

Psychological and Behavioral Treatments for Pain

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UCDAVIS
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Opioid
Response
Network



CTN-NE
The National Drug Abuse Treatment
Clinical Trials Network - Northeast Node

Disclosures

Commercial Support/Sponsorship:

There is no commercial support for this training.

Conflict of Interest:

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Faculty: Dr. Prasad is on the Advisory Board for Menda Health.

Planning Committee Members: Have no relevant financial relationship(s) with ineligible companies to disclose. .

Mitigation Steps Implemented:

All reported financial relationships have been mitigated through peer review.



Objectives

- ✦ Articulate psychosocial risk factors associated with chronification of pain
- ✦ Delineate the components of interdisciplinary pain management
- ✦ Identify evidence based psychological interventions employed in pain management



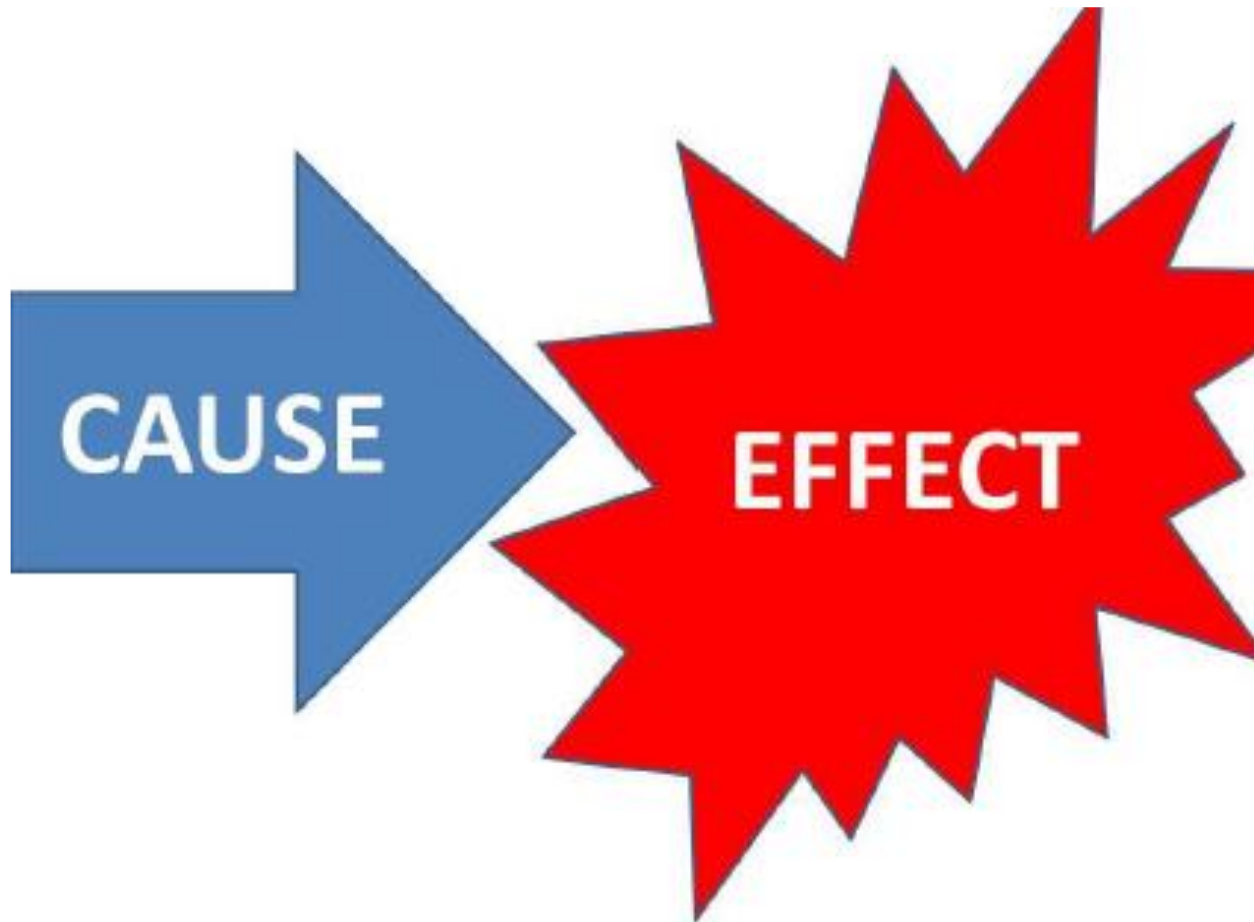
Pain in Context

- ✦ US Department of Health & Human Services/CDC (11/2020)
 - 20.4% of the US population has chronic pain
 - 36.4% of these individuals have high-impact chronic pain
 - Chronic pain is most prevalent in women, individuals over 65, and non-Hispanic white adults
 - Prevalence higher in more rural areas

Zelaya CE, Dahlhamer JM, Lucas JW, Connor EM. Chronic pain and high-impact chronic pain among U.S. adults, 2019. NCHS Data Brief, no 390. Hyattsville, MD: National Center for Health Statistics. 2020.



What causes pain?



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Multiple Etiological Pathways



Biological
Factors



Physical Factors



Psychosocial
Factors



Common Psychosocial Risk Factors Associated with Chronification of Pain



Mood

Early Life Experiences

Coping Mechanisms/Other Psychological Variables



Mood: The Impact of Depression

National Population Health Study [Canada]

- ✧ $N = 9,909$
- ✧ Data set included information on:
 - Mental health status
 - Lifestyle behaviors
 - Healthcare utilization
 - Socioeconomic information
- ✧ 24 months elapsed between data collection periods
- ✧ Respondents endorsing depression at T1 3x more likely to report low back pain (LBP) at T2



Mood: The Impact of Depression

Health Outcomes Study (CMS)

- ✧ $N = 91,347$ (T1); 55,690 (T2)
- ✧ Data set included information on:
 - SF36 Health Survey
 - Demographics
 - Mood
 - Health (e.g., complications, comorbidities, chronic conditions)
- ✧ 24 months elapsed between data collection periods
- ✧ Respondents endorsing depression at T1 more likely to report LBP at T2 when controlling for confounding variables



Early Life Experiences

Adverse Childhood Events (ACEs)

- ✦ Collaboration between Centers for Disease Control & Kaiser Permanente
- ✦ Initial data collection started in mid- to late 1990s (n = ~17,000)
- ✦ Primary goal: assess impact of ACEs on long-term health and well-being



ACE Variables

Physical
neglect

Emotional
neglect

Physical abuse

Emotional
abuse

Sexual abuse

Household
substance
misuse

Household
member
incarceration

Household
member mental
illness

Mother treated
violently

Separation/
divorce of
parents



ACE Preliminary Findings

- ✦ 38% of respondents experienced 2 or more ACEs
- ✦ Higher number of ACE variables reported associated with higher risk for negative outcomes in:
 - Injury
 - Mental health
 - Maternal health
 - Infectious disease
 - Chronic disease
 - Risky behaviors
 - Life opportunities



ACE Implications: Pediatric Populations

- ✦ National Survey of Children's Health data analysis
- ✦ $n = \sim 48,000$
- ✦ Risk for developing chronic pain higher as the number of ACE variables endorsed increased



ACE Implications: Adult Populations

- ✦ Systematic review & meta-analysis of studies relating to sexual abuse and somatic disorders
- ✦ Literature from 1980-2008 included in search
- ✦ History of sexual abuse associated with a lifetime diagnosis of:
 - Functional gastrointestinal disorders (FGID)
 - Non-specific chronic pain
 - Psychogenic seizures
 - Chronic pelvic pain
 - Endometriosis



Paras et al. (2009). Sexual Abuse and Lifetime Diagnosis of Somatic Disorders. *JAMA* 302(5): 550-561.

Harris HR, Wieser F, Vitonis AF, Rich-Edwards J, Boynton-Jarrett R, Bertone-Johnson ER, Missmer SA. Early life abuse and risk of endometriosis. *Hum Reprod.* 2018 Sep 1;33(9):1657-1668.

Coping & Other Psychological Factors

- ✦ Surgical Outcomes (lumbar surgery, spinal cord stimulation (SCS))
- ✦ Review of literature relating to presurgical psychological screening
 - Successful outcomes generally defined
 - Decreased pain
 - Increased function
 - Return to work
 - Reduced medical treatment
- ✦ Positive relationship between one or more psychological factors and poor treatment outcome in 92% of reviewed studies

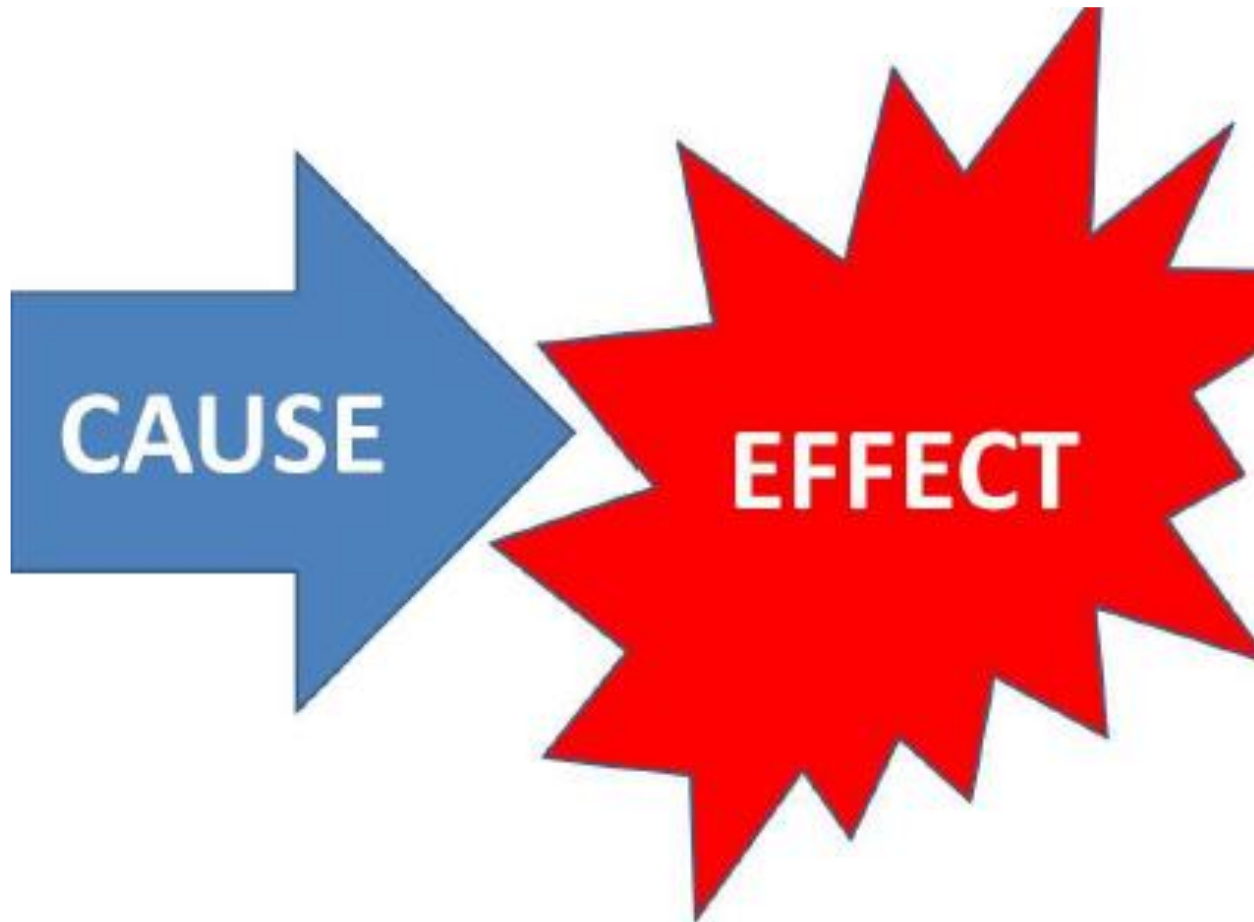


Coping & Other Psychological Factors

- ✦ Most useful predictors of poor outcome:
 - Presurgical somatization
 - Depression
 - Anxiety
 - Poor coping
- ✦ Minimally predictive factors
 - Pretreatment physical findings
 - Activity interference
 - Presurgical pain intensity

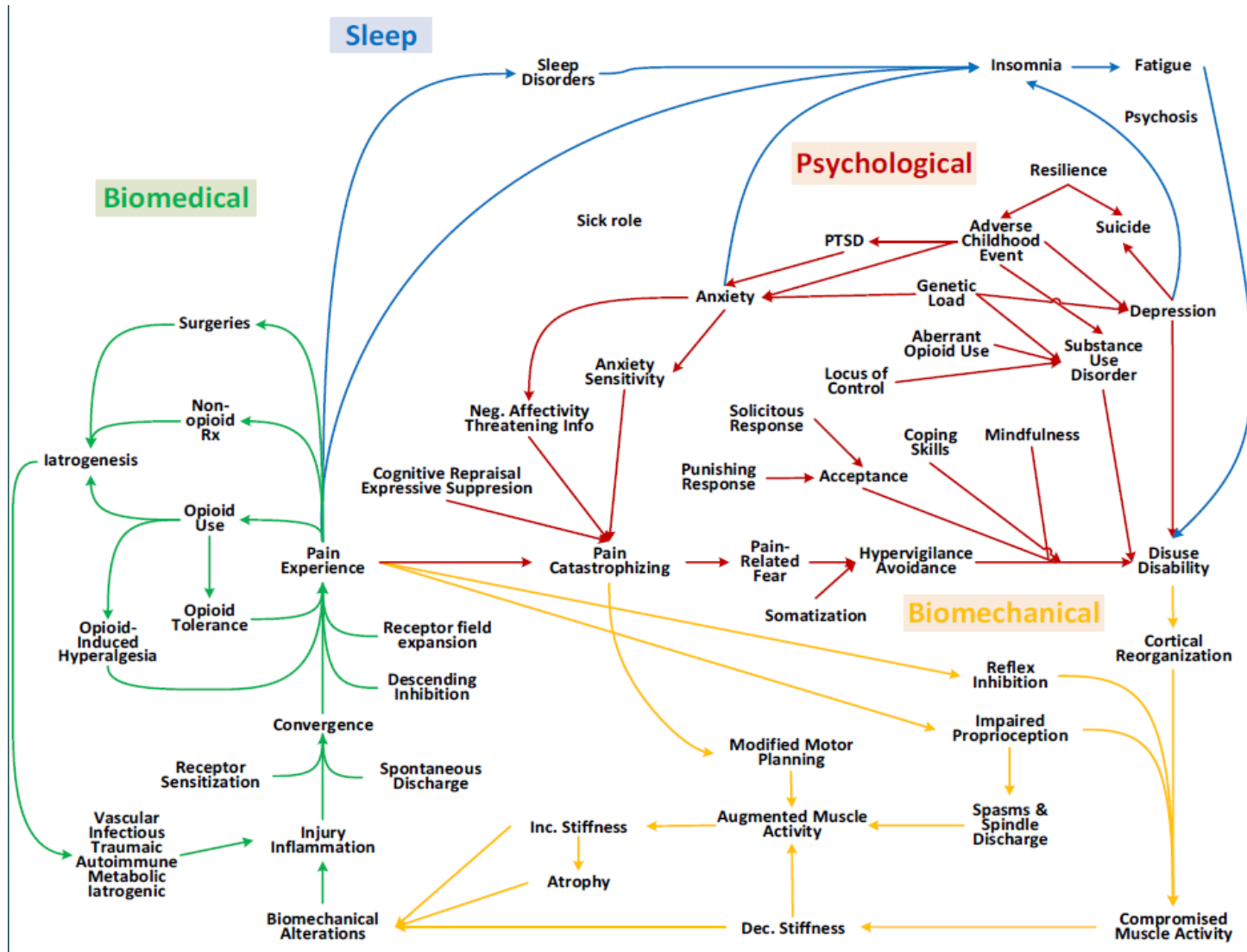


What causes pain?

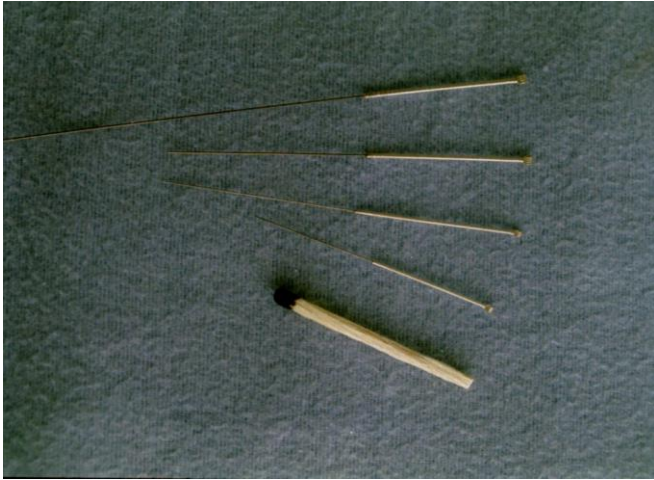


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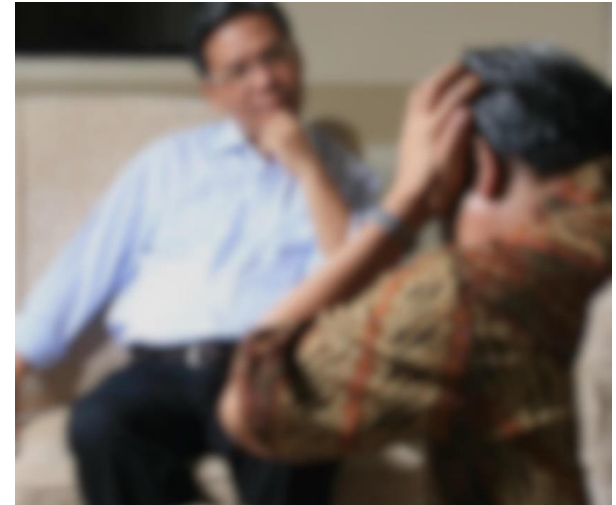
Extended Pain Cycle



Pain Treatment



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Does pain serve any function or purpose?





Is All Pain the Same?

Acute Pain

- ✦ Hurt = Harm
 - Avoidance decreases damage
- ✦ Etiology:
 - Clear pathway
 - Often single cause
- ✦ Treatment Course
 - Fixed end point
 - Immobilization often essential for recovery
 - Medications

Chronic Pain

- ✦ Hurt \neq Harm
 - Fear-avoidance cycle
- ✦ Etiology:
 - Many unknowns
 - Multifactorial
- ✦ Treatment Course
 - No fixed end point
 - Immobilization can worsen condition
 - Medications: Caution



Management Approach to Pain

- ❖ Similar to other chronic health conditions lacking a cure
- ❖ Focus on quality of life & functioning

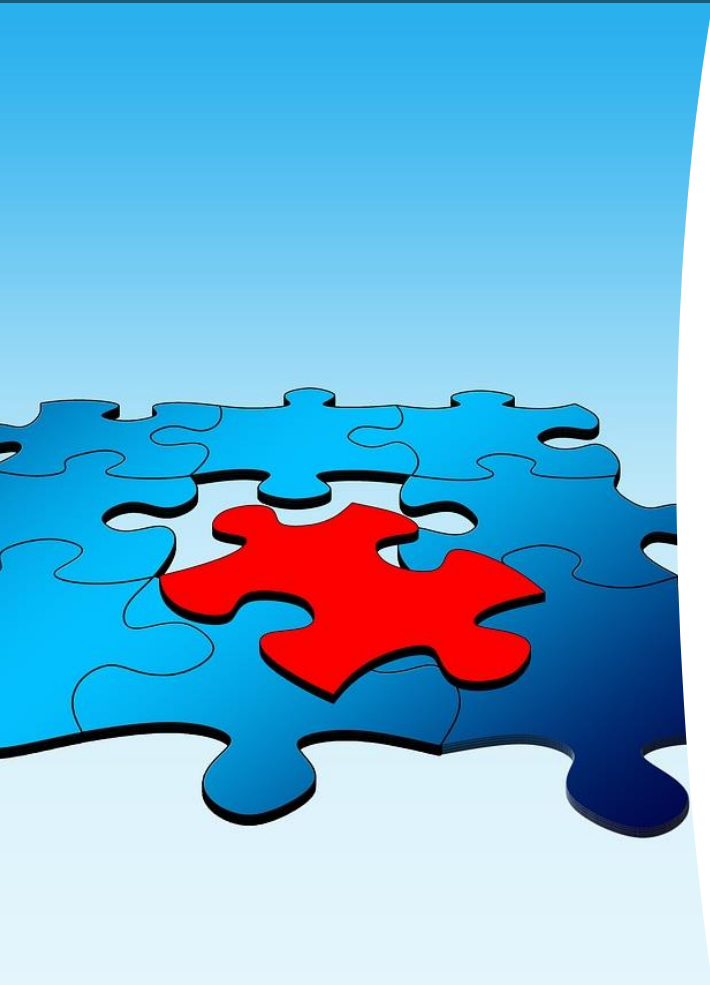


Example: Diabetes

- ✦ Regulate diet
- ✦ Check blood sugars
- ✦ Exercise regularly
- ✦ Take insulin/medications
- ✦ Monitor wounds



Chronic Pain Management



- ✧ Medical optimization
 - Physician, NP, PA
- ✧ Physical reconditioning
 - Rehabilitation provider (PT)
- ✧ Behavioral/lifestyle modification
 - Pain psychologist



Interdisciplinary Management

Diabetes

- ✦ Regulate diet
- ✦ Check blood sugars
- ✦ Exercise regularly
- ✦ Take insulin/medications
- ✦ Monitor wounds

Chronic Pain

- ✦ Medical optimization
- ✦ Physical reconditioning
- ✦ Behavioral/lifestyle modification



Learn to Live with Pain?

LIFE



Learn to Live with Pain?

LIFE

Family Friends Work School

Sports Leisure Self-care Music

Vacations Hobbies Dining

Entertainment Socializing

Cooking Cleaning Errands



Learn to Live with Pain?

LIFE

Family Friends Work School

Sports Leisure Self-care Music

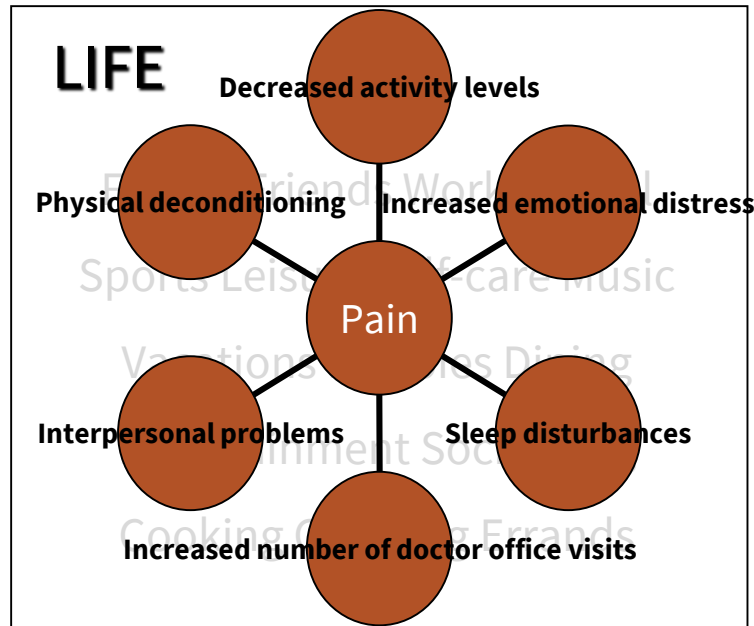
Vacation **Pain** Hobbies Dining

Entertainment Socializing

Cooking Cleaning Errands



Learn to Live with Pain?



Yes, Learn to Live with Pain!

LIFE

Family Friends Work School

Sports Leisure Self-care Music

Vacations Hobbies Dining

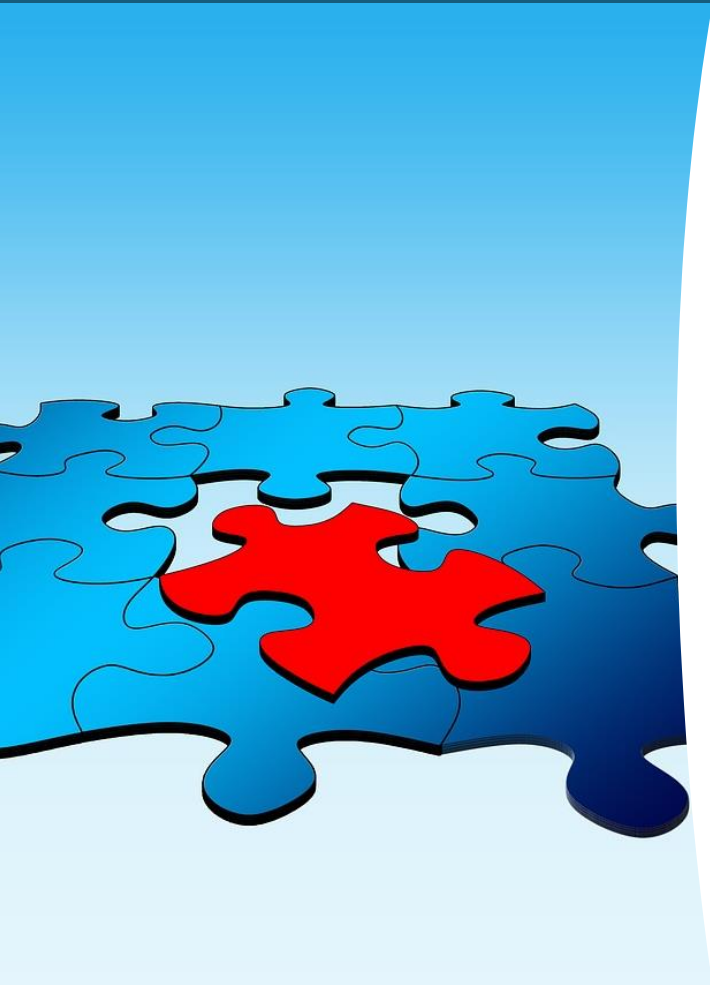
Entertainment Socializing

Cooking Cleaning Errands

Pain



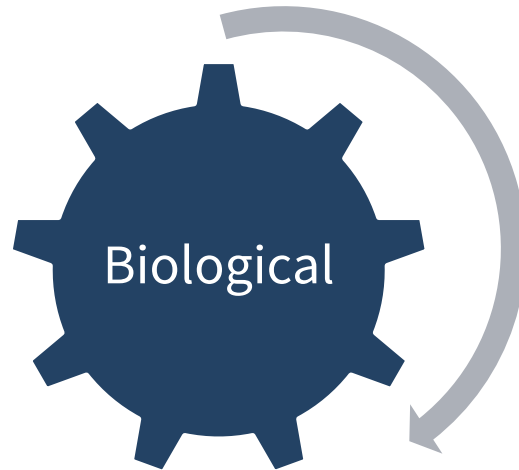
Chronic Pain Management



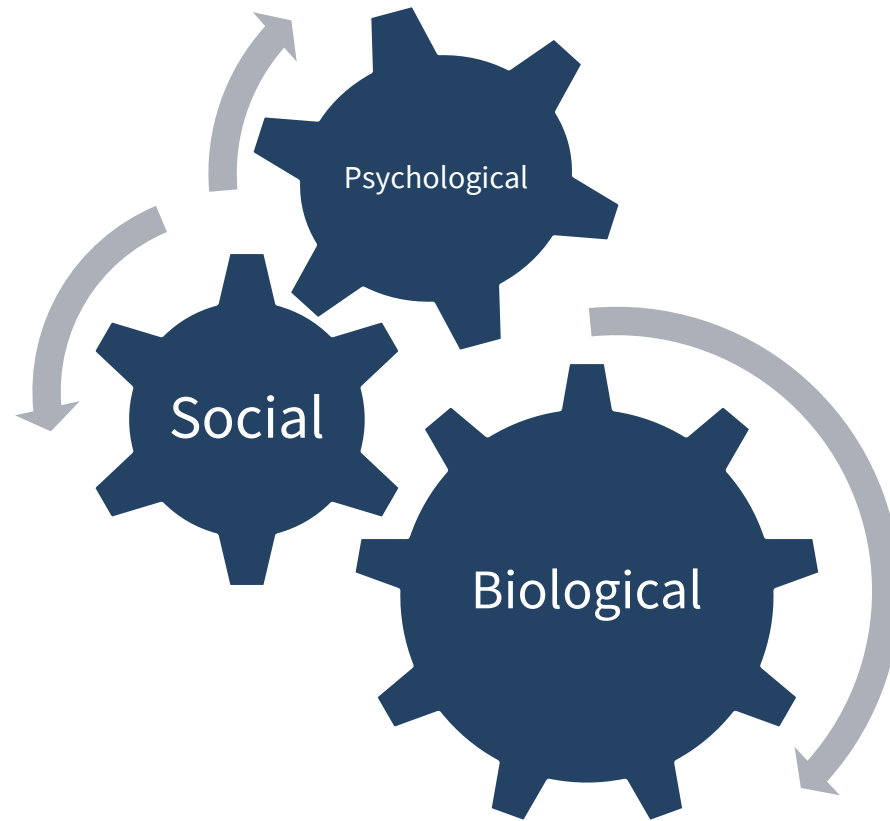
- ✧ Medical optimization
 - Physician, NP, PA
- ✧ Physical reconditioning
 - Rehabilitation provider (PT)
- ✧ Behavioral/lifestyle modification
 - Pain psychologist



Biomedical Approaches vs. Biopsychosocial Management



Biomedical Approaches vs. Biopsychosocial Management



Cognitive Behavioral Therapy (CBT)

✦ Three primary components:

- Helping patients understand how thoughts/behaviors can influence their experience of pain and their ability to impact this relationship
- Teaching patients pain management coping strategies
- Helping patients apply coping strategies and maintaining use of said skills over time



Common Pain Psychology Curriculum Components

- ✧ Overview of pain
- ✧ Pacing of activities
- ✧ Pain & stress physiology
- ✧ Relaxation training
- ✧ Sleep hygiene



Common Pain Psychology Curriculum Components

- ✦ Identifying environmental stressors (work & home)
- ✦ Development of stress management techniques (e.g., cognitive restructuring)
- ✦ Assertiveness/communication skills development
- ✦ Flare contingency planning

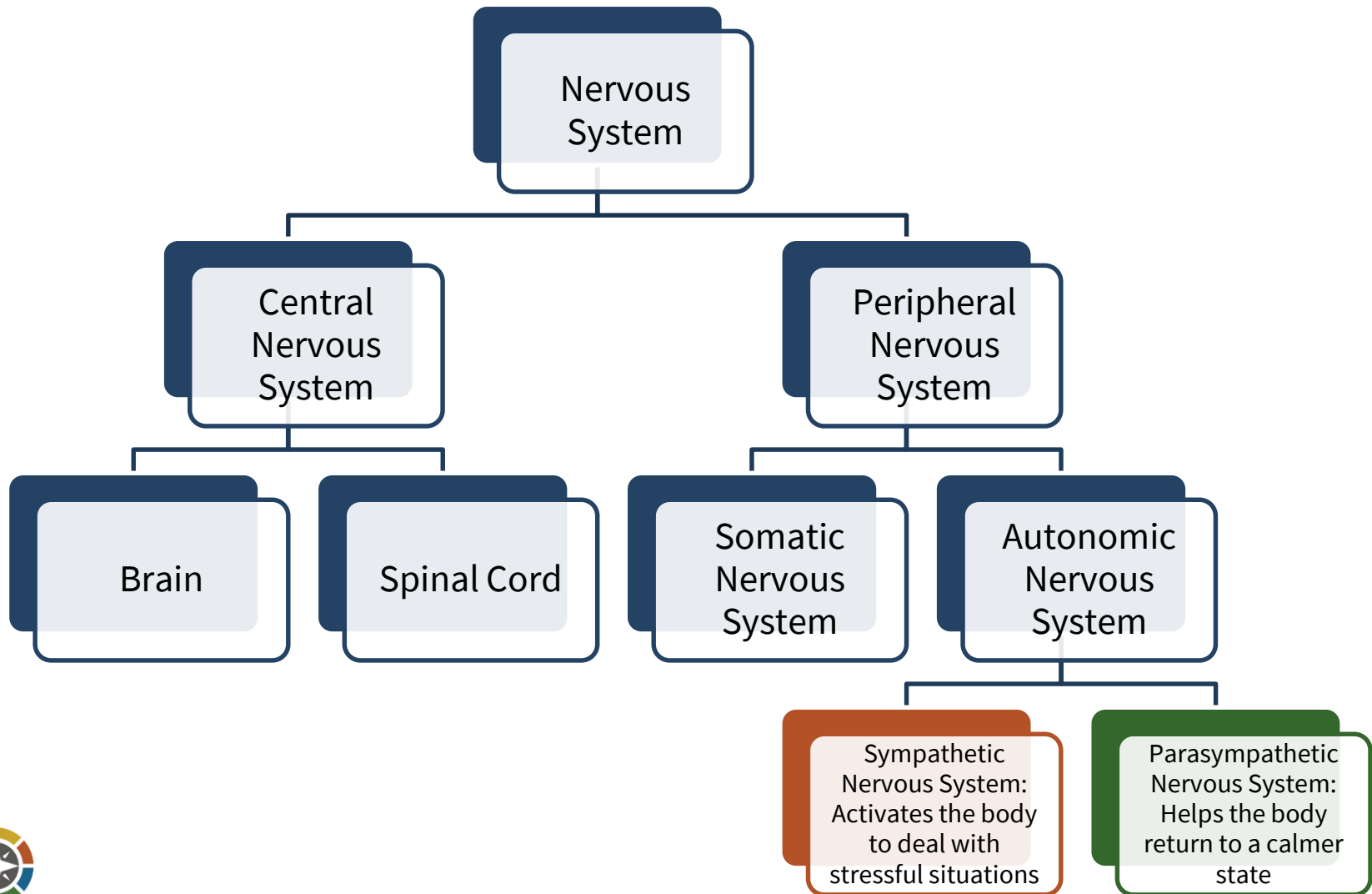


Deconstructing Pain Psychology

- ✦ Relaxation training
- ✦ The role of cognitive processes



Stress and the Nervous System



Stress and the Nervous System

Sympathetic Activation

- ✧ Increased heart rate
- ✧ Increased blood pressure
- ✧ Increased muscle tension
- ✧ Constriction of blood vessels
- ✧ Release of cortisol
- ✧ Pupil dilation
- ✧ Change in breathing patterns
- ✧ Additional systemic changes



Stress and the Nervous System

Parasympathetic Activation

- ✧ Decreased heart rate
- ✧ Decreased blood pressure
- ✧ Decreased muscle tension
- ✧ Expansion of blood vessels
- ✧ Discontinuation of cortisol release
- ✧ Pupil constriction
- ✧ Change in breathing patterns
- ✧ Additional systemic changes

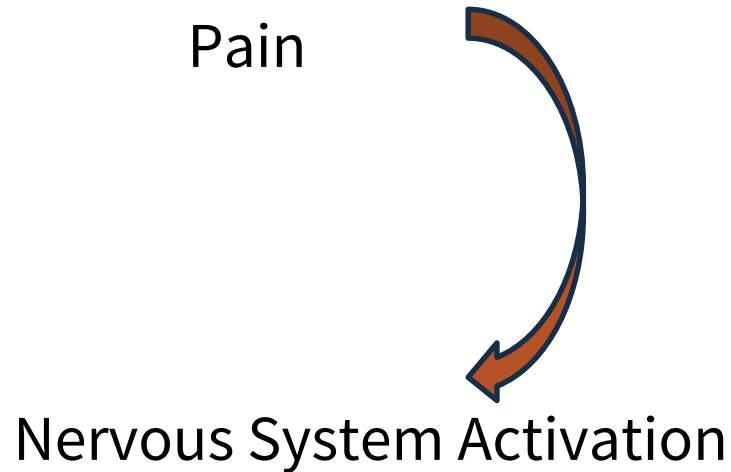
Stress, the Nervous System, and Pain

Pain

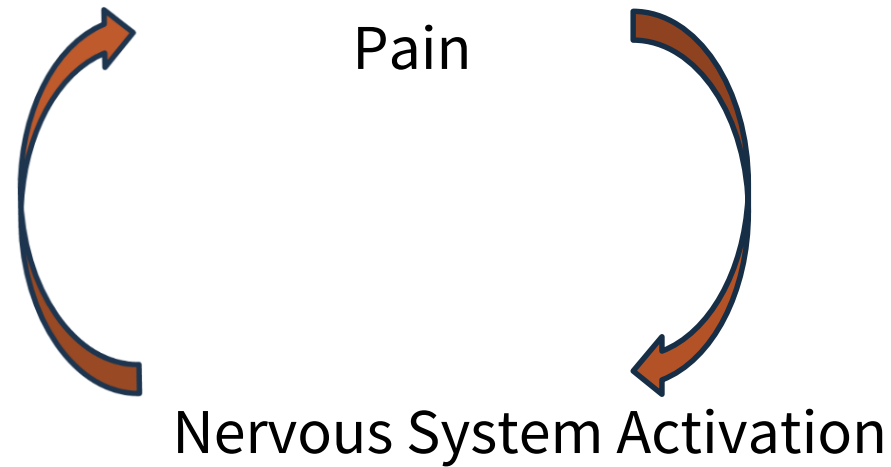
Nervous System Activation



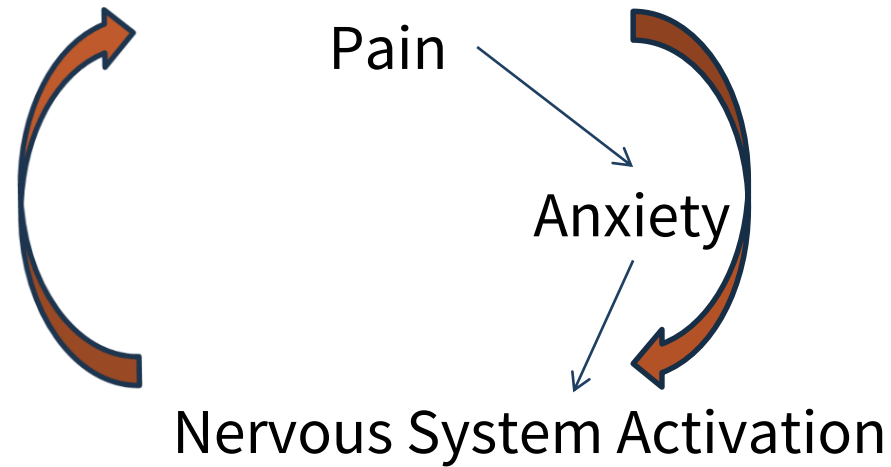
Stress, the Nervous System, and Pain



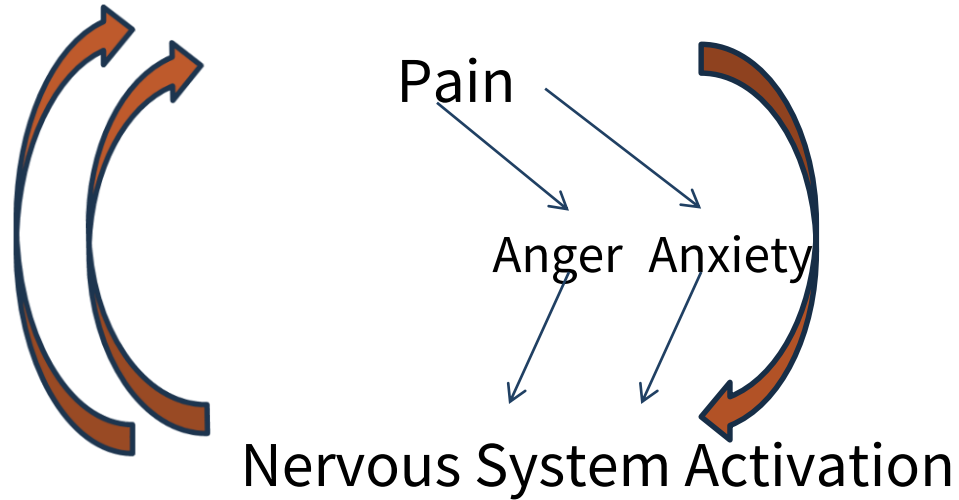
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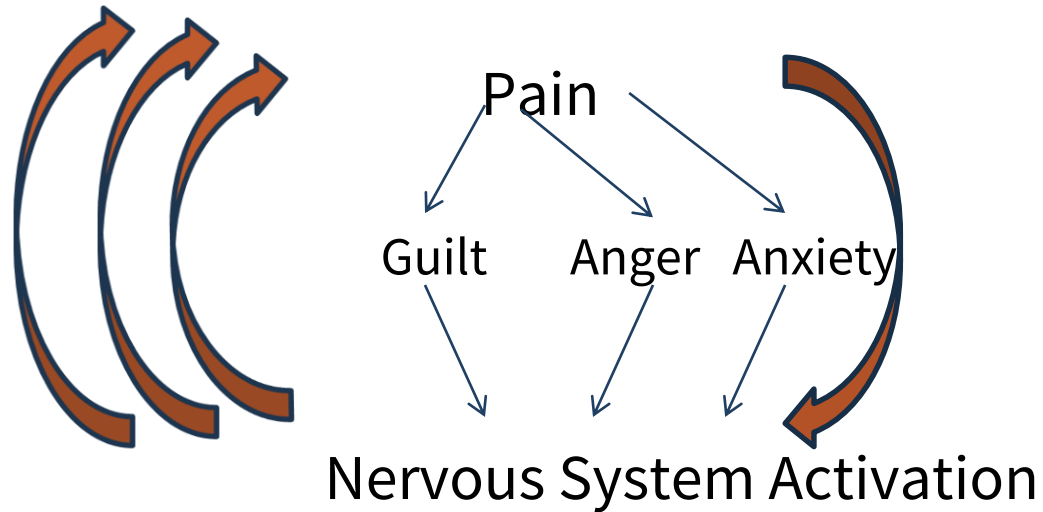
Stress, the Nervous System, and Pain



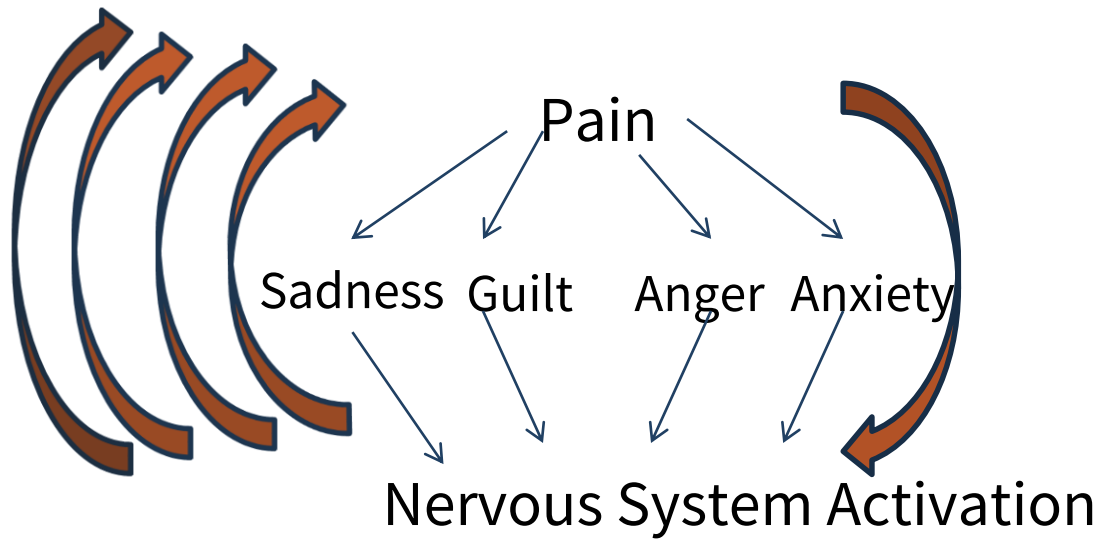
Stress, the Nervous System, and Pain



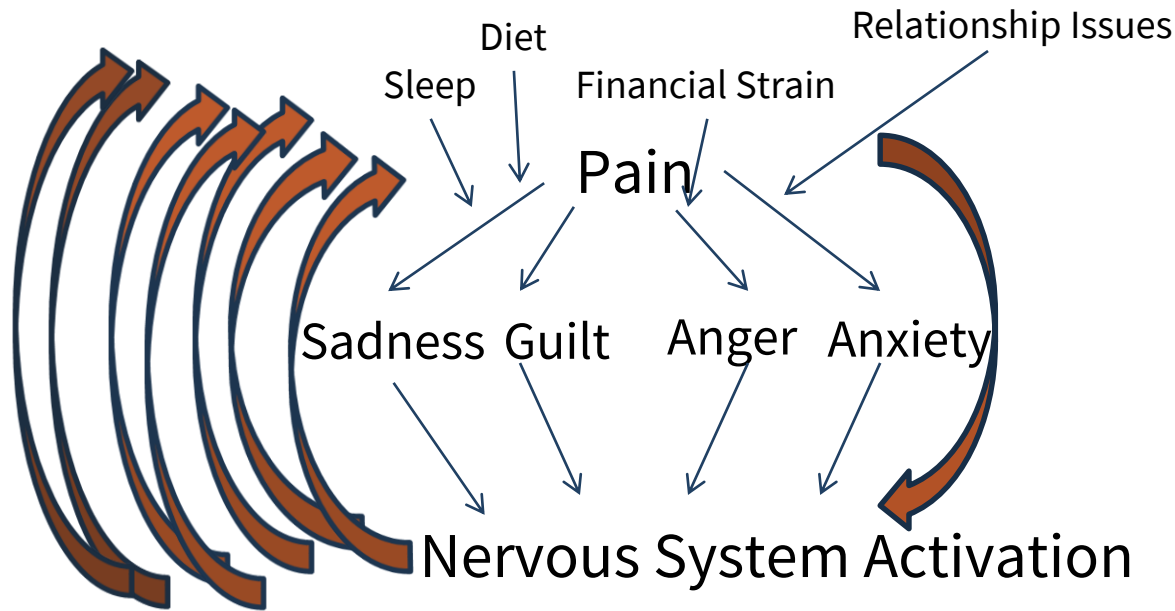
Stress, the Nervous System, and Pain



Stress, the Nervous System, and Pain



Stress, the Nervous System, and Pain



Relaxation Training

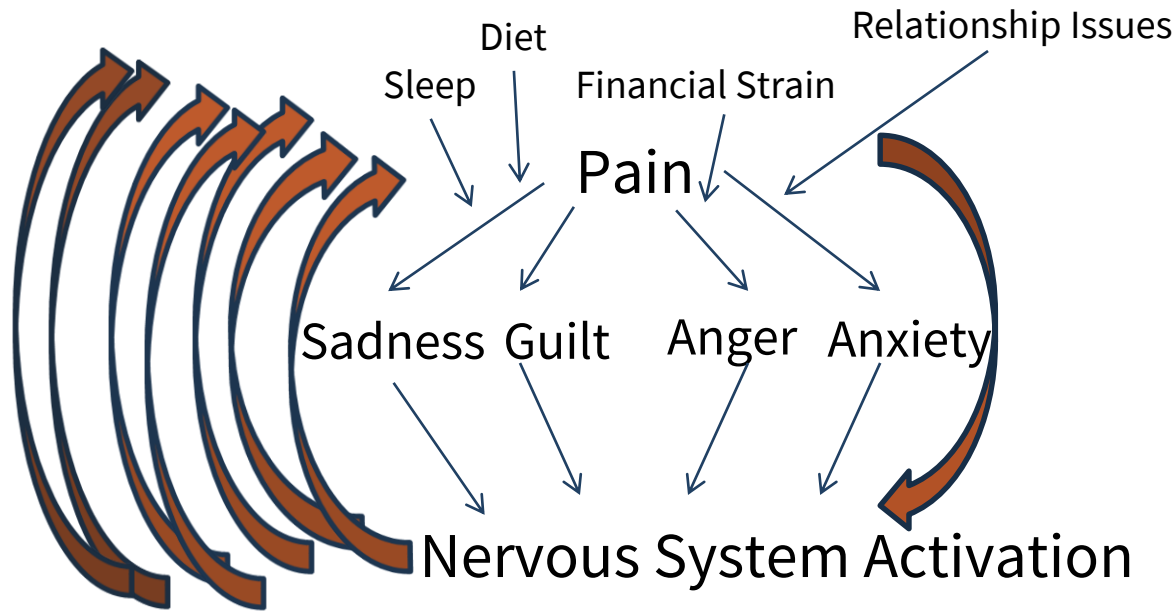


✧ Breathing exercises

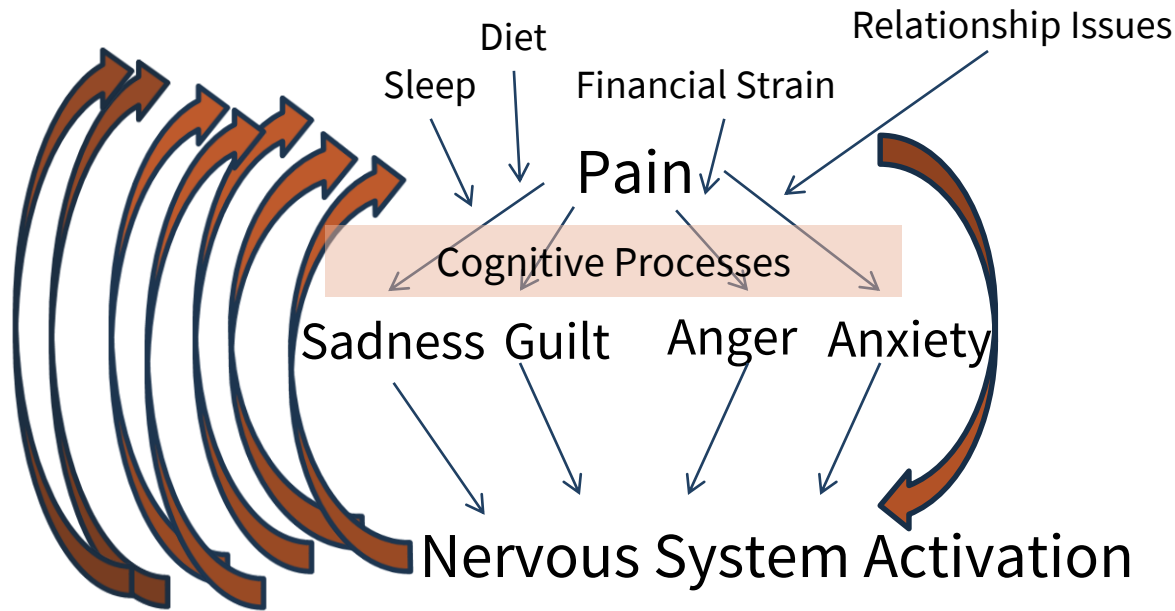
- Parasympathetic activity
- Distraction



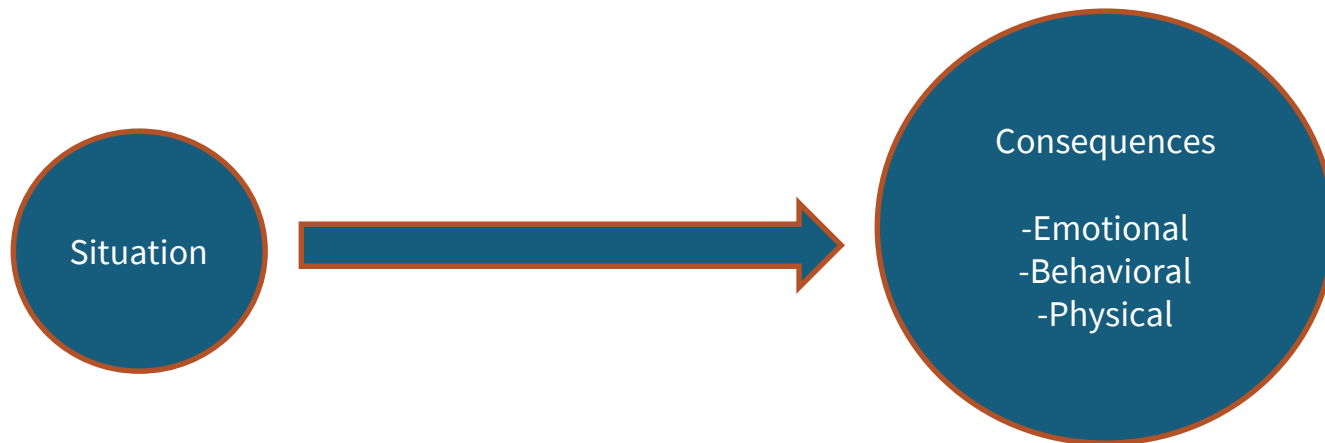
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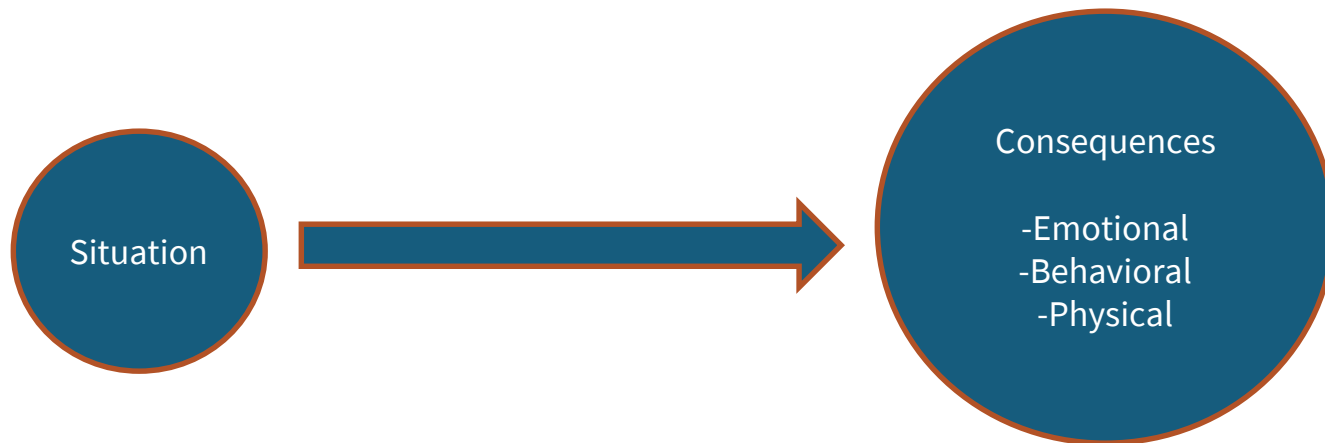
Stress, the Nervous System, and Pain



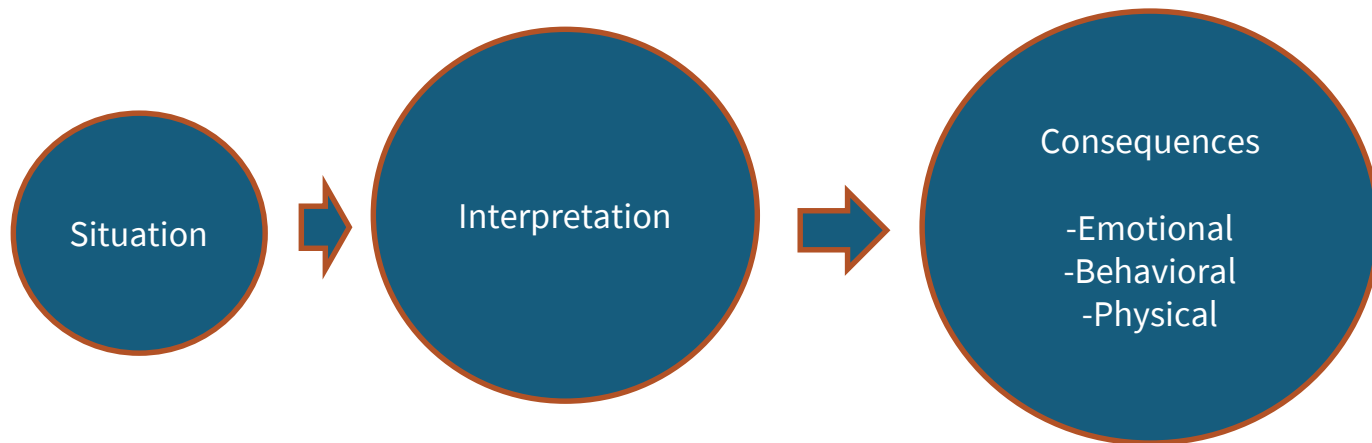
The Role of Cognitions



The Role of Cognitions



The Role of Cognitions



The Role of Cognitions

- ✦ Thought processes are often rooted in our core perception of ourselves and our roles in this world
- ✦ Usually shaped by early experiences
- ✦ Much of our maladaptive behaviors are rooted in dysfunctional thought patterns
- ✦ Can take a significant amount of time and work to alter our automatic thought processes



Catastrophization

- ✦ Exaggerated perception of a situation being worse than it actually is
 - Magnification
 - Rumination
 - Helplessness



Catastrophization

✦ Implications

- Pain expectations → affective distress
- Somatic hypervigilance/attention → increased pain perception
- Activity reduction coping strategy → fear-avoidance cycle
- Persistent symptoms
- Disability



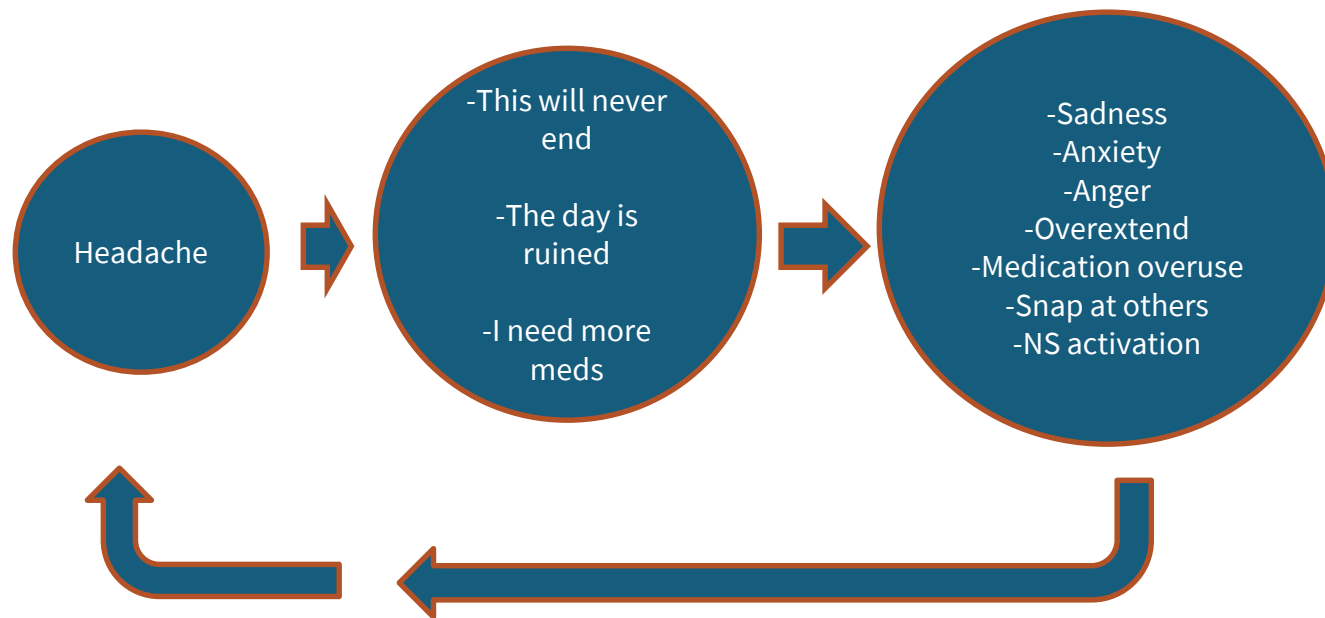
Goal of Cognitive-Behavioral Therapy (CBT)

✦ Target maladaptive thought process to achieve healthier outcomes

- Emotional
- Behavioral
- Physiologic



Using CBT: Pain Flare Example



Cognitive Restructuring

- ✦ Is this helpful?
- ✦ Is this accurate?



Cognitive Restructuring

Previous Thoughts

- ✦ This will never end
- ✦ The day is ruined
- ✦ I need meds

Modify Thoughts

- ✦ Are these statements helpful?
- ✦ Are these statements accurate?



Cognitive Restructuring

Previous Thoughts

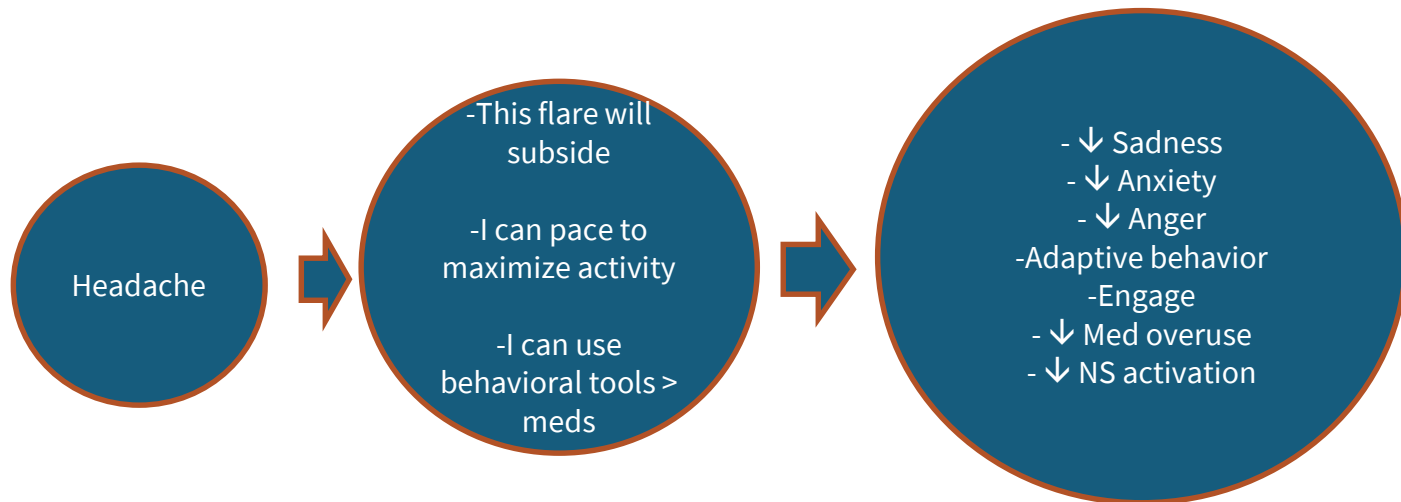
- ✦ This will never end
- ✦ The day is ruined
- ✦ I need more meds

Modified Thoughts

- ✦ My pain condition may be chronic but I know that this flare will eventually subside
- ✦ I don't know what the rest of the day will be like but I will make the most of it by pacing
- ✦ I can use behavioral tools to influence my pain rather than reaching for more medication



Using CBT: Pain Flare Example



Empirically Validated Treatment: Self-Management Education

- ✦ Lambeek, Van Mechelen, Knol, Loisel, Anema (2010)
- ✦ Buchner, Zahlten-Hinguranage, Schiltenswolf, Neubauer (2006)
- ✦ Linton & Ryberg (2001)
- ✦ Flor, Fydrich, Turk (1992)



Empirically Validated Treatment

✦ Linton & Andersson (2000)

- Randomized control trial (RCT; $n=213$)
- All patients received regular primary care treatment + Minimal Treatment (information pack, pamphlet) or 6-session CBT treatment.
- Assessments administered at pretest and 12-month follow-up
- Risk for developing long-term sick absence decreased 9x in CBT group
- CBT participants had decreased medical utilization compared to increase in other groups



Empirically Validated Treatment

✧ Linton & Nordin (2006)

- 5-year follow-up of Linton & Andersson (2000) study, also used supplemental records from the National Insurance Authority
- 97% completed follow-up questionnaire
- CBT group had significantly less pain, higher activity, better quality of life, and better general health compared to Minimal Treatment Group
- Risk of long-term sick leave 3x higher in the non-CBT group
- CBT group had significantly less lost productivity costs



Empirically Validated Treatment

- ✧ Gatchel, Polatin, Noe, Gardea, Pulliam, Thompson (2003)
 - Patients deemed high-risk (HR) for development of chronic disability were randomly assigned to an early intervention functional restoration (FR) group ($n=22$) or a non-intervention group ($n=48$). Low risk non intervention subjects also evaluated ($n=54$).
 - Patients tracked at 3 month intervals over the course of a year
 - HR patients in the early intervention group had significantly lower rates of healthcare utilization, medication use, and self-report pain variables



Empirically Validated Treatment

- ✦ [continued] Gatchel, Polatin, Noe, Gardea, Pulliam, Thompson (2003)
 - HR non-intervention group displayed more symptoms of chronic pain disability compared to low risk subjects
 - Greater cost savings associated with early intervention (\$12,721) vs no intervention group (\$21,843). Cost variables included healthcare visits, medication, lost wages, early intervention program cost.



Systematic Review & Meta-Analysis of CBT for Migraine

- ✦ Primary outcomes: migraine frequency, visual analogue scale (VAS) intensity, frequency of drug use, Migraine Disability Assessment (MIDAS), Headache Impact Test (HIT-6)
- ✦ Reduction in headache (HA) frequency and MIDAS scores
- ✦ Subgroup analysis showed reduction in HA intensity
- ✦ Limitations
 - Differences in interventions
 - Differences in comparators



Other Literature Findings

- ✦ 373 Comprehensive Pain Rehabilitation Program (CPRP) participants (3 week)
- ✦ ~57% on opioids at admission
- ✦ Assessments at admission, discharge, and 6-month (70% return rate; pain severity, depression, psychosocial functioning, health status, pain catastrophizing)
- ✦ Pain severity and depression higher in opioid users at admission
- ✦ Significant improvement on all variables at discharge, 6-month follow-up regardless of opioid status



Other Literature Findings

- ✦ 705 (600 completed) outpatient interdisciplinary program participants
- ✦ Opioid group tapered with cocktail
- ✦ Opioid group improved the same as or more than non-opioid group (pain severity, catastrophizing, sleep, treatment satisfaction, pain-related functioning domains)



Empirically Validated Treatment

Annals of Internal Medicine

ORIGINAL RESEARCH

Literacy-Adapted Cognitive Behavioral Therapy Versus Education for Chronic Pain at Low-Income Clinics

A Randomized Controlled Trial

Beverly E. Thorn, PhD; Joshua C. Eyer, PhD; Benjamin P. Van Dyke, MA; Calia A. Torres, MA; John W. Burns, PhD; Minjung Kim, PhD; Andrea K. Newman, MA; Lisa C. Campbell, PhD; Brian Anderson, PsyD; Phoebe R. Block, MA; Bentley J. Bobrow, MD; Regina Brooks; Toya T. Burton, DC, MPH; Jennifer S. Cheavens, PhD; Colette M. DeMonte, PsyD; William D. DeMonte, PsyD; Crystal S. Edwards; Minjeong Jeong, PhD; Mazheruddin M. Mulla, MA, MPH; Terence Penn, BS; Laura J. Smith, BA; and Deborah H. Tucker, MBA*

(2018) Ann Intern Med. 168(7):471-480. doi:10.7326/M17-0972 <http://annals.org/aim/fullarticle/2673506/literacy-adapted-cognitive-behavioral-therapy-versus-education-chronic-pain-low?guestAccessKey=80fd617a-8806-454f-884f-4df3a51d7ee6>



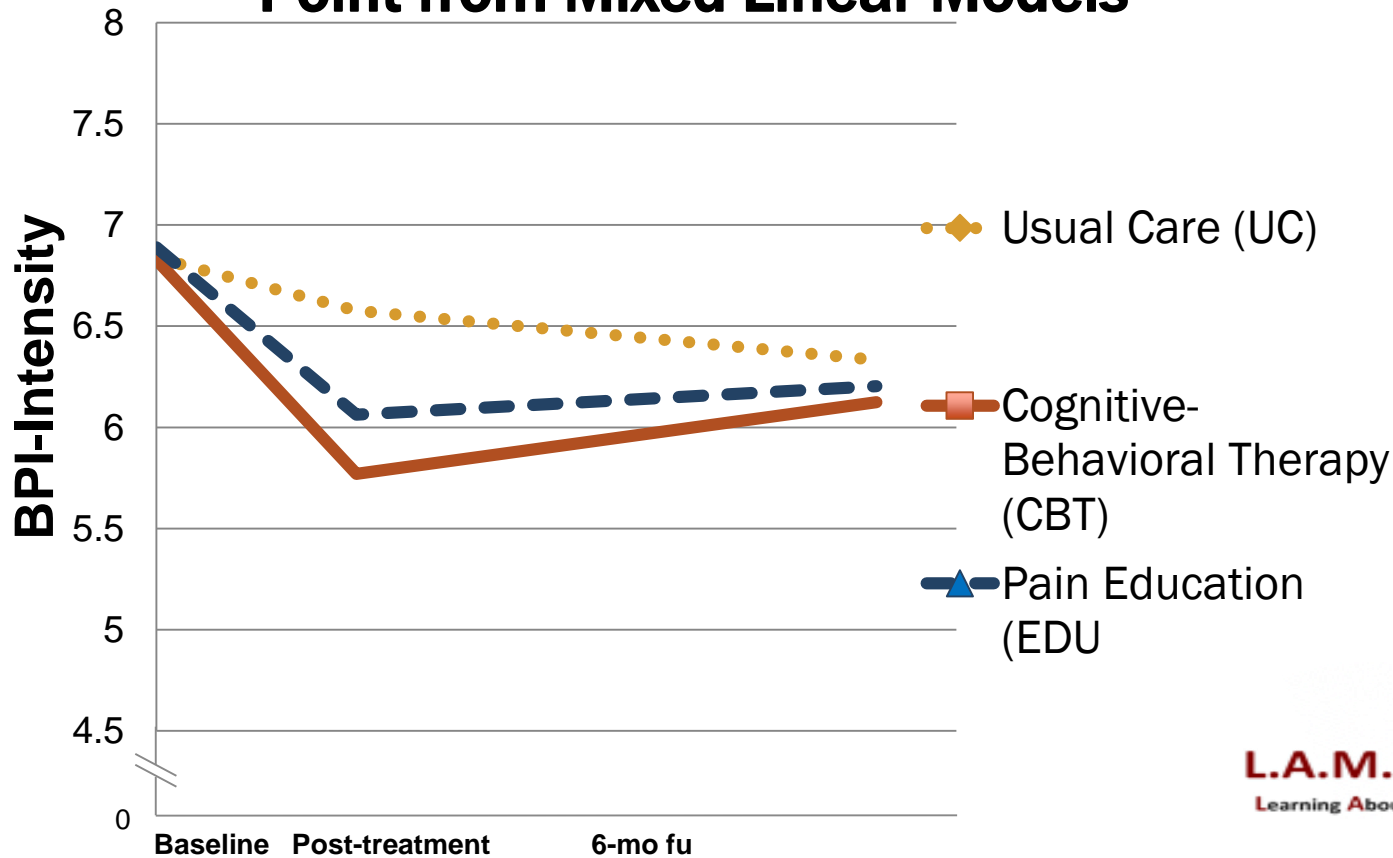
Participant Data

- ✧ 290 participants who had on average:
 - Pain in greater than 6 sites
 - Greater than 4 pain etiologies
 - Pain present for longer than 15-years

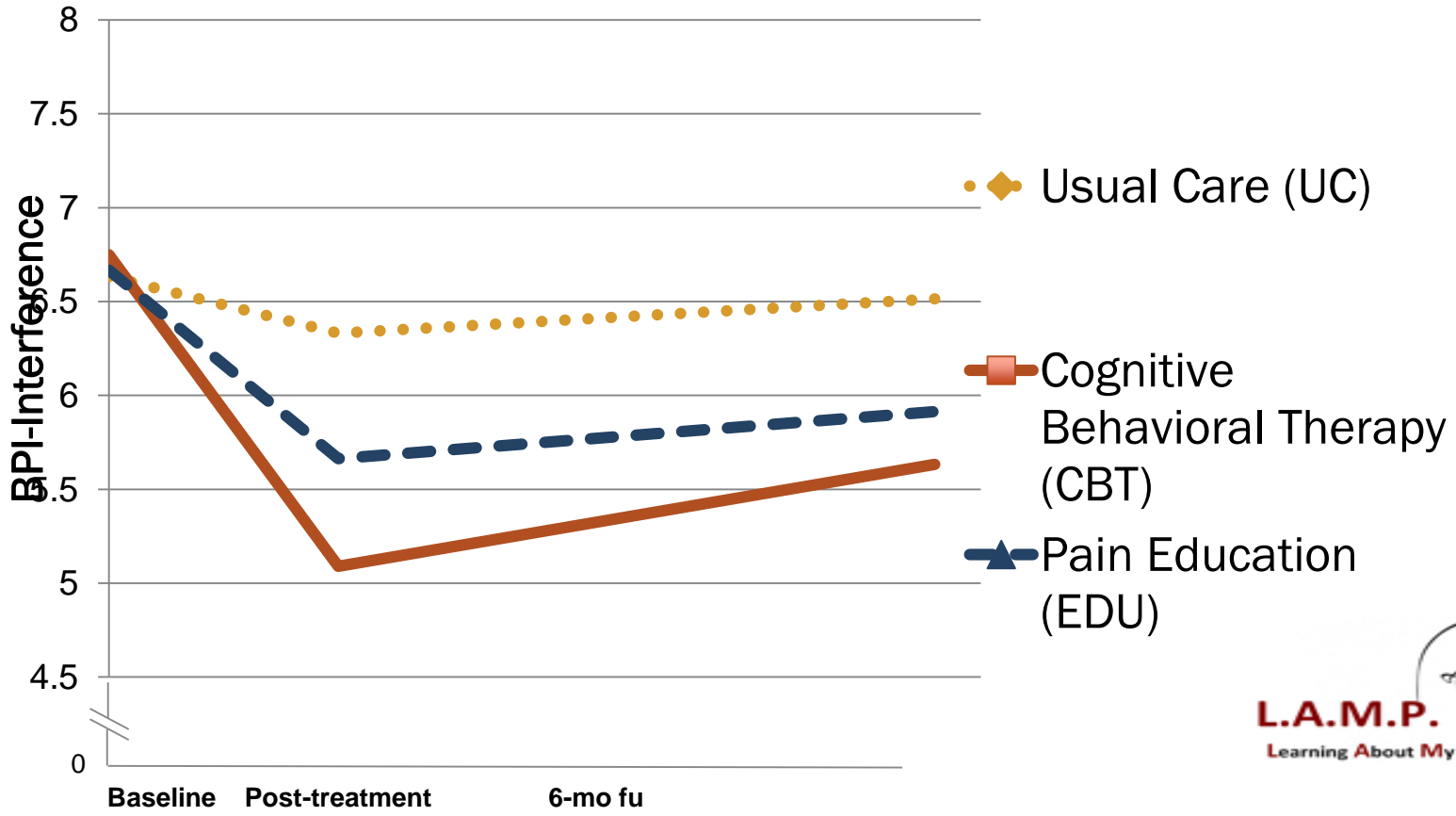
- ✧ Other characteristics
 - 67% Black/African American
 - 72% at or below the poverty level
 - 36% reading below the 5th-grade level,
 - 83% living on or seeking disability benefits
 - 43% no health insurance



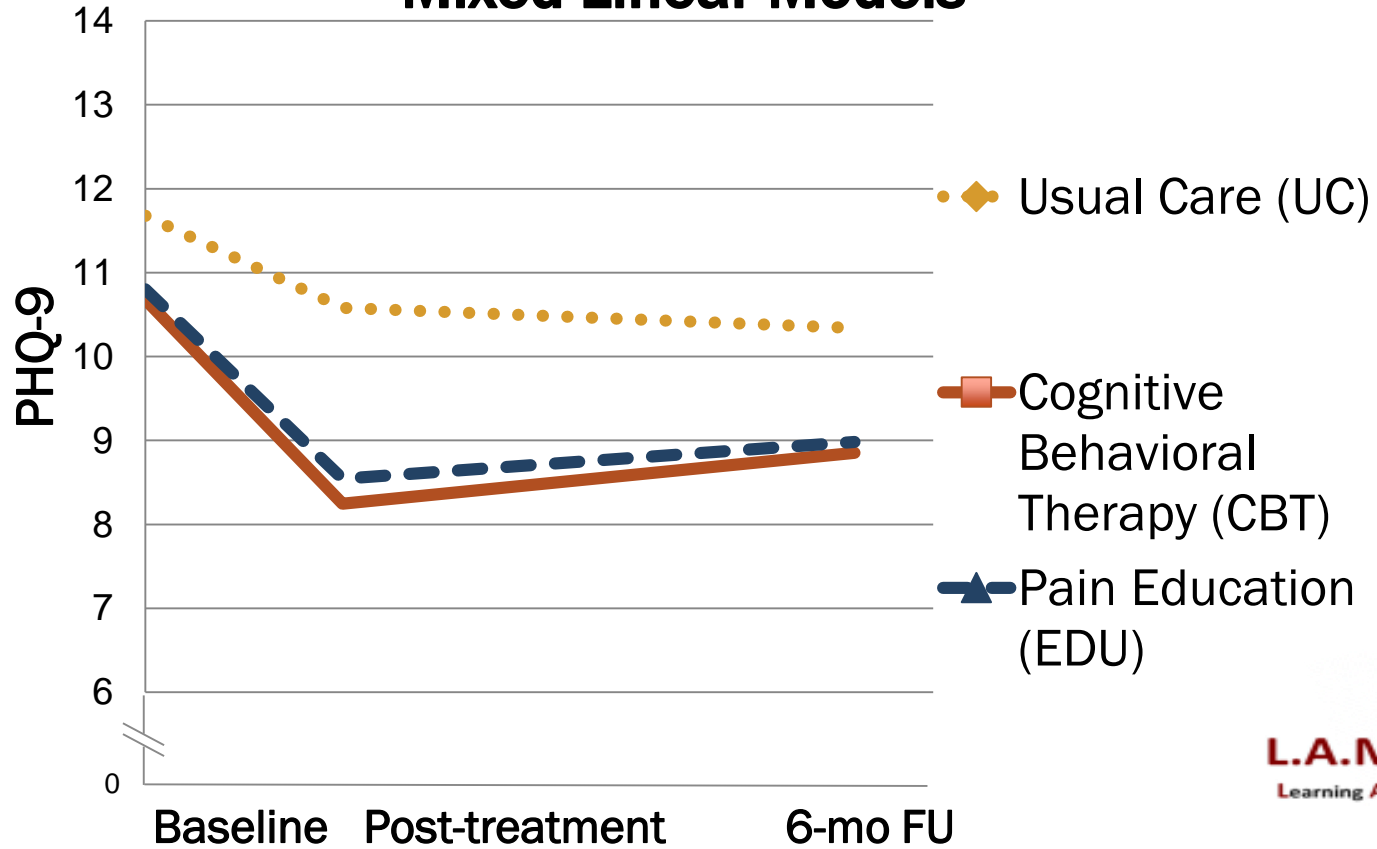
Estimated Mean Pain Severity Scores (BPI-Severity) by Condition and Time Point from Mixed Linear Models



Estimated Mean Physical Function Scores (BPI-Interference) by Condition and Time Point from Mixed Linear Models



Estimated Mean Depression Scores (PHQ-9) by Condition by Time Point from Mixed Linear Models



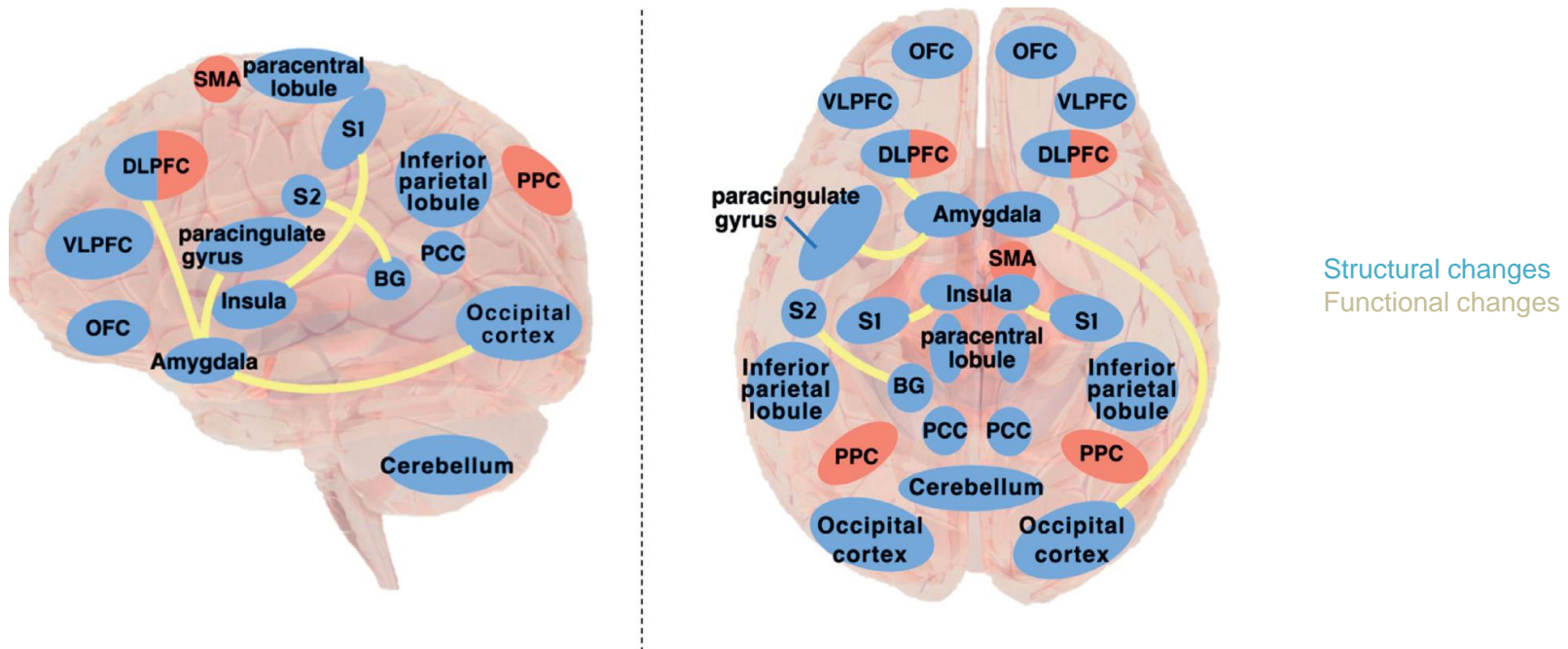
Neuroplastic Associations

- ✧ Imaging studies following CBT reflect changes in activity and/or gray matter volume of the following brain regions:
 - Dorsolateral prefrontal cortex
 - Orbitofrontal cortex
 - Ventrolateral prefrontal cortex
 - Posterior cingulate cortex
 - Amygdala

Bao, S., Qiao, M., Lu, Y., & Jiang, Y. (2022). Neuroimaging Mechanism of Cognitive Behavioral Therapy in Pain Management. *Pain research & management*, 2022, 6266619. <https://doi.org/10.1155/2022/6266619>



Neuroplastic Associations



Bao, S., Qiao, M., Lu, Y., & Jiang, Y. (2022). Neuroimaging Mechanism of Cognitive Behavioral Therapy in Pain Management. *Pain research & management*, 2022, 6266619. <https://doi.org/10.1155/2022/6266619>



Neuroplastic Associations

- ✦ RCT comparing CBT to pain education shows fMRI changes in limbic and prefrontal regions following participation in the former
 - CBT participants noted significant improvements in pain and self-efficacy for coping with chronic pain
 - Imaging findings correlated with clinical outcomes observed
- ✦ Overall, structural changes/activation are associated with:
 - Enhanced pain control
 - Cognitive reassessment
 - Altered perception of stimuli

Shpaner, M., Kelly, C., Lieberman, G., Perelman, H., Davis, M., Keefe, F. J., & Naylor, M. R. (2014). Unlearning chronic pain: A randomized controlled trial to investigate changes in intrinsic brain connectivity following Cognitive Behavioral Therapy. *NeuroImage. Clinical*, 5, 365–376.

<https://doi.org/10.1016/j.nicl.2014.07.008>



Bao, S., Qiao, M., Lu, Y., & Jiang, Y. (2022). Neuroimaging Mechanism of Cognitive Behavioral Therapy in Pain Management. *Pain research & management*, 2022, 6266619. <https://doi.org/10.1155/2022/6266619>



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Beyond CBT



Evidence-Based Psychological Approaches

Biofeedback

Acceptance and
Commitment
Therapy (ACT)

Mindfulness-Based
Interventions

Emotional
Awareness and
Expression
Therapy (EAET)

Pain Reprocessing
Therapy



Conclusions

- ✦ Chronic pain involves an interplay among biological, psychological, and social factors; thus, it is essential to employ a biopsychosocial approach to conceptualizing its etiology and treatment
- ✦ Treatment for chronic pain conditions focus on maximizing functioning and improving quality of life
- ✦ There are a wide range of evidence-based psychological treatments for pain



Conclusions

- ✦ Which treatment is best matched for the patient is determined after a comprehensive psychological evaluation that obtains information on a wide range of psychosocial factors known to impact the experience of pain
- ✦ It is important for other members of the interdisciplinary team to reinforce the approaches being used by their colleagues to promote patient engagement



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Twitter: [@RaviPrasadPhD](https://twitter.com/RaviPrasadPhD)

Thank you!

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