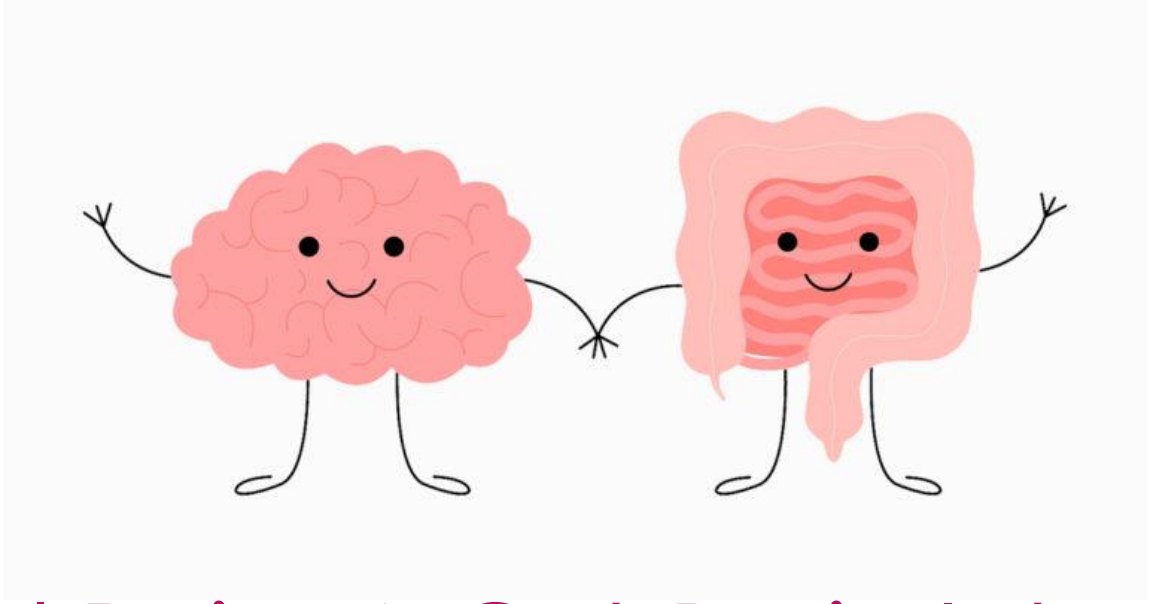

Abdominal Pain: A Gut-Brain Interaction Lens

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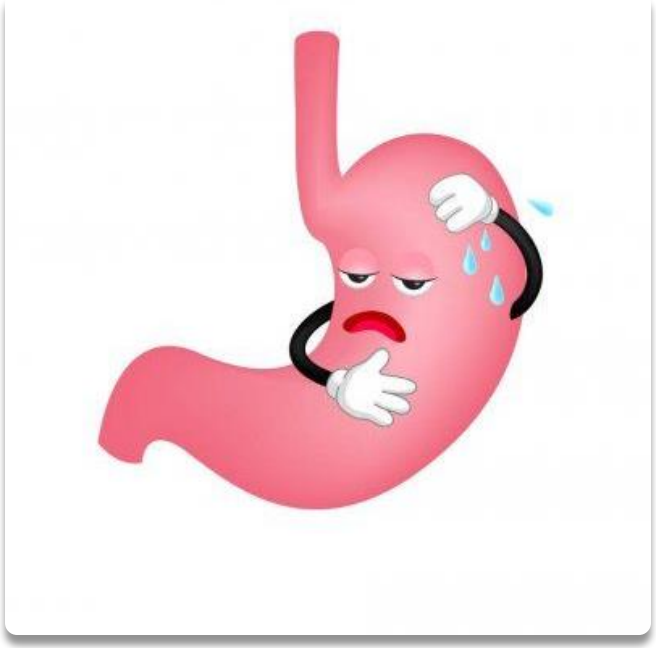
Objectives

- Identify key psychological, social, and biological factors involved in the development and maintenance of pediatric functional abdominal pain disorders
- Describe effective, patient-centered communication strategies for delivering a functional abdominal pain diagnosis
- List evidence-based psychological treatments for pediatric functional abdominal pain disorders

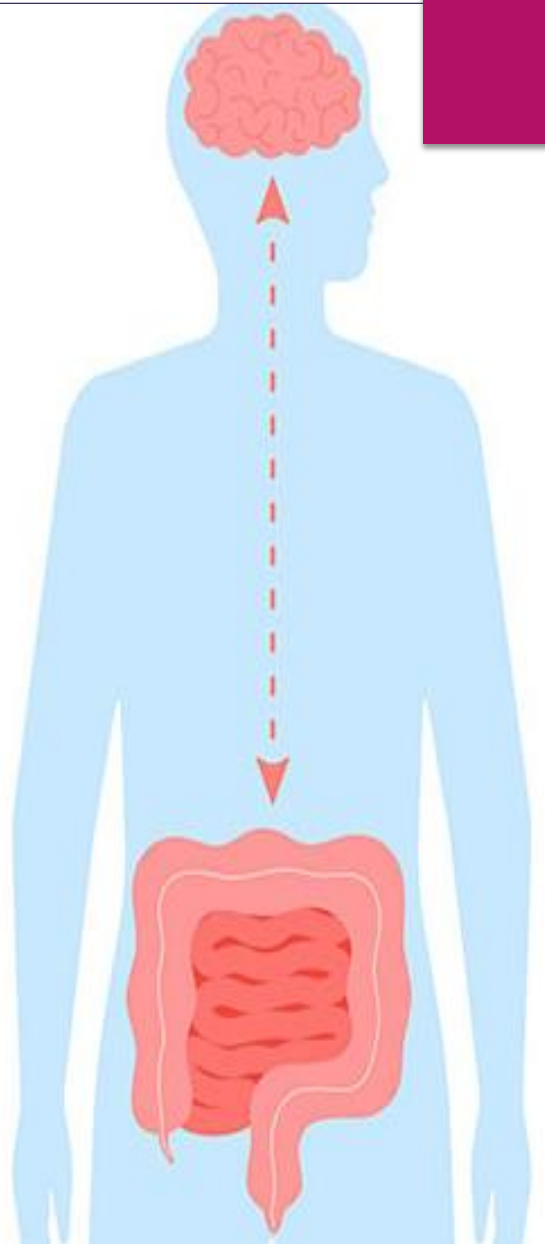
Overview

- **DDGBIs – Overview & Impact**
  - FAPDs
- **Biopsychosocial Model**
  - Contributing Factors
- **Communication With Children/Families**
- **Evidence-based Treatments Of FAPDs**
  - Clinical Targets
  - Gut-directed Hypnosis



Disorders of Gut-Brain Interaction (DGBIs)

- Previously known as functional gastrointestinal disorders
- ROME IV (2016) Diagnostic Criteria
- Pathophysiology best understood using a biopsychosocial model of illness and relates to any combination of:
  - Visceral hypersensitivity
  - Motility disturbance
  - Altered CNS processing
  - Altered mucosal and immune function
  - Altered gut microbiota
- Abdominal pain is one of the most prominent symptoms



ROME IV: Functional Abdominal Pain Disorders

(Overall prevalence in youth: 25% to 29%)

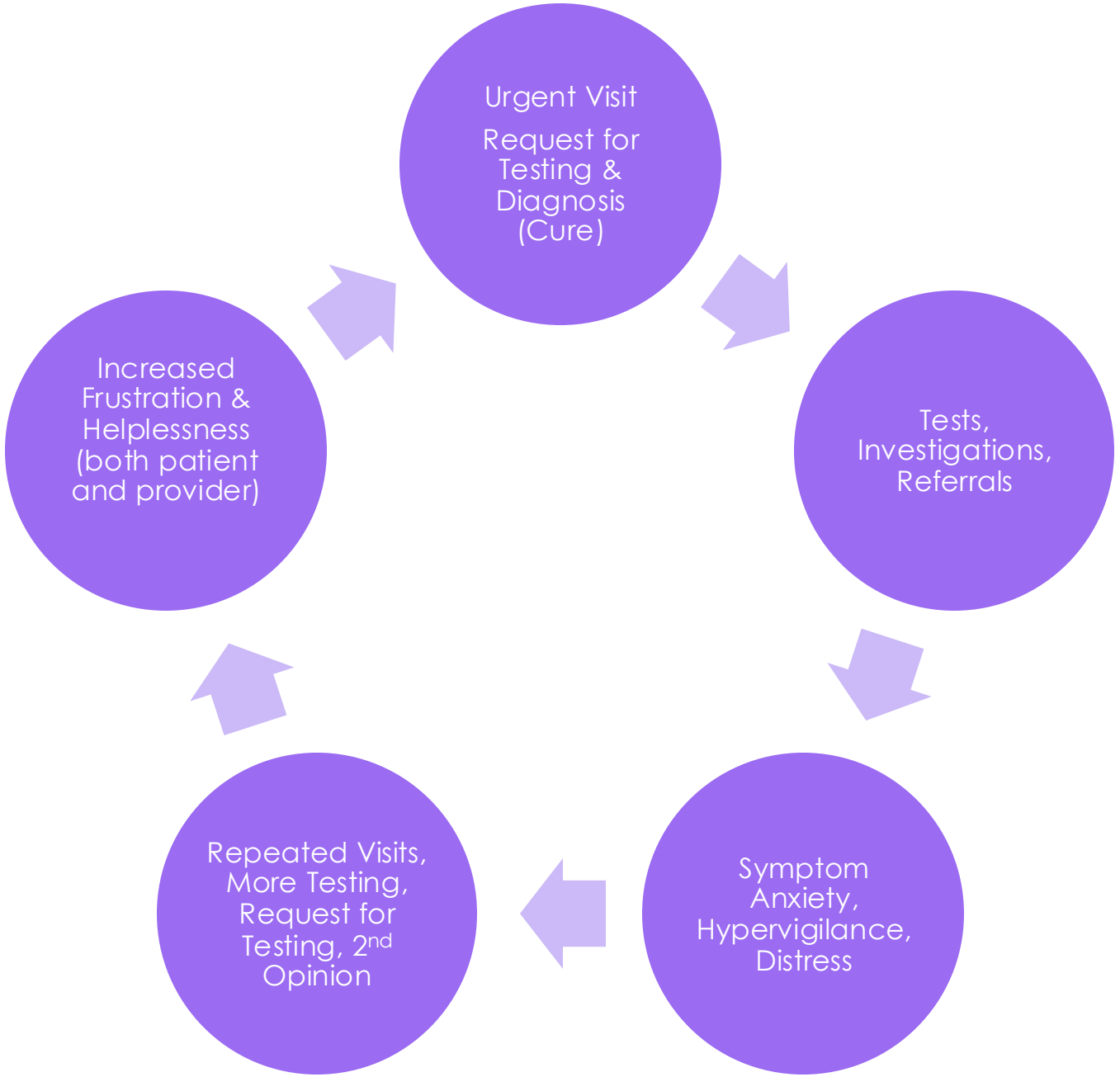
- **Functional Dyspepsia** (2-5%)
- **Irritable Bowel Syndrome** (~5%)
- **Abdominal Migraine** (1 to 4%)
- **Functional Abdominal Pain Not Otherwise Specified (FAP-NOS)** (1% to 5%)

The Challenge of DGBIs

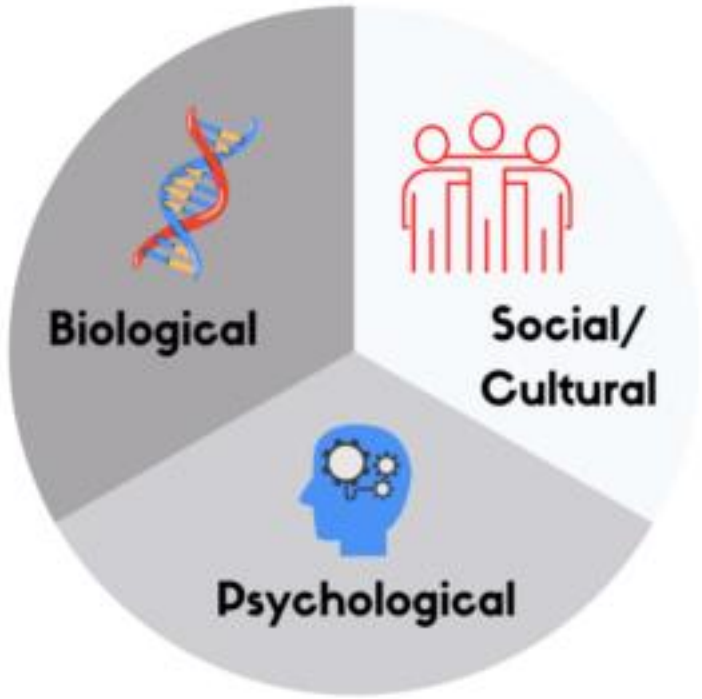
- **One of the most common reasons for seeking medical attention**
  - Major economic effects on health care systems (Canavan et al., 2018, Sperber et al, 2021)
  - Frequent hospital visits that often result in extensive and often unnecessary medical testing
  - FAPDs is the main reason for GI emergency room visits among youth

- **Adverse impact on quality of life and functional impairment** (Sperber et al., 2021)
  - Children with FAP have lower quality of life than healthy children (similar to IBD)
  - School absenteeism (e.g,. 10% of children with FAP attend school regularly); lower achievement
  - Social withdrawal/isolation
  - Impaired sleep (Robertz et al., 2023)

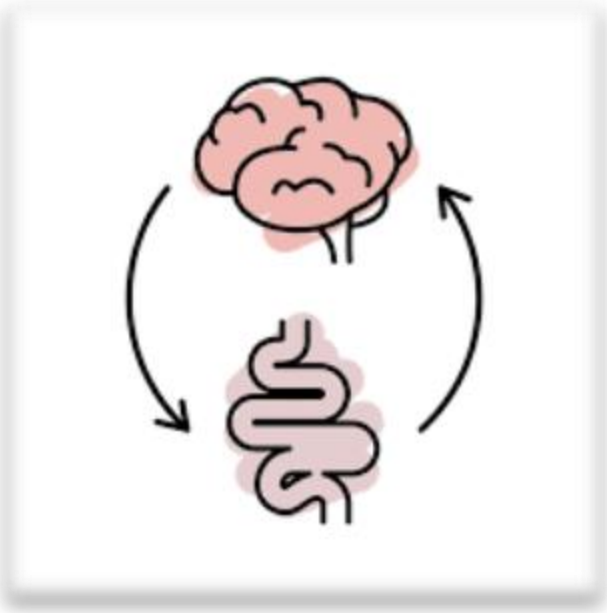
- **Family frustration with medical system & Provider frustration / burnout** (Luo et al., 2022)


Urgent Visit
Request for Testing & Diagnosis (Cure)
Tests, Investigations, Referrals
Symptom Anxiety, Hypervigilance, Distress
Repeated Visits, More Testing, Request for Testing, 2nd Opinion
Increased Frustration & Helplessness (both patient and provider)

Biopsychosocial Framework



The Gut-Brain Axis

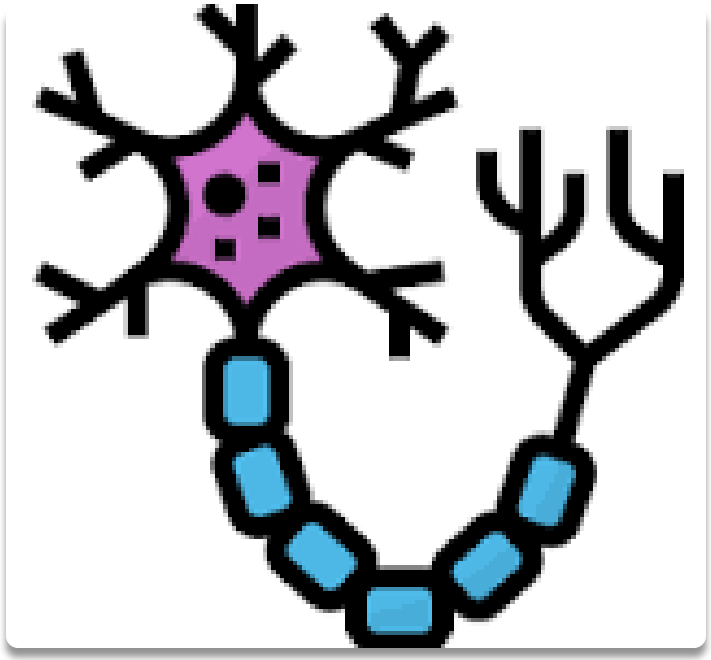


- **Bi-directiona**l communications between the brain and gut
  - Stress, dysregulation, emotions, thoughts can all impact GI symptoms (**descending brain-to-gut**) &
  - GI stimuli can trigger a response within the emotional and cognitive centers of the brain (**ascending gut-to-brain**)
  - Involves central nervous system, autonomic nervous system, the hypothalamic-pituitary-adrenal (HPA) axis, and the gut
- Abdominal pain represents a complex interaction of nerve signals, the spinal cord, brain structures, and alterations in pain processing (brain & visceral level of the gut)

DGBIs: Biological Contributors

- Genetic predisposition
- Sex (Females > Males)
- An infection (e.g., gastroenteritis)

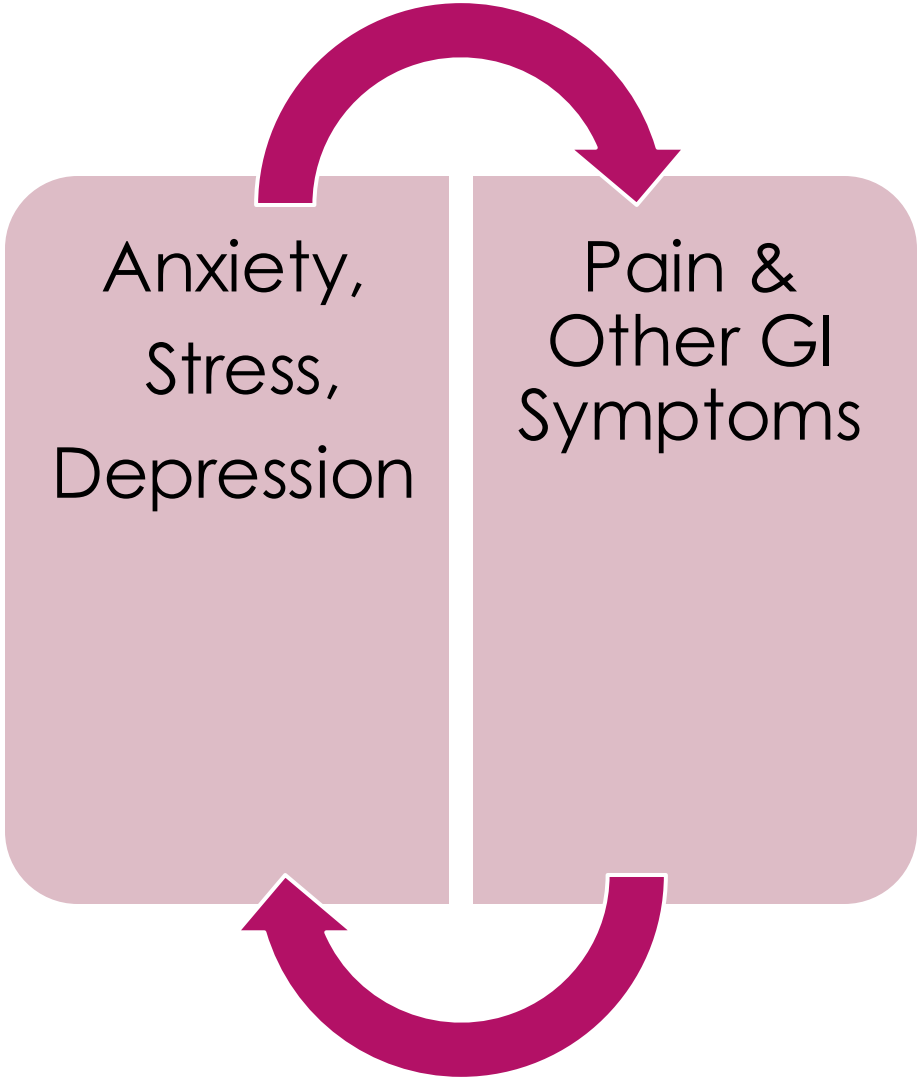
- **Visceral hypersensitivity**
- Altered CNS processing
  (e.g., **hypervigilance to stimuli**)
- Altered GI motility
- Altered mucosal and immune function
- Microbiome imbalance



DGBIs: Psychological Influences

- **Cognitive-affective processes**
  - GI symptom-specific anxiety
  - Pain cognitions ("I can't…")
  - Symptom hypervigilance
  - Pain Catastrophizing
- **Personality Traits**
  - Perfectionism, High-Achieving, Emotionally Sensitive
- **Coping Skills**
  - Emotional avoidance; internalizing
- **Psychiatric Comorbidity**
  - Anxiety disorders 30-50%;
  - Depression 30%
  - Stress reactivity
- **Emotional Regulation**
- **Somatization**

Anxious and depressive symptoms can contribute to the onset of GI symptoms



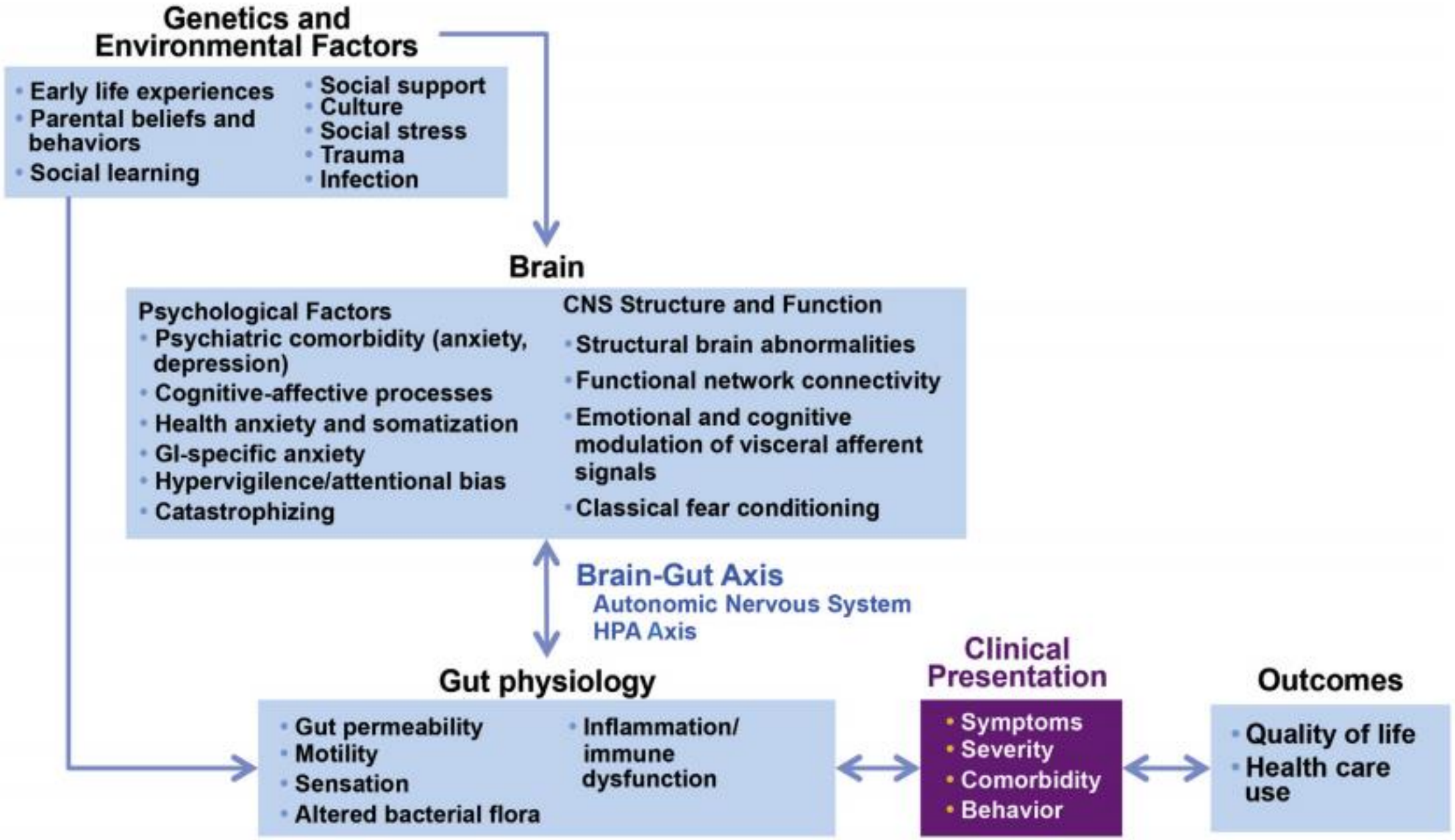
Anxious and depressive symptoms may also occur as a result of pain:

- **practical challenges in living with symptoms (e.g., chronic pain, emotional toll, social isolation)**
- **Processes within the GI tract (e.g., changes in microbiome)**

THE BIDRECTIONALITY TO STRESS & SYMPTOMS

DGBIs: Social/Environmental Influences

- **Early Life Adversity**
  - E.g., onset of DGBIs associated with significant environmental stressors (e.g., peer victimization)
  - E.g., chronic life stress is the main predictor of IBS symptom intensity over 16 months
  - Higher ACE scores associated with a higher likelihood of DGBI diagnosis (with anxiety as a large mediator) (Fritz et al., 2024)
- **Stressors (School, Family, Peers)**
- **Cultural Interpretations of Symptoms & Illness**
- **Parental Factors (Beliefs, Behaviours, Somatization, Anxiety/Depression)**
  - Parental catastrophizing about children's pain; Hypervigilance to child's symptoms
  - Modeling and/or reinforcement (attention)
  - E.g., reinforcement of illness behaviour & increased AP severity and school absenteeism (Levy et al., 2006)


Genetics and Environmental Factors
Early life experiences
Parental beliefs and behaviors
Social learning
Social support
Culture
Social stress
Trauma
Infection
Brain
Psychological Factors
Psychiatric comorbidity (anxiety, depression)
Cognitive-affective processes
Health anxiety and somatization
GI-specific anxiety
Hypervigilence/attentional bias
Catastrophizing
CNS Structure and Function
Structural brain abnormalities
Functional network connectivity
Emotional and cognitive modulation of visceral afferent signals
Classical fear conditioning
Brain-Gut Axis
Autonomic Nervous System
HPA Axis
Gut physiology
Gut permeability
Motility
Sensation
Altered bacterial flora
Inflammation/ immune dysfunction
Clinical Presentation
Symptoms
Severity
Comorbidity
Behavior
Outcomes
Quality of life
Health care use

Communication & Messaging with Families

Common Patient Experiences

- Perceive the severity of symptoms has been dismissed Fear that a sinister diagnosis has been missed
- Not provided with a diagnosis *("Good news! Tests were negative….everything is perfectly all right")*
- Referred to psychology without any discussion of the biopsychosocial model & DGBIs
- "All in her head" or solely due to stress/anxiety

"How is it possible that my child can be in this much pain and nothing be physically wrong with them?!?"

Tips for Communicating a DGBI Diagnosis

- Acknowledge, reflect, and **validate** symptoms and parental concerns
- Be **confident** in the diagnosis and provide the specific diagnosis to the family
- Discuss the **biopsychosocial** conceptualization of DGBIs, including **brain-gut axis**
- Highlight some of the risk factors for DGBIs that are specific to this patient
- Review that there are effective, evidence-based treatments
  - Emphasize that the most effective and durable treatment is **psychosocial intervention**
- Ask patient/family to **paraphrase their understanding** of the diagnosis/concerns
  - *What are you concerned about? What worries you the most?*
  - Review why certain sinister diagnoses have been ruled out

Brain-Gut Behavioural Therapies

- Cognitive behavioural therapy (CBT)
- Mindfulness - Acceptance and commitment therapy (ACT)
- Gut-directed hypnosis

Clinical Assessment for Treatment

- Start with, and give AMPLE time and attention to, the **physical complaints** (pain, nausea) that initiated the referral (onset, frequency, intensity, patterns, alleviating/exacerbating factors, experience with medical system, understanding of diagnosis)

- GI-symptoms specific anxiety & escape/avoidance behaviours ("safe" vs "unsafe" activities, places, foods, etc.,)

- Impact of symptoms on daily functioning (school, food intake, social, family dynamics)

- Identification of psychosocial factors that may be contributing and may be appropriate targets for treatment

Clinical Targets

- PSYCHOEDUCATION
- Nonpharmacological Pain Management
- GI-specific Cognitions
- Hypervigilance to Symptoms / Sensations
- Escape/Avoidance Behaviours
- Return to Functioning (School, Food, Sleep)
- Parental Response
- Secondary Gains
- Psychological Factors
- Processing Experience with Medical System

Psychoeducation

- **Brain-Gut Axis**
  - Highway; talking/texting
- **Visceral Hypersensitivity**
  - False alarm; software vs. hardware; sunburn (post-infectious)
  - Gut has a microphone/is on speakerphone
- **Brain Hypervigilance**
  - Brain on high-alert mode; brain binoculars; bear in woods
  - The unconscious has become conscious
- **Pain Processing 101**
  - Brain as the control center / supercomputer / boss of body
  - Volume switch vs. on/off switch
- **Hurt ≠ Harm**

Parental Response

- **Maintaining expectations** for school attendance, participation in activities
- **Modeling** and encouraging **active coping strategies** for managing GI symptoms
- Minimize the amount of attention paid to symptom complaints **(stop asking!)**
- Positive reinforcement / attention for adaptive coping behaviours
- Validating, labelling, and empathizing with emotions

- Parents as coaches for symptom management & cheerleaders for efforts/successes

Nausea among FAPDs

- Nausea is a common symptom among FAPD patients
  - >25% experience daily nausea (Kovacic et al., 2013)
- Nausea in FAPD has been associated with higher levels of functional disability, negative affect, fatigue, and anxiety (de Bruijn et al, 2002; Levy et al., 2008; Kovacic & Li, 2014; Kovacic et al., 2014; Tarbell et al., 2014))
- Compared to FAP-only patients, FAP + nausea patients reported significantly greater abdominal pain severity, GI symptoms, depression, and functional disability (Russell et al., 2017)
- Children with FAP + nausea more likely to have DGBIs in adulthood (Russell et al., 2017)

Clinical Practice – Nausea & Pain

- +++ Hypervigilance to symptoms
- ? Underlying fear of vomiting (emetophobia)
- ? Safety Behaviours
  - Avoidant Restrictive Food Intake Disorder (ARFID – Fear of Aversive Consequences)
- Use of diaphragmatic breathing as an incompatible response to vomiting (with psychoeducation!)
- Nausea/Pain → Restricted Food Intake → Increased gut sensitivity → Increased Nausea/Pain → etc.

Gut-Directed Hypnosis

Hypnosis:
Trance & Suggestions

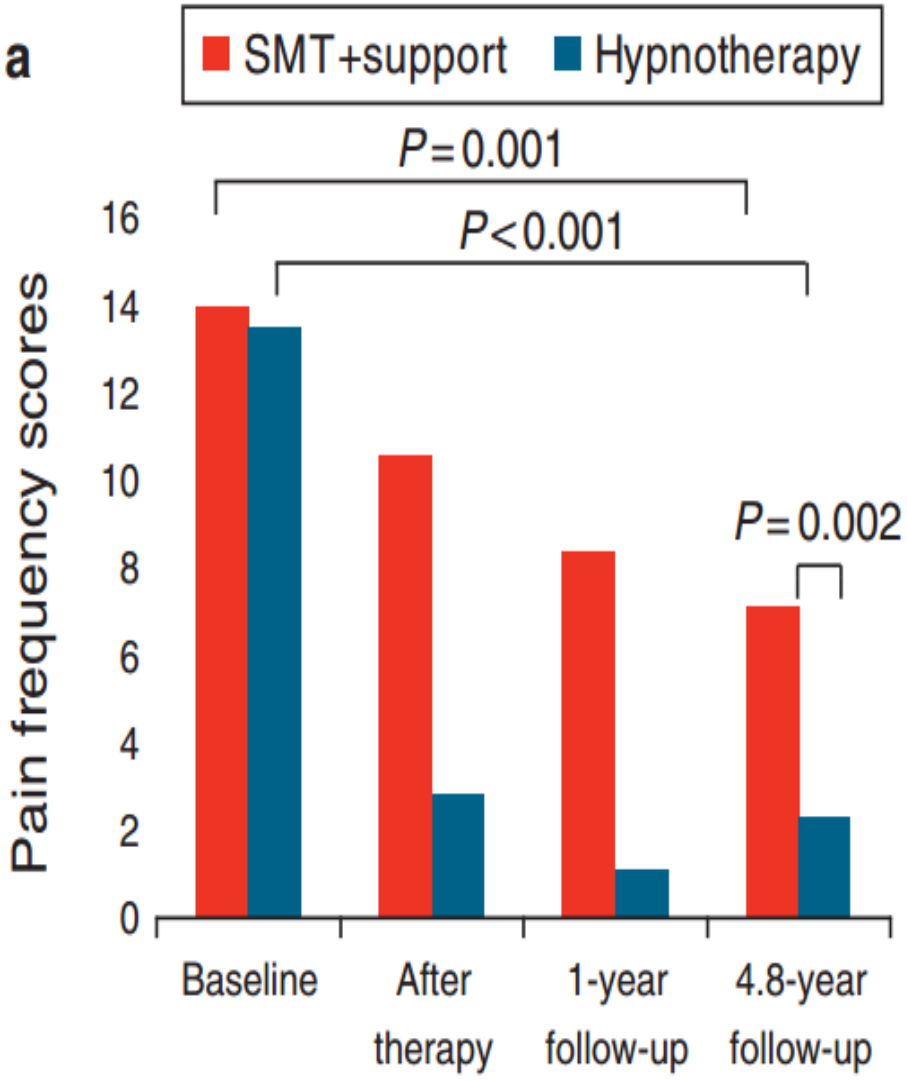
- **Trance**
  - Increased concentration, susceptibility, physiologic response
  - Internal absorption
  - Relaxation (or not)
  - Trance logic

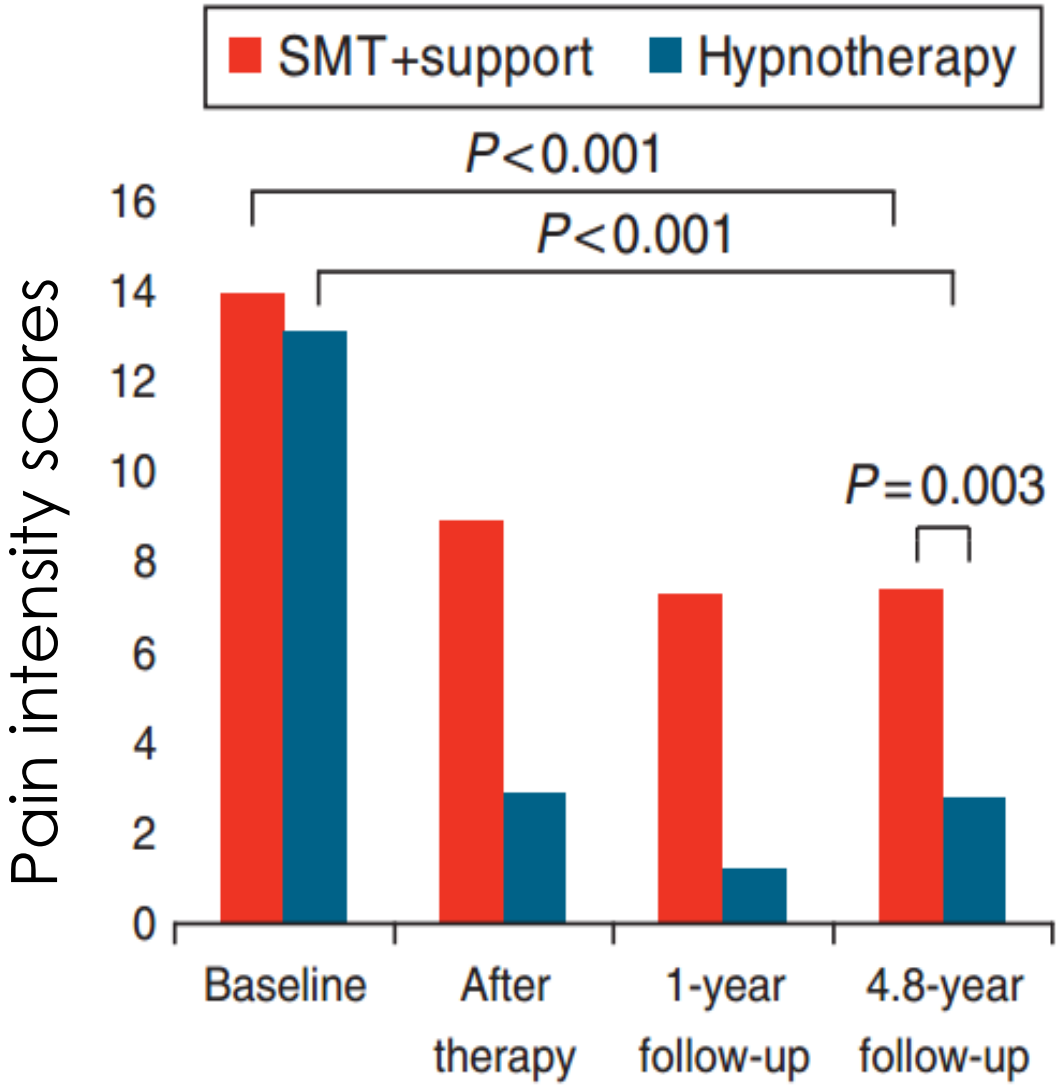
- **Suggestions**
  - Imagery
  - Metaphor
  - Incorporate child's language and interests

Gut Directed Hypnosis

- Change the perception and meaning of pain/symptoms by using imagination, metaphor, etc.
- Teach skills that alter physical sensations
- Create distance/disassociation from symptoms
- Increase sense of control and mastery
- Reduce the impact of stress on symptoms
- Induce relaxation

Vlieger, et al., (2012)





Clinical Remission Rates

	Standard Medical Treatment	Hypnosis
End of Treatment	12%	59%
6-month F/U	17%	71%
12-month F/U	25%	85%
~4.8 years F/U	20%	68%

Clinical Remission = a decrease of the pain severity and frequency scores of greater than 80% when compared to baseline.

Vlieger et al., (2007 & 2012)

Gut-Directed Hypnosis:

Proposed Mechanisms

- **Hypnosis modulates processing of noxious peripheral stimuli**
  - Sensory and affective dimensions of pain are impacted by hypnosis (fMRI studies)
- **Evidence that some GI physiological events can be influenced by hypnosis**
  - Trance itself appears to have a powerful soothing effect on GI tract (e.g., GI smooth muscle activity quiets markedly; emptying of stomach is reduced; motility slows)
- **Hypnosis also improves psychological status and QoL**
  - Significant reduction in affective symptoms is a well-documented benefit of gut-directed hypnosis

Key Takeaway Points

DGBIs are medical diagnoses

DGBIs are understood, assessed, and treated from a biopsychosocial framework

Psychoeducation regarding the brain-gut axis is essential for patients and families

Evidence-based treatments do exist

Questions?