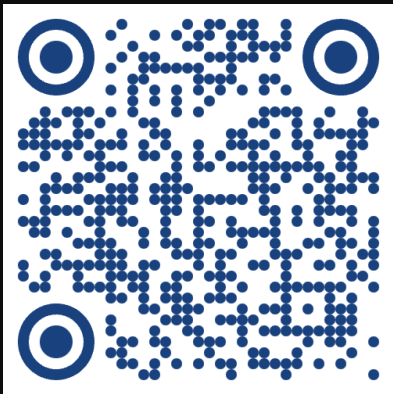



Risk Factors in the Transition from Acute to Chronic Pain



Updated Slides



A movie poster for 'Monty Python and the Holy Grail'. The background is a bright blue sky with a few white clouds. In the upper right, a purple castle with spires and flags is visible. A large, golden chalice is held by a hand in the foreground, with several characters from the film appearing to be inside or around it. The characters include a man in a white tunic with a sun emblem, a man with a beard and a white cap, a man with a mustache, a woman with dark hair, a man with a beard and a blue tunic, and a man in a chainmail surcoat. The title 'MONTY PYTHON and the Holy Grail' is written in a golden, serif font on the left side. The word 'MONTY PYTHON' is on the top line, 'and the' is smaller and on the second line, and 'Holy Grail' is the largest and on the third line. A thin red line is under 'MONTY PYTHON'.

MONTY PYTHON
and the
Holy Grail

(Bouter et al., 2003)

A red pushpin is stuck into a map, with the text "Today's Roadmap" overlaid in white. The map shows various colored lines representing roads and geographical features. The background is a light gray color.

Today's Roadmap

- Introductions
- Biomedical model fails to fix the problem of pain



INTRODUCTIONS

- *Serendipity*: The unexpected good luck resulting from unplanned moments in which proactive decisions lead to positive outcomes.

BISON HEALTH INNOVATIONS



KAISER
PERMANENTE®

Serendipitous Hooks

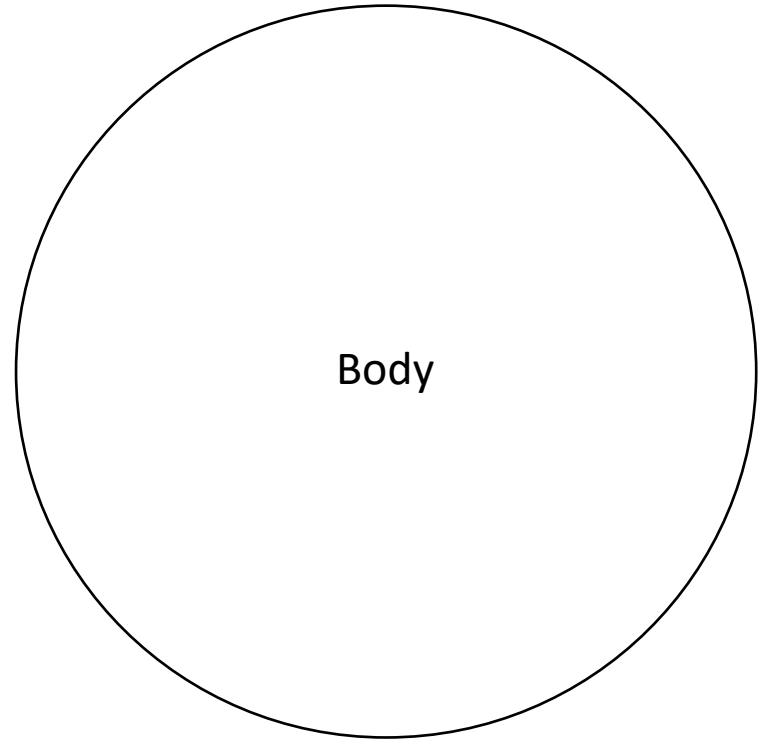
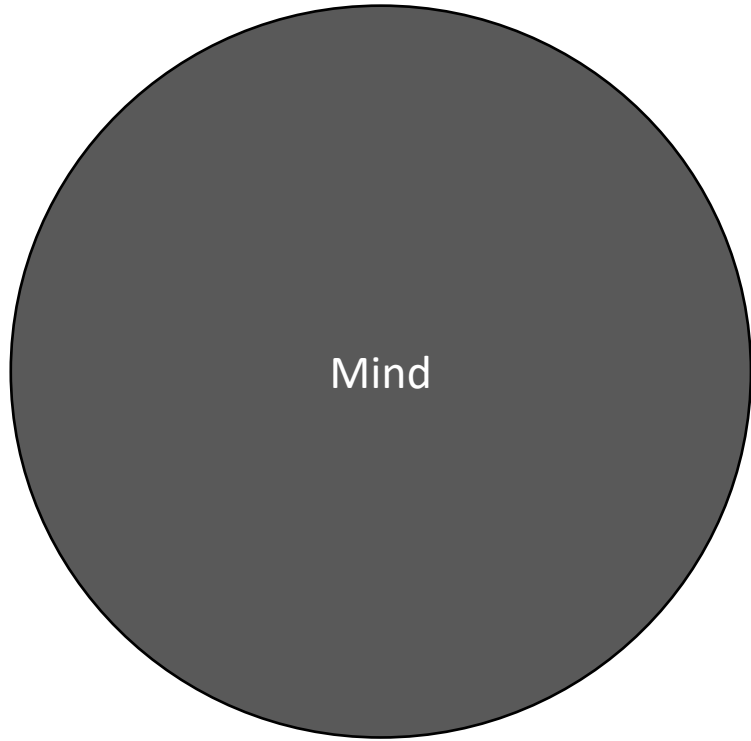
- What excites you right now?
- What are you looking forward to?
- What's the best thing that's happened to you this year?
- Where did you grow up?
- What do you do for fun?
- Who is your favorite superhero?
- Is there a charitable cause you support?
- What's the most important thing I should know about you?





Cogito ergo sum.

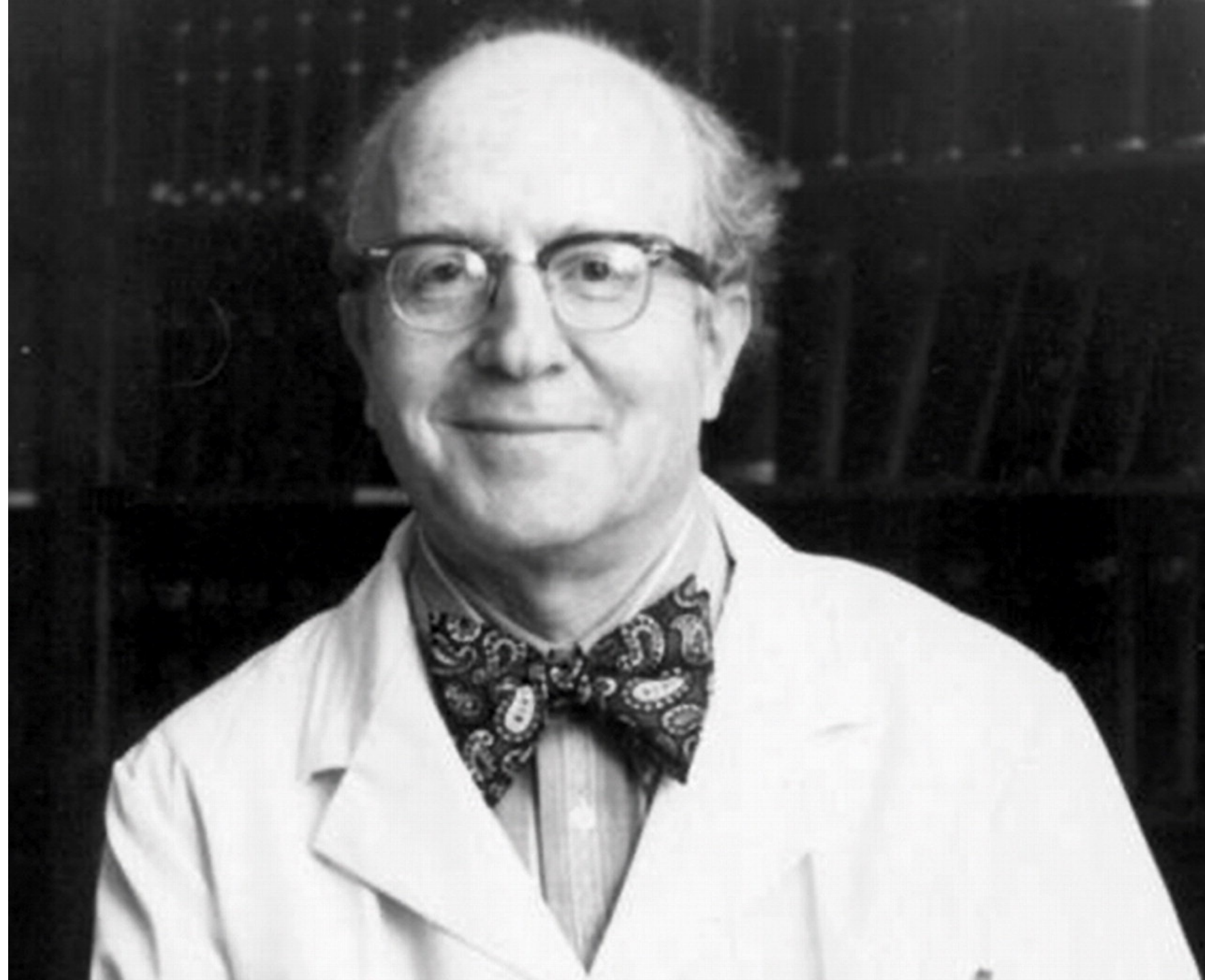
Mind-Body Dualism



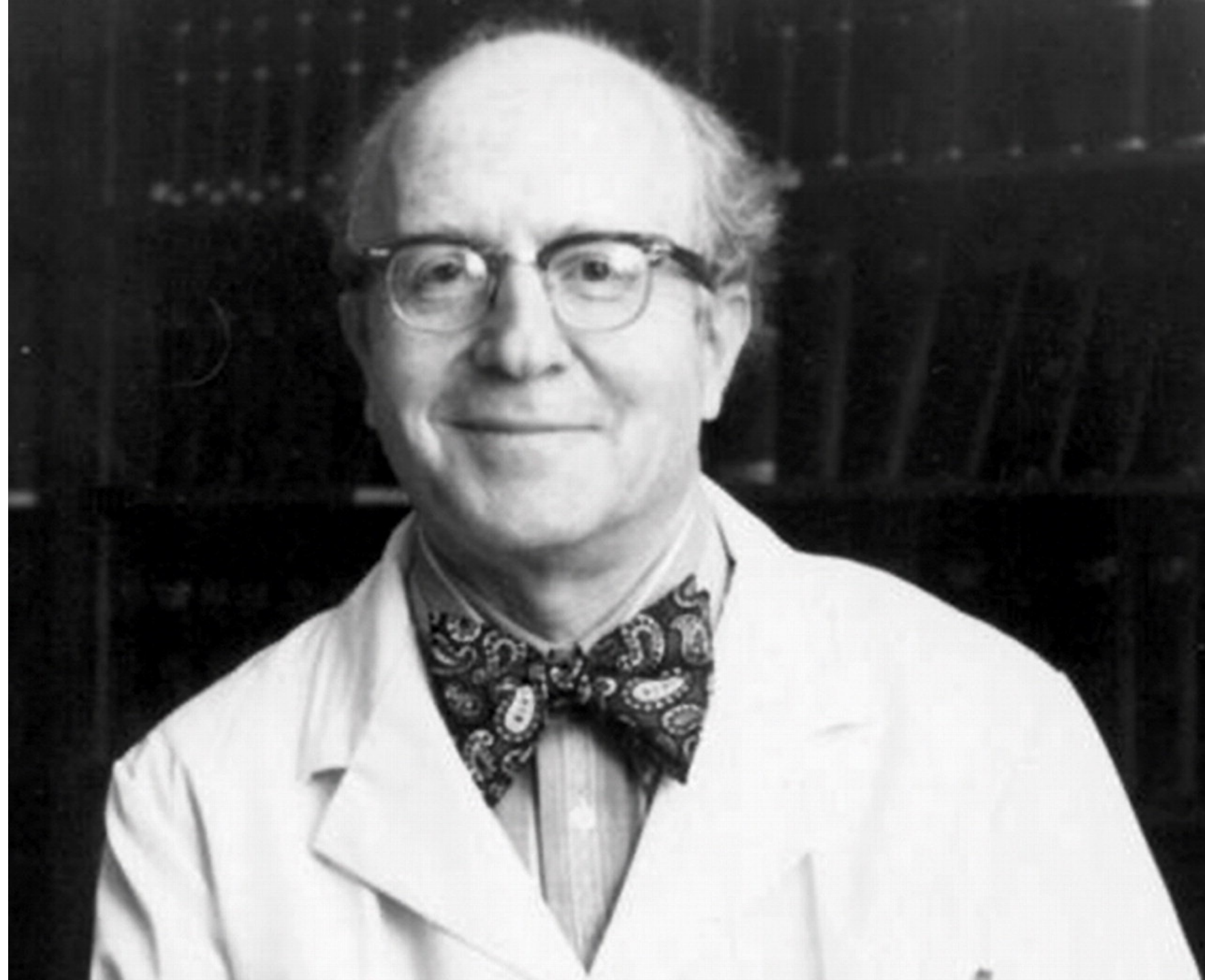


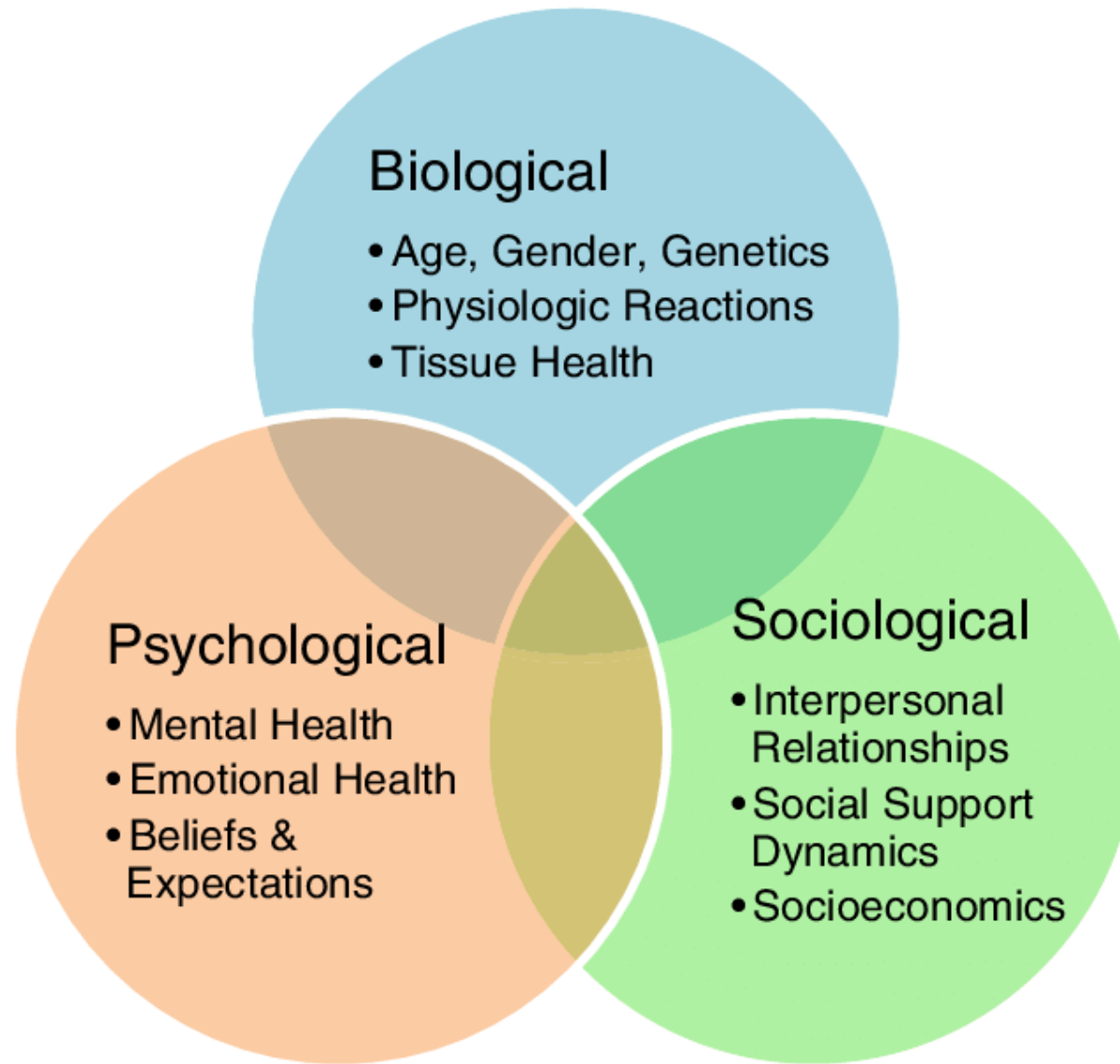
Influence of Germ Theory of Disease on Biomedical Model

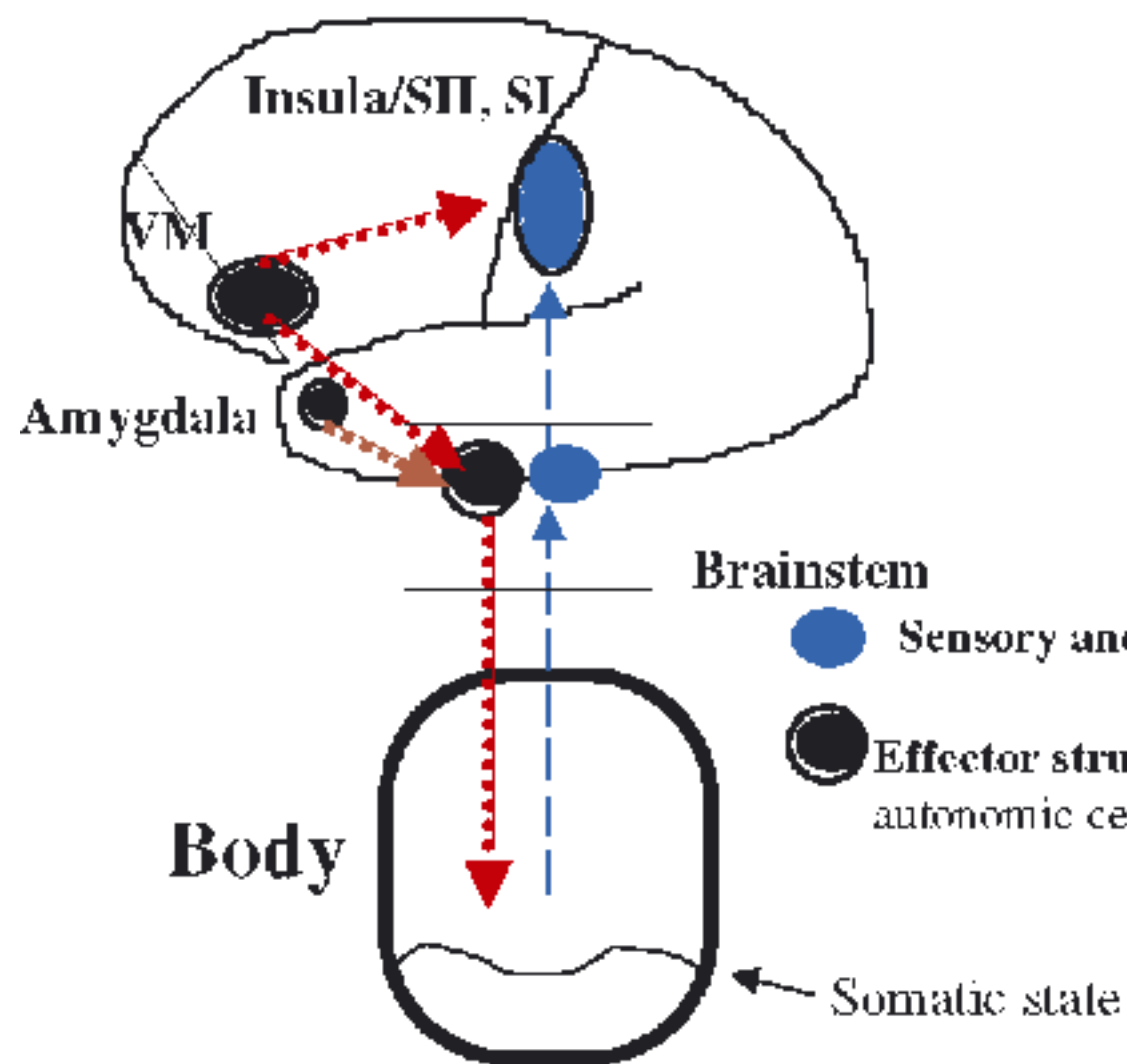
- Louis Pasteur- Germ Theory of Disease
- Claude Bernard: the “terrain” of the body must be prepared for the germ to grow (9).
- “Bernard avait raison. Le germe n’est rien, c’est le terrain qui est tout”
- Early 20th Century: Excessive stress prepares the body for disease growth.



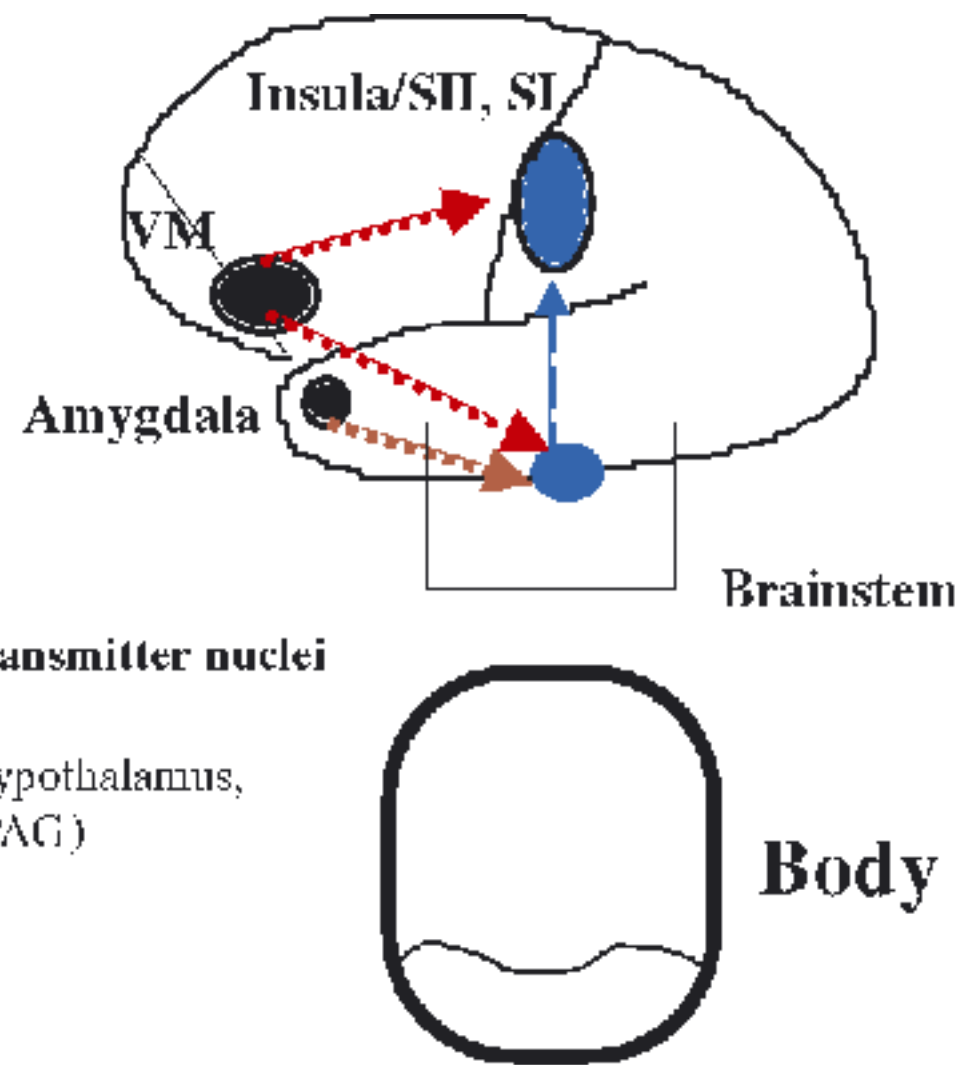








"Body Loop"

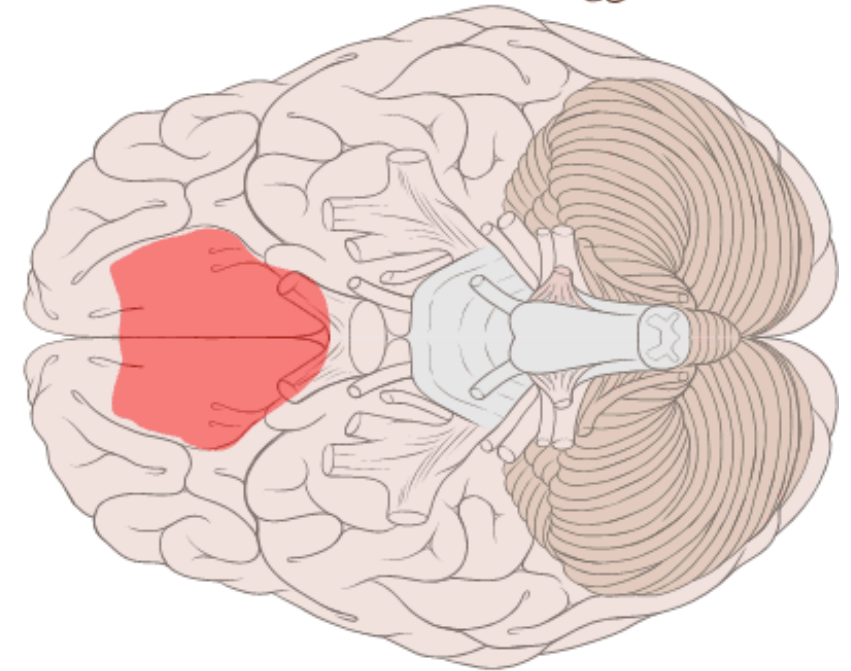


"As If Body Loop"

Ventromedial Prefrontal Cortex

Frontal lobe damage

- Difficulty with:
 - organizing and planning behaviors
 - learning from previous mistakes
 - **Expressing and experiencing appropriate emotions**
- Retained:
 - working memory
 - attention
 - language comprehension
 - Language expression.



Somatic Marker Hypothesis

- A neural theory of economic decision-making.
- Economic decision-making models ignored emotional integration
- Decision-making is a process that depends on emotion and that both the amygdala and the orbitofrontal cortex are parts of a neural circuit critical for judgment and decision-making.



What are emotions?

- According to Damasio:
 - Changes in body and brain states in response to stimuli
- WITH REPETITION, emotions and corresponding bodily changes become associated with particular situations and past outcomes.
 - Conscious or unconscious association



Pain (rev. 2020)

- An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage.

Notes:

- Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors.
- Pain and nociception are different phenomena. Pain cannot be inferred solely from activity in sensory neurons.
- Through their life experiences, individuals learn the concept of pain.
- A person's report of an experience as pain should be respected.
- Although pain usually serves an adaptive role, it may have adverse effects on function and social and psychological well-being.
- Verbal description is only one of several behaviors to express pain; inability to communicate does not negate the possibility that a human or a non-human animal experiences pain.



- Predicting Chronicity

Chronic Pain

- High Cost of Care
- Incidence is **INCREASING**

Dahlhamer et al., 2018; Cohen et al., 2018

NATIONAL DATA



PT REFERRAL RATE:
7-20%



INCIDENCE OF CHRONIC
PAIN AT 1 YEAR: 28-46%

Low Back Pain (LBP)

Leading cause of disability (Buchbinder, et al., 2013).

No identifiable pathoanatomical diagnosis for 85% of cases (Deyo et al., 2001).

Vulnerability and Protective Factors

- Vulnerability = Risk, e.g., childhood trauma
- Protective, e.g., social support.

February 16, 2021

Risk Factors Associated With Transition From Acute to Chronic Low Back Pain in US Patients Seeking Primary Care

Joel M. Stevans, DC, PhD¹; Anthony Delitto, PT, PhD¹; Samannaaz S. Khoja, PT, PhD¹; [et al](#)

[» Author Affiliations](#) | [Article Information](#)

JAMA Netw Open. 2021;4(2):e2037371. doi:10.1001/jamanetworkopen.2020.37371

- Incidence at 6 months: 32%
- -Women (58%)
- -Overweight (31%)
- -Obese (44%)
- -Baseline disability: aOR 1.16 higher for moderate disability, 1.82 for severe disability, and 2.08 for very severe disability vs. minimal disability.
- Health Insurance
- -BMI
- -Smoking Status
- -Diagnosis
- -Psychological comorbidities
- exposure to non-concordant care

Biological

- Age, Gender, Genetics
- Physiologic Reactions
- Tissue Health

General Psychosocial Factors

- Negative Affect
- Depression, anxiety and emotional distress
- Pre-op depression scores:
 - 2x less likely to return to work
 - 2x time to return to work

Psychological

- Mental Health
- Emotional Health
- Beliefs & Expectations

ACEs and PTSD

- Strong prospective links have been observed between early traumatic experiences and subsequent chronic pain development
- Social/Interpersonal experiences:
 - Childhood physical, sexual, and psychological abuse
 - Linked to adult development of FM, IBS, chronic pelvic pain, and TMJD.
- Past trauma: 2 to 3-fold increase in chronic widespread pain
- Report of abuse in childhood: 97% increase in risk (i.e., Odds Ratio= 1.97) for painful somatic syndrome in adulthood.

Afari et al., 2014; Brennstuhl et al., Kadam et al., 2005; Moeller-Betram et al., 2012

What is the PTSD-Pain relationship?

- Direct Result of Trauma?
- Affective, cognitive behavioral response to trauma (Forming intense fear/avoidant behavior as a result)?
- Retrospective attempt to explain a cluster of diverse symptoms?

(Jenewein et al., 2009; Jensen, 2011; Koopman et al., 2015; Wuest et al., 2009; Wuest et al., 2010)



Pain-Specific Constructs

- Vulnerability Factors:
 - Pain catastrophizing
 - Self-Efficacy
- Protective (Resilience) Factors:
 - Active coping
 - Pain Science Knowledge

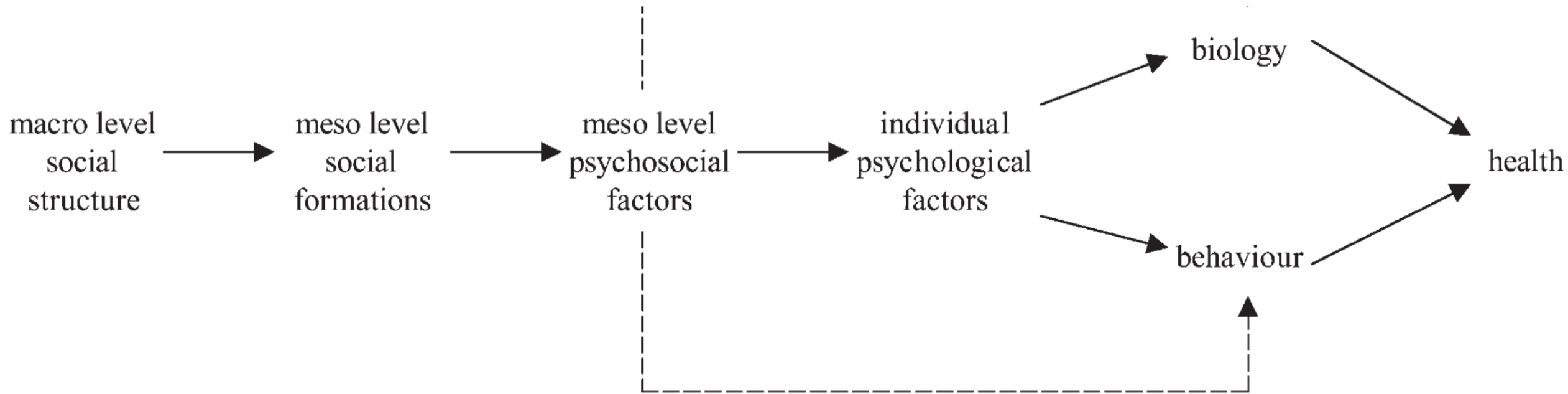
Sociological

- Interpersonal Relationships
- Social Support Dynamics
- Socioeconomics

Social and Interpersonal Processes

- Perceived global support vs. solicitous social responses
 - (Offering to take over tasks or encouragement to be less active)
- Solicitousness predicted pain-related disability
-  *General* social support =  persistent phantom limb pain.

Edwards et al., 2016; Jensen et al., 2011



Social Levels of Influence:

- Macro-level (e.g., socioeconomic and legal structures)
- Meso-level (e.g., workplaces and schools)
- Micro-level (e.g. personal relationships, access to informal help)


(Martikainen, et al., 2002)

Other Social Factors

- Cultural background
- Employment status and occupational factors:
 - Lack of social support and coworker dissatisfaction
 - Interactions with disability compensation
- Lower socio-economic status
- Geographical Location

Li et al., 2006; Van Hecke et al., 2013; Macfarlane, GJ, 2016

Who's Got the Power? Social Influences

- Parent → child
- Spouse → married/coupled *patient*
- What if your significant other's personality type was a predictor of recovery?
- Factors in pediatric cases:
 - Parental cognition
 - Parental behavioral function
 - Response to child's pain
 - **parental pain catastrophizing following major surgery
- Married patients:
 - Spousal depression
 - Social support and interpersonal effectiveness
 - Partners demonstrating avoidant or anxious attachment styles.

Questions to Ponder

- How do the social constructs of work affect rehabilitation and the patient:clinician relationship and therapeutic alliance?
- Have you ever felt your patient trusts Dr. Google too much? What about Dr. Coworker?
- Some of the challenge we face in this therapeutic alliance is the strength or reliability in the relationship. For the patient, how reliable is Google in providing necessary information? How reliable are family members or work mates?
- How do we solve for this?

Factors to Consider

- Depression, Anxiety, Emotional Distress
- Interpersonal conflict
- Pain-related fear
- Job dissatisfaction
- Low job control
- Minimal social support
- Self-efficacy
- Litigation/Victimhood
- Previous traumatic experience (ACEs, PTSD)
- Cultural and Religious Factors (e.g., Guilt, Shame)
- Meaning in Life/Life Purpose
- Patient-Clinician Collaboration (Therapeutic Alliance)



HHS Public Access

Author manuscript

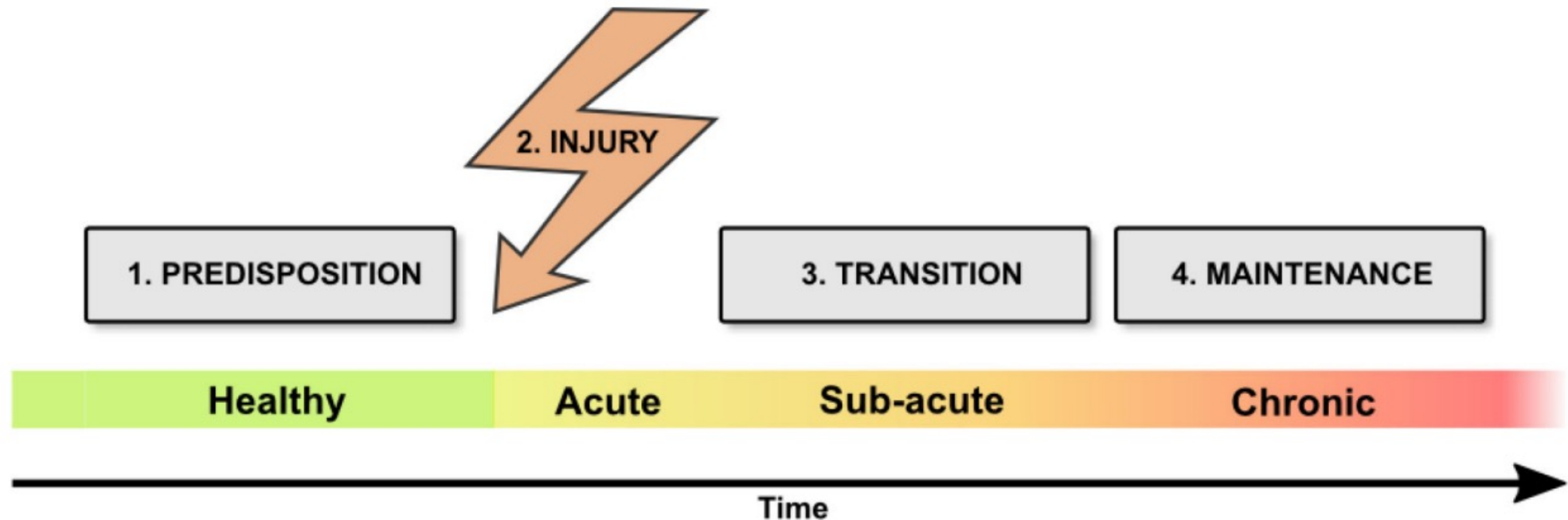
Pain. Author manuscript; available in PMC 2020 May 01.

Published in final edited form as:

Pain. 2019 May ; 160(Suppl 1): S37–S48. doi:10.1097/j.pain.0000000000001529.

Deconstructing biomarkers for chronic pain: context and hypothesis dependent biomarker types in relation to chronic pain

Diane Reckziegel^{1,2}, Etienne Vachon-Preseu¹, Bogdan Petre¹, Thomas J. Schnitzer^{2,3,4}, Marwan Baliki¹, and A. Vania Apkarian^{1,2,4,5}



What is Chronic Pain?



Comprehensive Spine Ecosystem

Direct Access to Multidisciplinary Care

Right Care-Right Time

The Spine Care Evolution

Consequences of “Wait-and-See” Approach

- What are the consequences of delaying physical therapy *just* 4 days?
- **130% increase in spine surgery**
- *Number of spine surgery increases nearly 5-fold increase when delaying physical therapy 15 days*

Virtual Care Goal: < 3 days

Liu et al., 2018. Immediate Physical Therapy Initiation in Patients with Acute Low Back Pain is Associated with a Reduction in Downstream Healthcare Utilization and Costs. Physical Therapy Journal, 98(5), 336-347



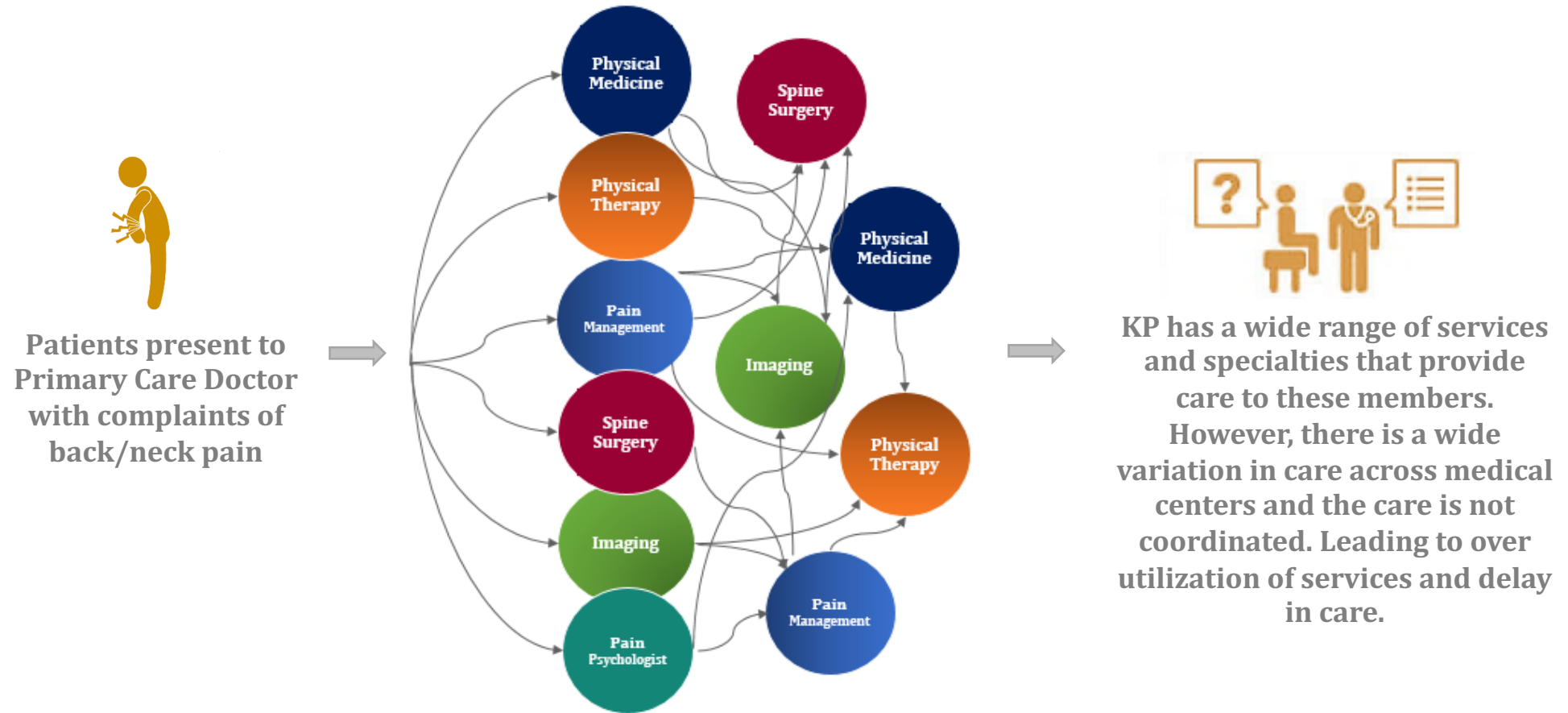


2007



2023

Traditional Spine Care pre-2016



Spine Center Model of Care- 2016

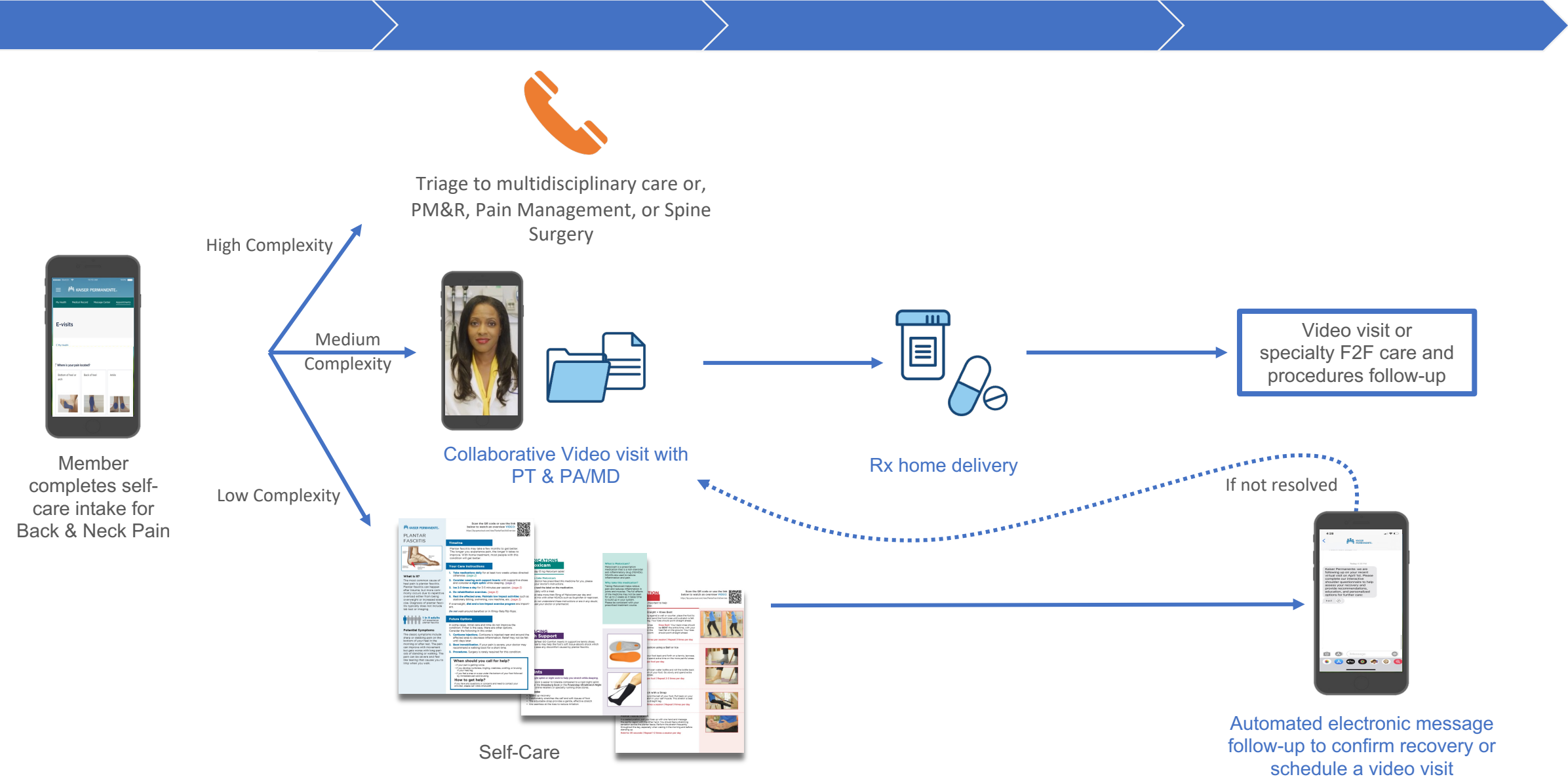


Over **55,000 members** have been seen in one of the thirteen Spine Centers



The revised model offers personalized and immediate access to spine care. The PA/RNP, Physical Therapist and Physician In Charge coordinate access to care and procedures based on the members clinical presentation.

Comprehensive Spine Ecosystem 2022



Polaris Spine Virtual Staffing Model- Multidisciplinary Care, the 3:1 Model

Physical
Therapists

LVNs

Changing consumption of healthcare: Millennials and Gen Z are now the largest segment. Their healthcare needs, and the way they consume healthcare, are different

Largest segment



Burdened economically, looking for convenience and value



Population is underserved and unhealthy



M

Millennials

(1996-1981)
25-40 years old

The largest generation.
They make up more than 1/3 of the workforce (~35%)

Burdened by student debt.
Millennials are financially worse off than baby boomers & Gen X was at their age

Convenient, easy to access care[®] cited by 51% of Millennials as the #1 factor in their healthcare decision-making

Family planning stage. Millennial women accounted for 82% of all births in 2016

Top 4 healthcare needs:
1. OBGYN/sexual health
2. Mental Health
3. Dermatology
4. MSK

Z

Gen Z

(2012-1997)
9-24 years old

The country's **most racially and ethnically diverse** generation

Young entrepreneurs.
62% would like to start their own companies instead of working for an established company

Socially responsible.
68% of Gen Z wants brands to be more socially conscience

College years.
Gen Z is on the way to becoming the most educated generation yet

16-24 year olds are **3x likely to be lonely** as those over 64 years of old.

In 2018 about 37% of 12th graders reported **vaping**

<https://www.statista.com/statistics/797321/us-population-by-generation/#:~:text=Millennials%20were%20the%20largest%20generation,the%20population%20for%20many%20years>
<https://www.pewresearch.org/social-trends/2019/02/14/millennial-life-how-young-adulthood-today-compares-with-prior-generations-2/>
<https://www.pewresearch.org/fact-tank/2018/05/04/more-than-a-million-millennials-are-becoming-moms-each-year/>
 WGSN Gen-Z Mental Wellness Report (2019)

Changing consumption of healthcare: Millennials are looking for convenient, technology-first solutions to access healthcare

36%

Prefer self-diagnosis and home treatment to in-person doctor visits

70%

Would rather have an online visit with a doctor than travel to an office appointment

93%

Do not schedule preventative doctor's visits

50%

Have no personal relationship with a primary care physician. Only 19% of millennials said they will “definitely” or “most likely” stay with their current PCP for at least the next 12 months





2007



2023

A hand holding a glowing lightbulb with a network of white nodes and lines above it, symbolizing technology and innovation. The background is a solid blue color. The lightbulb is illuminated, and the network of nodes and lines is composed of small white dots connected by thin white lines, forming a complex, interconnected structure that resembles a neural network or a data network. The text "The TTT- Back and Neck Triage Tool" is centered in the image in a white, sans-serif font.

The TTT- Back and Neck Triage Tool

TTT Design

- 11-item questionnaire
- Psychological/Social factors associated with chronic pain
 - Depression
 - Anxiety
 - Pain-Catastrophizing
 - Fear/Avoidance of physical activities (kinesiophobia) and work
 - Self Efficacy
 - Financial Distress
 - History of Traumatic Experience and Residual Impact
 - Personal Relationship Distress
 - Occupational Distress
 - Pain Intensity

Future Considerations

- Passive Data Collection from Electronic Medical Records:
 - Age
 - Gender
 - Ethnicity
 - BMI
 - Smoking and Alcohol consumption
 - Comorbidities
 - E.g., DM2 (controlled vs. uncontrolled)
- Previous visit(s) for similar condition (recurrence)



References

- Afari, N., Ahumada, S. M., Wright, L. J., Mostoufi, S., Golnari, G., Reis, V., & Cuneo, J. G. (2014). Psychological trauma and functional somatic syndromes: a systematic review and meta-analysis. *Psychosomatic medicine*, 76(1), 2.
- Brennstuhl, M. J., Tarquinio, C., & Montel, S. (2015). Chronic pain and PTSD: Evolving views on their comorbidity. *Perspectives in psychiatric care*, 51(4).
- Diatchenko L, Fillingim RB, Smith SB, Maixner W. The phenotypic and genetic signatures of common musculoskeletal pain conditions. *Nat Rev Rheumatol*. 2013; 9:340–350. [PubMed: 23545734]
- Fillingim RB, Ohrbach R, Greenspan JD, Knott C, Diatchenko L, Dubner R, Bair E, Baraian C, Mack N, Slade GD, Maixner W. Psychological factors associated with development of TMD: the OPPERA prospective cohort study. *J Pain*. 2013; 14:T75–T90. [PubMed: 24275225]
- Hill, J. C., Whitehurst, D. G., Lewis, M., Bryan, S., Dunn, K. M., Foster, N. E., Konstantinou, K., Main, C. J., Mason, E., Somerville, S., Sowden, G., Vohora, K., & Hay, E. M.. (2011). Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. *The Lancet*, 378(9802), 1560-1571. [https://doi.org/10.1016/s0140-6736\(11\)60937-9](https://doi.org/10.1016/s0140-6736(11)60937-9)
- Li, X., Gignac, M. A., & Anis, A. H. (2006). Workplace, psychosocial factors, and depressive symptoms among working people with arthritis: a longitudinal study. *The Journal of rheumatology*, 33(9), 1849-1855.
- Jenewein, J., Wittmann, L., Moergeli, H., Creutzig, J., & Schnyder, U. (2009). Mutual influence of posttraumatic stress disorder symptoms and chronic pain among injured accident survivors: a longitudinal study. *Journal of Traumatic Stress: Official Publication of the International Society for Traumatic Stress Studies*, 22(6), 540-548.
- Jensen, M. P. (2011). Psychosocial approaches to pain management: an organizational framework. *PAIN®*, 152(4), 717-725.
- Kadam, U. T., Thomas, E., & Croft, P. R. (2005). Is chronic widespread pain a predictor of all-cause morbidity? A 3 year prospective population based study in family practice. *The Journal of Rheumatology*, 32(7), 1341-1348.
- Koopman, J., Howe, M., Hollenbeck, J. R., & Sin, H. P. (2015). Small sample mediation testing: misplaced confidence in bootstrapped confidence intervals. *Journal of Applied Psychology*, 100(1), 194.
- Linton SJ, Nicholas MK, MacDonald S, Boersma K, Bergbom S, Maher C, Refshaug K. The role of depression and catastrophizing in musculoskeletal pain. *Eur J Pain*. 2011; 15(4):416–22. [PubMed: 20884261]
- Martikainen, P., Bartley, M., & Lahelma, E. (2002). Psychosocial determinants of health in social epidemiology. *International journal of epidemiology*, 31(6), 1091-1093.
- Pence, L., Cano, A., Thorn, B., & Ward, L. C. (2006). Perceived spouse responses to pain: The level of agreement in couple dyads and the role of catastrophizing, marital satisfaction, and depression. *Journal of behavioral medicine*, 29, 511-522. Pinto, P. R., McIntyre, T., Almeida, A., & Araújo-Soares, V. (2012). The mediating role of pain catastrophizing in the relationship between presurgical anxiety and acute postsurgical pain after hysterectomy. *Pain*, 153(1), 218-226.
- Stevans, J. M., Delitto, A., Khoja, S. S., Patterson, C. G., Smith, C. N., Schneider, M. J., ... & Saper, R. B. (2021). Risk factors associated with transition from acute to chronic low back pain in US patients seeking primary care. *JAMA network open*, 4(2), e2037371-e2037371.
- Reckziegel D, Vachon-Pressseau E, Petre B, Schnitzer TJ, Baliki MN, Apkarian AV. Deconstructing biomarkers for chronic pain: context- and hypothesis-dependent biomarker types in relation to chronic pain. *Pain*. 2019 May;160 Suppl 1(Suppl 1):S37-S48. doi: 10.1097/j.pain.0000000000001529. PMID: 31008848; PMCID: PMC6478400.
- Van Hecke, O., Torrance, N., & Smith, B. H.. (2013). Chronic pain epidemiology and its clinical relevance. *British Journal of Anaesthesia*, 111(1), 13-18. <https://doi.org/10.1093/bja/aet123>
- Macfarlane, G. J. (2016). The epidemiology of chronic pain. *Pain*, 157(10), 2158-2159.
- Raja, S. N., Carr, D. B., & Cohen, M. (2020). The Revised IASP definition of pain: concepts, challenges, and compromises HHS public access. *Pain*, 161(9), 1976-1982.
- Wuest, J., Ford-Gilboe, M., Merritt-Gray, M., Wilk, P., Campbell, J. C., Lent, B., ... & Smye, V. (2010). Pathways of chronic pain in survivors of intimate partner violence. *Journal of Women's Health*, 19(9), 1665-1674.
- Wuest, J., Ford-Gilboe, M., Merritt-Gray, M., Varcoe, C., Lent, B., Wilk, P., & Campbell, J. (2009). Abuse-related injury and symptoms of posttraumatic stress disorder as mechanisms of chronic pain in survivors of intimate partner violence. *Pain medicine*, 10(4), 739-747.