed to examine the lifetime and 12-month prevalence and utilization patterns of chiropractic use, profile of chiropractic users, and health-related predictors of chiropractic consultations

(Adams, Peng et al. 2017)

TABLE 2. Reasons for Using Chiropractic, Changes Owing to Chiropractic and Disclosure to Personal Health Care Provider

Did chiropractic lead to	
Give a sense of control over health	32.5 (30.7–34.3)
Help to reduce stress level or to relax	40.2 (38.4–42.1)
Help to sleep better	41.9 (40.0–43.8)
Helps to feel better emotionally	27.4 (25.7–29.1)
Make it easier to cope with health problems	38.5 (36.6–40.4)
Improve overall health and make you feel better	66.9 (65.1–68.7)
Improve your relationships with others	13.3 (12.0–14.6)
Improve attendance at job or school	17.0 (15.4–18.6)
How important was chiropractic for maintaining health and well-being	
Very important	47.9 (45.9–49.8)
Somewhat important	29.6 (27.8–31.3)
Slightly important	13.9 (12.6–15.2)
Not at all important	8.7 (7.6–9.8)
Used chiropractic for a specific health problem (top health problem)	66.9 (65.1–68.7)

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E.g. how safe and effective is chiropractic care at helping those with depression/anxiety feel better

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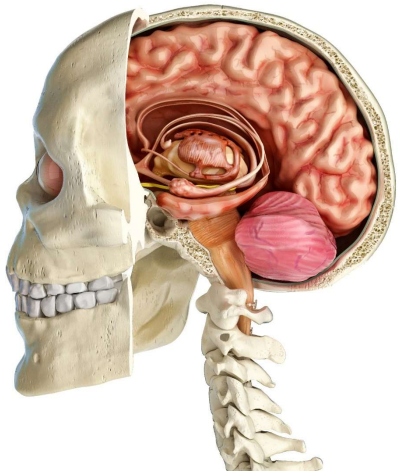
So according to the BRAIN model How might chiropractic care alter mental health?

- Because chiropractic adjustments (of vertebral subluxations) alters brain regions that are essential for feeling good, for emotional resilience and good mental health



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The Brain, Anxiety and Depression

- Key factors to consider regarding the mechanisms of depression and anxiety are (Bisgaard, Allin et al. 2022):
  - Pro-inflammatory cytokines (consider Gut dysbiosis, diet)
  - Vagal nerve signaling (PSN)
  - Genetics
  - Changes in brain signaling and morphology

- Many neurobiological and neuroendocrinological studies have reported alterations in **prefrontal–limbic pathways** (including amygdala and hippocampus), **serotonergic projections** and the **hypothalamic–pituitary–adrenal (HPA) axis** (Chen 2022; Ghasemi, Navidhamidi et al. 2022)
- Studies have also found Depression and Anxiety are linked with plastic changes in the **Default Mode Network** (Briley, Webster et al. 2022; Menon, 2011)

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Triple Brain Network and Psychopathology

The science of large-scale brain networks offers a powerful paradigm for investigating cognitive and affective dysfunction in psychiatric and neurological disorders. This review examines recent conceptual and methodological developments which are contributing to a paradigm shift in the study of psychopathology. I summarize methods for characterizing aberrant brain networks and demonstrate how network analysis provides novel insights into dysfunctional brain architecture. Deficits in access, engagement and disengagement of large-scale neurocognitive networks are shown to play a prominent role in several disorders including schizophrenia, depression, anxiety, dementia and autism. Synthesizing recent research, I propose a triple network model of aberrant saliency mapping and cognitive dysfunction in psychopathology, emphasizing the surprising parallels that are beginning to emerge across psychiatric and neurological disorders.

(Menon 2011)

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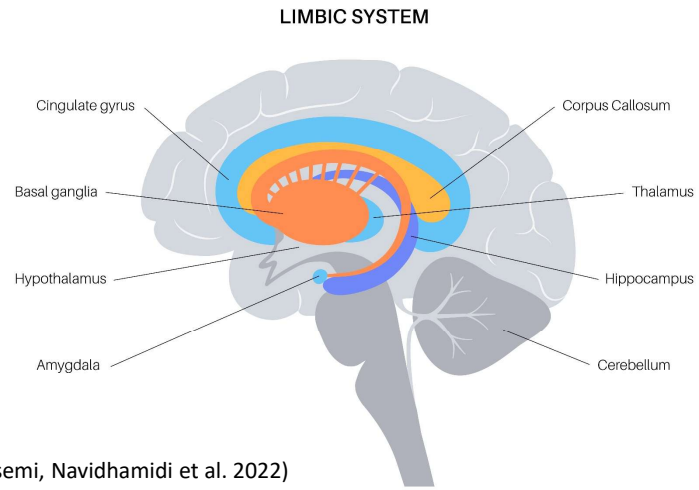
"Anxiety and hippocampal neuronal activity: Relationship and potential mechanisms."

- "The hippocampus has been implicated in modulating anxiety.
- It interacts with a variety of brain regions, *regulating emotion and stress responses* and adjusting anxiety levels in response to a variety of stressful conditions
  - *prefrontal cortex*
  - *amygdala*
  - *hypothalamus*
  - *nucleus accumbens*



(Ghasemi, Navidhamidi et al. 2022)

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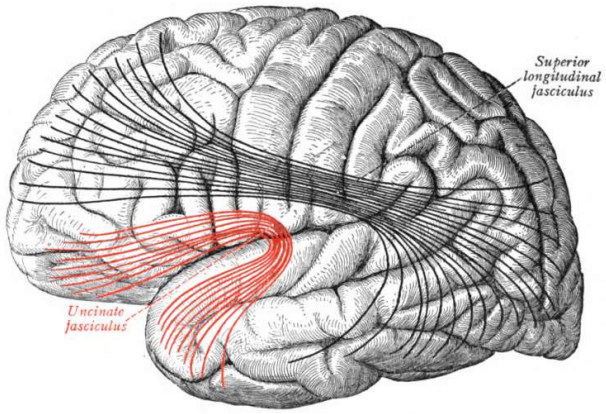
A meta-analysis on the uncinate fasciculus in depression



- Aberrant microstructure of the uncinate fasciculus, a white matter tract implicated in emotion regulation, has been hypothesized as a neurobiological mechanism of depression.
- The uncinate fasciculus is a white matter tract in the brain (essentially a bundle of myelinated axons) that connects:
  - the **anterior temporal lobe** (including areas important for memory and emotion like the anterior parahippocampus and amygdala) with the
  - **orbitofrontal cortex** (part of the frontal lobe involved in decision-making, social behavior, and emotional regulation).

(Xu, Nguyen et al. 2023)

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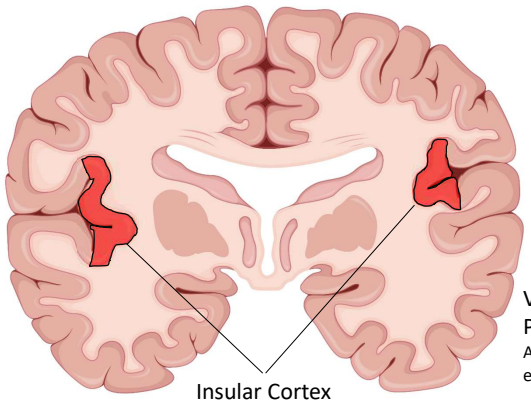
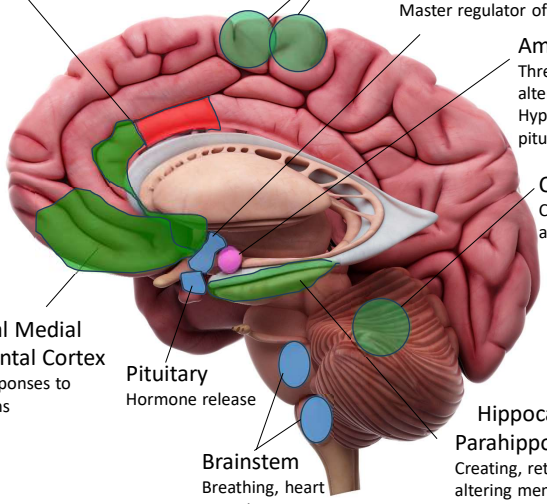
Key Brain Regions known to activate ANS & NeuroEndocrine Systems



Insular Cortex
Processes Interoception
Controls ANS



Anterior Cingulate Cortex
integrates the body's internal milieu with emotional and pain signals influencing autonomic output

Sensorimotor Cortex

Hypothalamus
Master regulator of the ANS

Amygdala
Threat detector; alters ANS and Hypothalamus – pituitary gland

Cerebellum
Can alter ANS and pituitary

Ventral Medial Prefrontal Cortex
ANS responses to emotions

Pituitary
Hormone release

Brainstem
Breathing, heart rate, digestion

Hippocampus & Parahippocampus
Creating, retrieving and altering memory and, interoceptive learning

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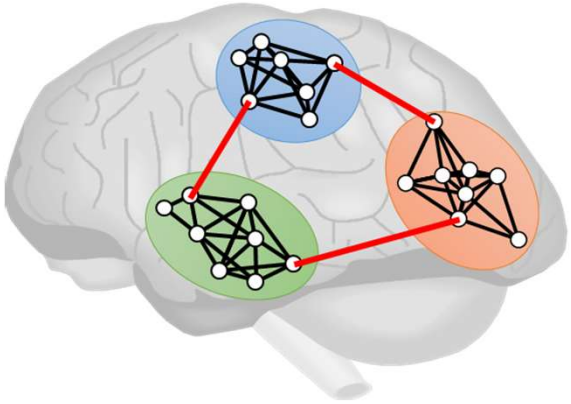
Biological Networks in the Brain (and Hubs)

- A biological neural network in the brain is a complex network of neurons that are chemically connected by synapses.
- Neurons send and receive electrochemical signals to each other, and the brain uses these signals to process information.



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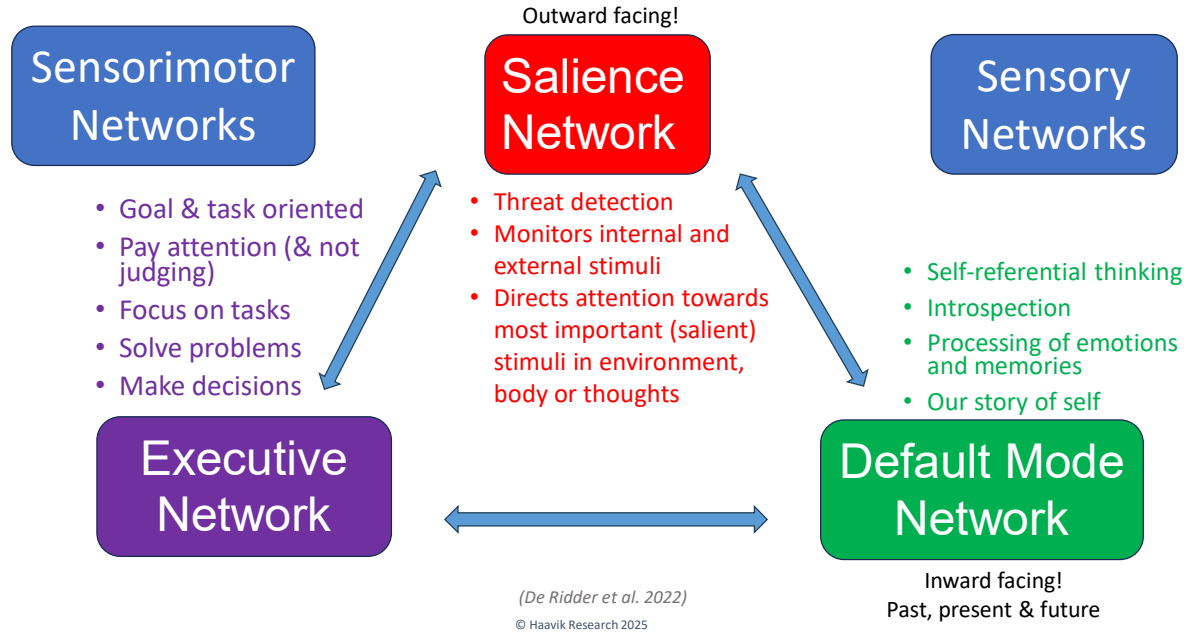
Triple Brain Network



(De Ridder et al. 2022)

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Functional connectivity in people with both Anxiety & Depression

- "This systematic review examined differences in resting-state brain connectivity associated with anxiety comorbidity in young- and middle-aged adults with MDD, with the aim of identifying novel targets for neuromodulation treatments, as these treatments are thought to work partly by altering dysfunctional connectivity pathways."
- "Only two studies included people with MDD and formally diagnosed co-morbid anxiety disorders; the remainder included people with MDD with dimensional anxiety measurement."
- "There was evidence for dysconnectivity between the amygdala and other brain networks in depression with co-morbid anxiety, and an indication that abnormalities of default mode network connectivity may play an underappreciated role in this condition."

(Briley, Webster et al. 2022)

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Common and specific large-scale brain changes in major depressive disorder, anxiety disorders, and chronic pain: a transdiagnostic multimodal meta-analysis of structural and functional MRI studies

- "Major depressive disorder (MDD), anxiety disorders (ANX), and chronic pain (CP) are frequent disorders of brain and behavior"
- "High comorbidity and overlapping risk factors, such as chronic and/or acute life stress, suggest overlapping neural correlates, i.e., similar changes in large-scale brain systems mediating between microscopic alterations and behavioral dysfunctions".
- "Indeed, shared structural [8–10] and functional [11–14] changes in prefrontal-insular circuits, for example, have been reported in all three disorders."
- "Using coordinate-based meta-analysis, we provide first-time evidence for common and specific large-scale brain changes in major depression, anxiety disorders, and chronic pain."
- "Common changes concerned gray matter volume loss in **insular and prefrontal cortices** of **default-mode and salience networks**, suggesting a neural correlate for comorbidity and possibly shared chronification mechanisms."

(Brandl, Weise et al. 2022)

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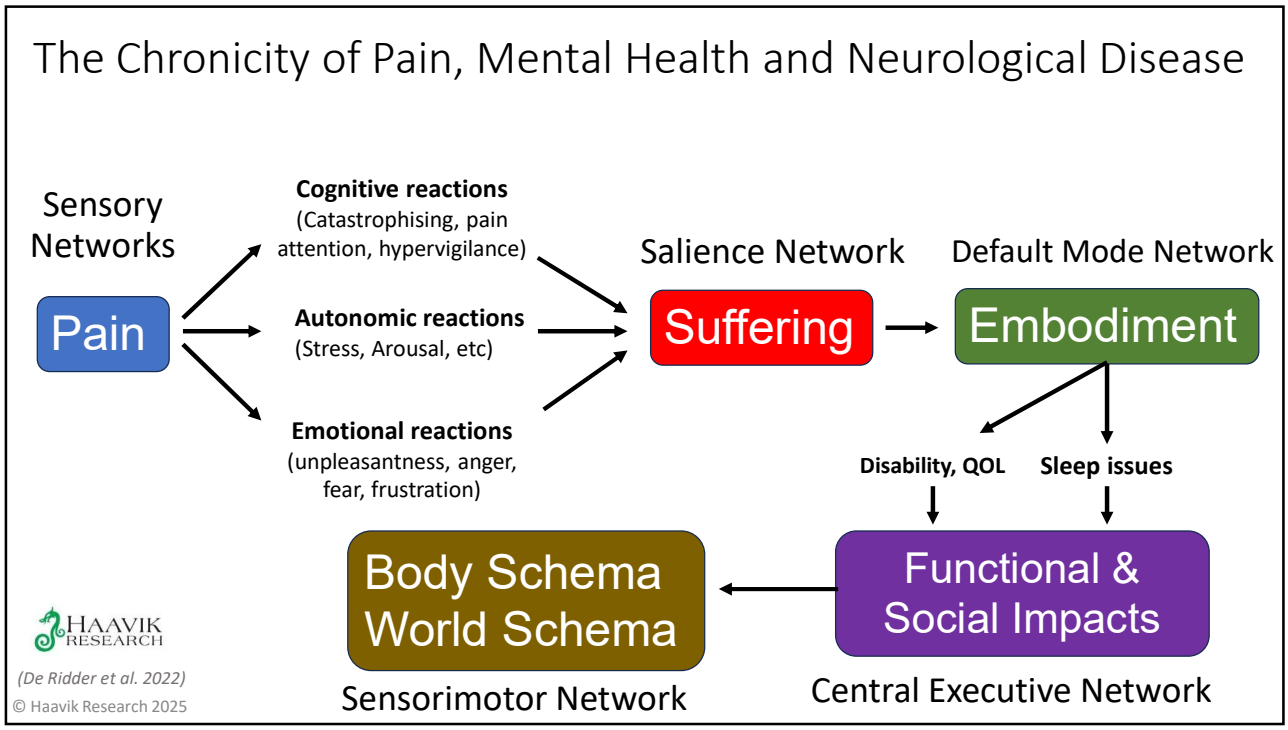
The Chronicity of Pain, Mental Health and Neurological Disease
Sensory Networks
Pain
Cognitive reactions
(Catastrophising, pain attention, hypervigilance)
Autonomic reactions
(Stress, Arousal, etc)
Emotional reactions
(unpleasantness, anger, fear, frustration)
Salience Network
Suffering
Default Mode Network
Embodiment
Disability, QOL
Sleep issues
Functional & Social Impacts
Central Executive Network
Body Schema World Schema
Sensorimotor Network
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(De Ridder et al. 2022)
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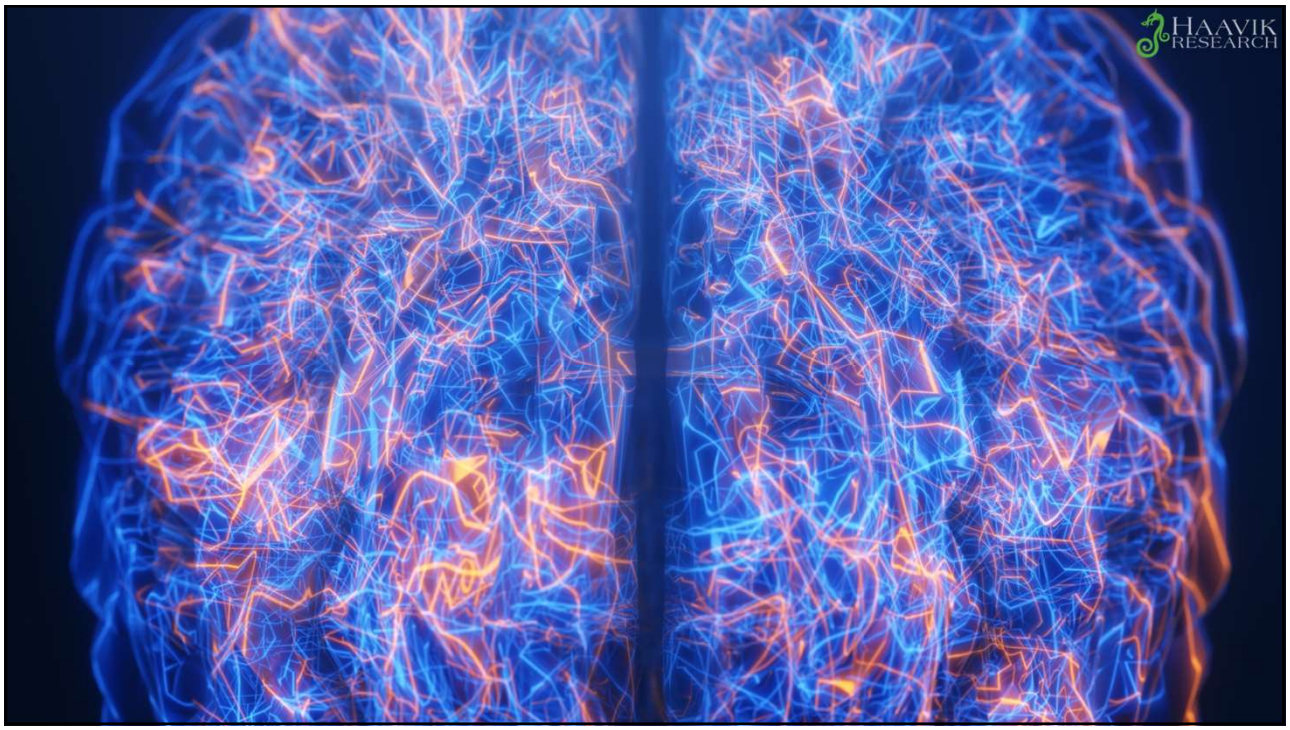
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Bidirectional comorbid associations between back pain and major depression in US adults

- Low back pain and depression have been globally recognized as key public health problems and they are considered co-morbid conditions.
- The cross-sectional analysis showed significant associations between back pain and major depression.
- The longitudinal analysis indicated that back pain at baseline was prospectively associated with major depression at follow-up, controlling for health behavioral and demographic variables.
- Major depression at baseline was also prospectively associated with back pain at follow-up, controlling for a set of related confounders.
- These findings of a bidirectional comorbid association fill a gap in the current understanding of these comorbid conditions and could have clinical implications for the management and prevention of both depression and low back pain.

(Yang, Hurwitz, Li, de Luca, Tavares, Green & Haldeman 2023)

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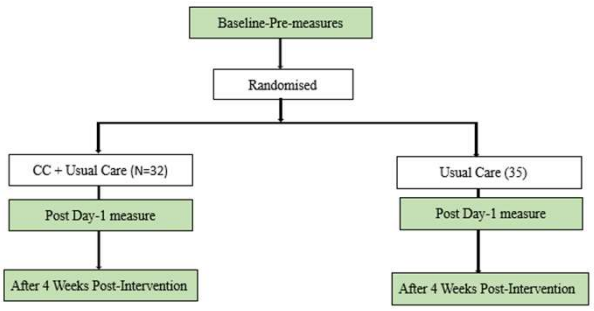
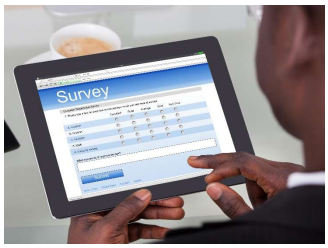
4 week Randomised Controlled Trial

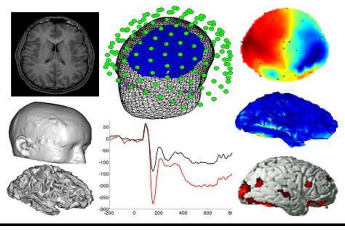


PROMIS-29 v2.0 profile



HR, HRV, Sleep, Activity

64 channel EEG



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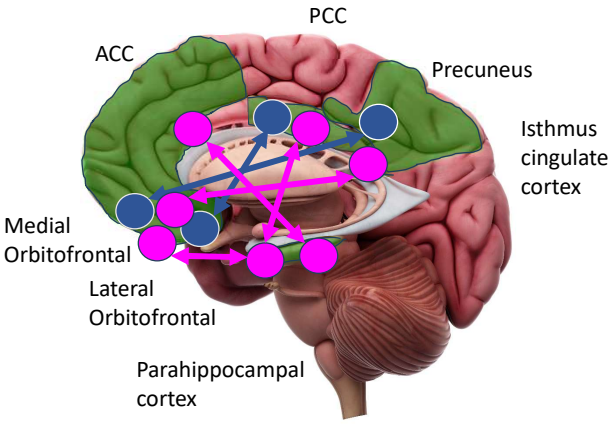
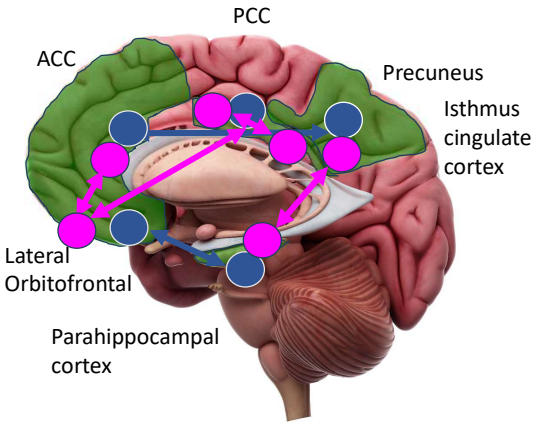
DMN changes after Chiro Care

Pre and Post Chiro



Pre and Post 4 weeks Chiro



(Haavik et al 2024, Brain Sciences)

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Unmedicated depressed people have significantly increased functional connectivity between the Precuneus and the prefrontal cortex

Increased functional connectivity of the posterior cingulate cortex with the lateral orbitofrontal cortex in depression (Cheng, Rolls et al. 2018B)

The increased connectivity of the precuneus and/or PCC with the prefrontal cortex short-term memory system may contribute to the rumination about low self-esteem in depression.

(Cheng, et al 2018A; Cheng, Rolls et al. 2018B*)*

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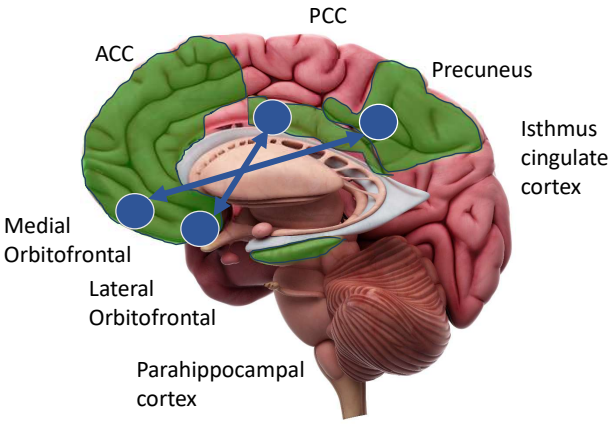
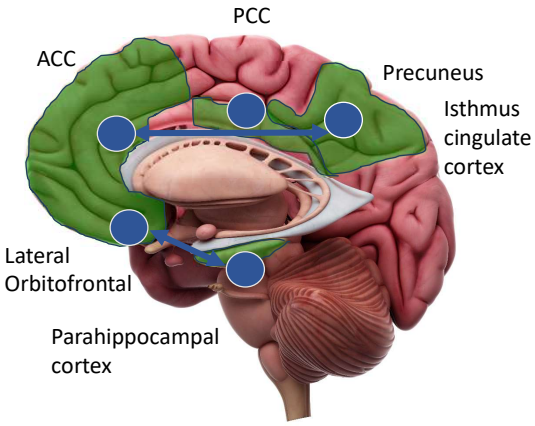
DMN changes after Chiro Care

Pre and Post Chiro



Pre and Post 4 weeks Chiro



(Haavik et al 2024, Brain Sciences)

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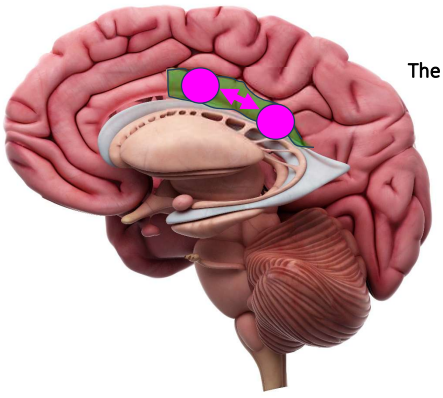
PRE vs POST 4 weeks of chiropractic care

SEPs Alpha ↑ L isthmus-cingulate- R PCC SEPs Alpha ↓ L PCC – R PCC

Thus, may reflect altered narrative sense of self in a manner that is reducing symptoms of depression and improvements in fatigue

- **The Posterior Cingulate Cortex**
  - internally focused, self-referential processing
  - implicated in depression
- In depression there is asymmetry in the thickness of PCC (↑ cortical thickness in left vs right)
- Depressed individuals with higher somatic symptoms (e.g. sleep disturbance, appetite disturbance, and fatigue or loss of energy) have greater asymmetry in PCC thickness



The isthmus cingulate
- introspection and self-referential processing
- construction of the narrative sense of self, including autobiographical memories

(Haavik et al 2024, Brain Sciences)

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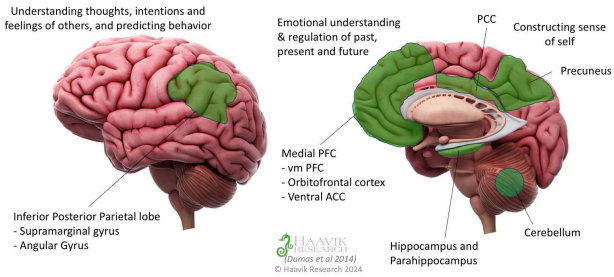
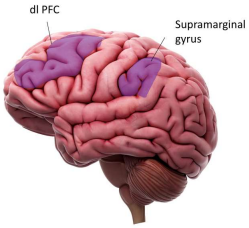
Default Mode Network

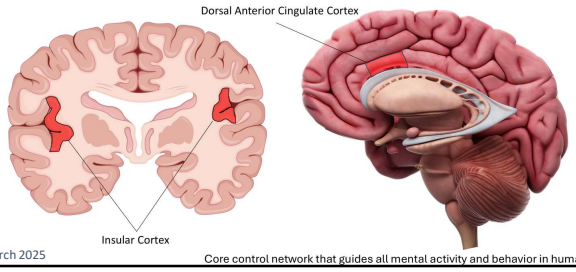


Fronto-parietal (Executive Control) Network

- It is Goal and Task oriented
- When you are actively engaged in a task
- Actively paying attention (and not judging)
- Capable of recruiting a wide variety of brain systems
- Multiple FP / EC networks
- Key Regions
  - Dorsolateral PFC
  - Posterior parietal cortex (supramarginal gyrus)



Salience Network



(Witt, van Ettinger-Veenstra et al. 2021; Menon and D'Esposito 2022; Menon and D'Esposito 2022)

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Core control network that guides all mental activity and behavior in humans

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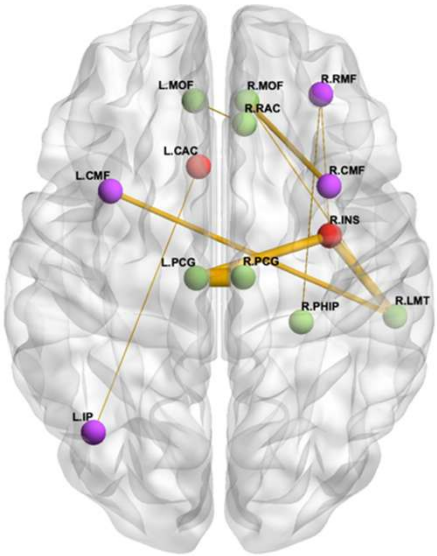
After first Adjustment session Chiro Group



Preliminary Results NOT published yet

Alpha

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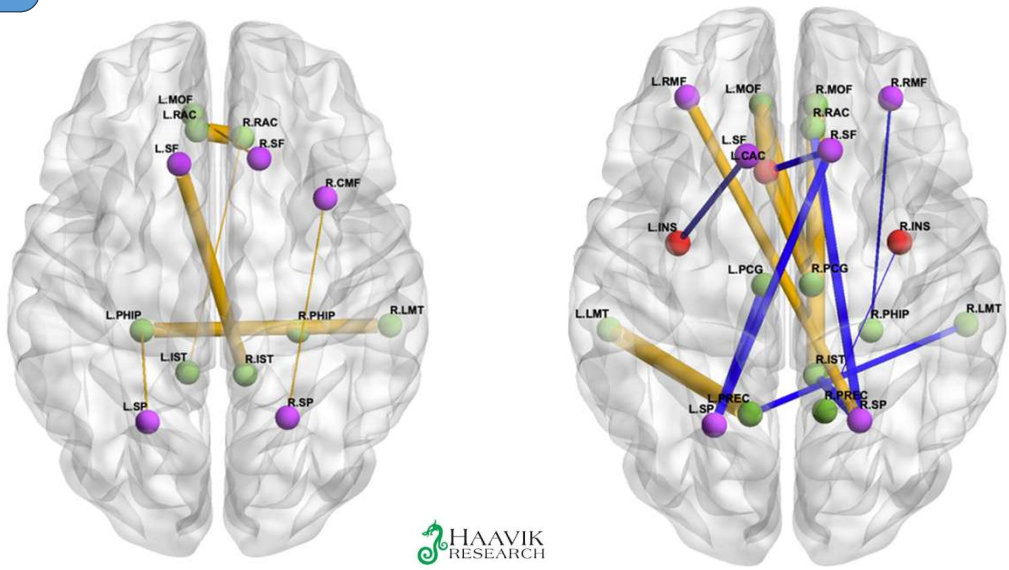
Preliminary Results NOT published yet

After 4 weeks Chiro Group Brain changes



Alpha

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Beta

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The Contemporary Model of the Subluxation

Interoceptive input:
- Pain
- Temperature
- Chemoreception
- Emotions
- Proprioception

Exteroceptive input:
- Vision
- Olfaction
- Audition
- Gustation

Past experiences and expectations about the future

Spinal adjustment

Altered vertebral column afferent input

Abnormal multisensory processing and filtering of exteroceptive and interoceptive stimuli and abnormal sensorimotor integration

Impacting:
- Whole body proprioception
- Whole body motor control
- Whole body control, homeostasis, neuro- and bio-plasticity
- Resilience, adaptability, function, wellbeing

Vertebral subluxation

Altered vertebral column function

Altered vertebral column motor control

Haavik et al 2021 EJAP

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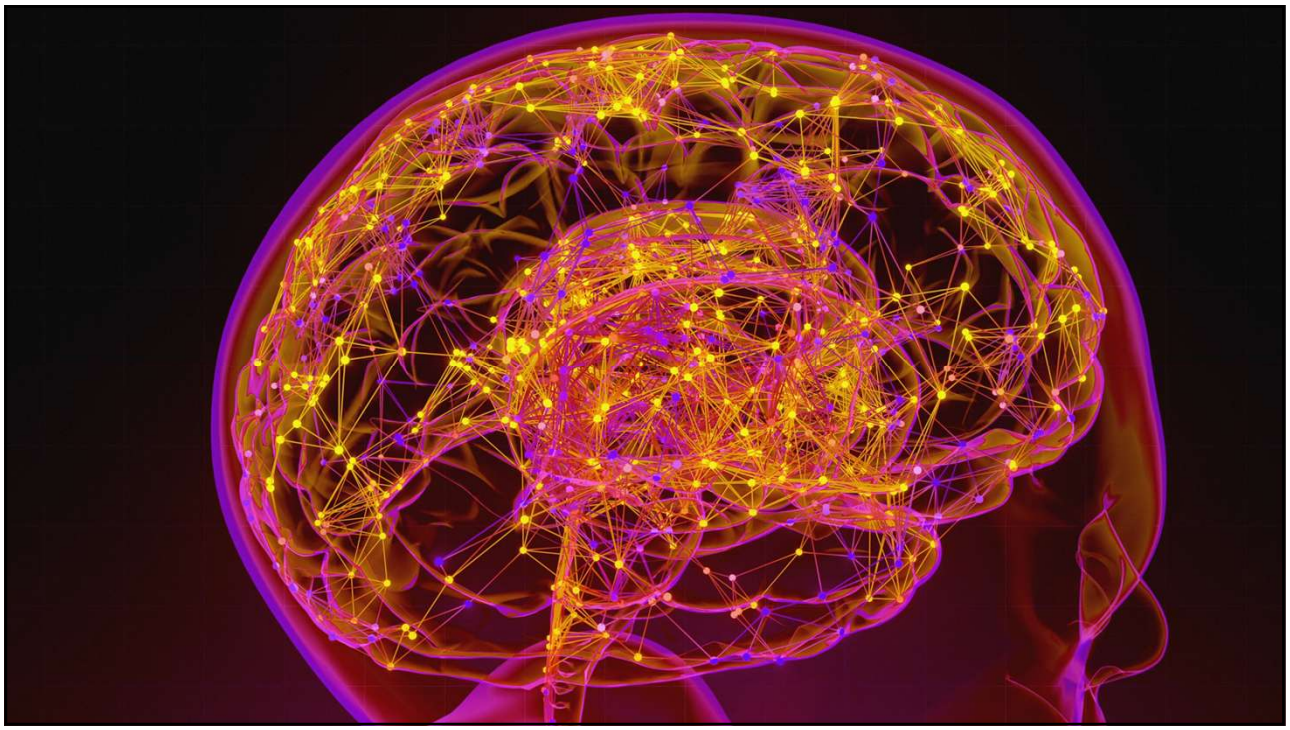

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Please Note:

Im not suggesting you claim chiropractic care can cure anxiety or depression!!

However, some patients might notice they also feel better mentally while under chiropractic care

If they do, you now know how to explain why that might be

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Effect of breathwork on stress and mental health: A meta-analysis of randomised-controlled trials

- Deliberate control of the breath (breathwork) has recently received an unprecedented surge in public interest and breathing techniques have therapeutic potential to improve mental health.
- Across all studies combined, the intervention produced a moderate, statistically significant reduction in both anxiety and depression symptoms as reported by participants themselves

(Fincham, Strauss et al. 2023)

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- At least 1 non-muskuloskeletal improvement was reported after the previous chiropractic session in 21% to 25% of cases.
- Of these responses, 26% (highest response) were related to the airway passages (usually reported as “easier to breathe”), 25% were related to the digestive system (mostly reported as “improved function”)

(Leboeuf-Yde, Axén et al. 1999)

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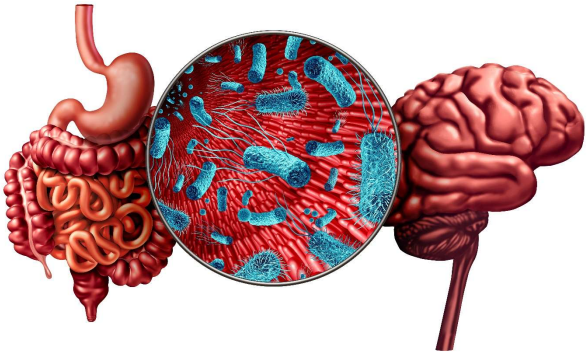
“The gut microbiome exerts a considerable influence on human neurophysiology and mental health. Interactions between intestinal microbiology and host regulatory systems have now been implicated both in the development of psychiatric conditions and in the efficacy of many common therapies. With the growing acceptance of the role played by the gut microbiome in mental health outcomes, the focus of research is now beginning to shift from identifying relationships between intestinal microbiology and pathophysiology, and towards using this newfound insight to improve clinical outcomes. Here, we review recent advances in our understanding of gut microbiome–brain interactions, the mechanistic underpinnings of these relationships, and the ongoing challenge of distinguishing association and causation. We set out an overarching model of the evolution of microbiome–CNS interaction and examine how a growing knowledge of these complex systems can be used to determine disease susceptibility and reduce risk in a targeted manner.”

The gut microbiome and mental health: advances in research and emerging priorities



(Shoubridge, Choo et al. 2022)

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Questions?

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