

Psychosocial Treatments for Chronic Pain: They Work, but by What Mechanism?

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Interdisciplinary Graduate Program in
Neuroscience at the University of Iowa
Graduate Student Retreat
October 9, 2012

Acknowledgments

- The National Institute of Neurological Disorders and Stroke (NINDS)
- The National Headache Foundation
- The National Institute of Nursing Research (NINR) & The National Institute of Mental Health (NIMH)
- The Marchionne Foundation
- John Burns, Frank Keefe, Mark Jensen

Disclaimer

- “Mechanism” in psychosocial research is not molecular
- “Mechanism” may or may not include functional neuroanatomy
- “Mechanism” in psychosocial research is primarily measured by cognitive constructs (e.g., pain catastrophizing, mindfulness) that rely on self-report/behavioral observation

Overview of Presentation

- **Psychosocial Treatments for Chronic Pain**
 - What are they?
 - Why use them?
 - What are the common treatments?
 - What populations are served?
- **Measurement of Constructs**
 - How do we measure pain in humans?
 - How do we measure our outcomes (and potential mechanisms)?
- **Mechanisms in Psychosocial Pain Research**
 - Why is it important to identify mechanisms of action?
 - Where do we need to go in psychosocial mechanism research?
 - From efficacy to effectiveness and dissemination

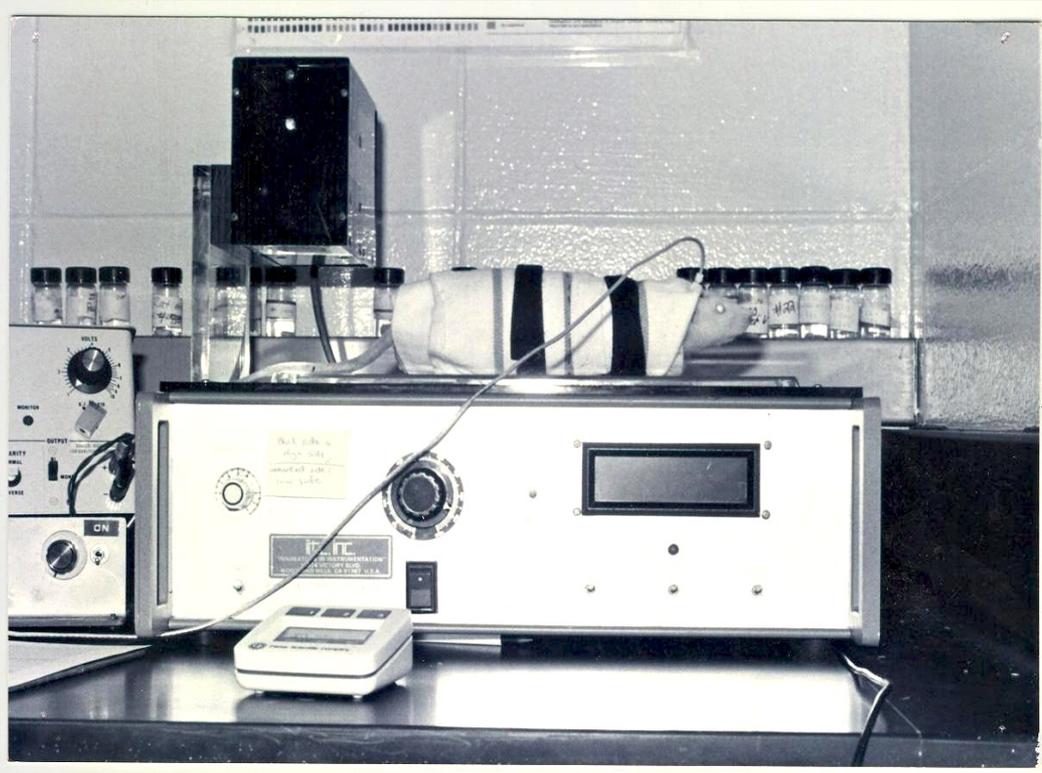
But first: my background

- Undergrad: Emory University (psychology)
- Ph.D.: Southern Illinois University (dual training – Physiological and Clinical Psychology)
- 1st Academic Appointment: Ohio State Univ. (rat lab, human experimental pain)
- Next – and present- Academic Appointment: University of AL (rat lab, human experimental, human “clinical”)

Southern Illinois (Ph.D.): Etorphine-Induced Analgesia & Catatonia in the Rat



Early Career (Ohio State/UA): Opiatergic & Non-Opiatergic Mechanisms of Stimulation-Produced Analgesia



Human Experimental Pain Research – A focus on Cognitive Processes

IN THE NAME OF SCIENCE

UA lab: No pain, no gain

By RICHARD POWELL
Staff Writer

TUSCALOOSA — Beverly Thorn and Latryce Cole put a blood pressure cuff on someone's arm, pump it until it cuts off circulation, then make the person exercise the arm until it changes color and the fingers curl up.

They're not sadists; it's all done in the name of science.

Thorn, a clinical psychologist and director of clinical training at the University of Alabama, goes to the laboratory to put somebody in a painful state and explore different aspects of their pain. She hopes the research helps her learn how to best help chronic pain sufferers cope.

She also sometimes has volunteers hold their hands in ice water, but she has to work fast to get any good from that experiment.

"After about four minutes it becomes so numb it's no longer painful," Thorn said.

Cole, 18, of Boligee, who's fresh out of the Alabama School of Mathematics and Science and headed to Spelman College in Atlanta, has no qualms about inducing pain on the volunteers.

"I knew what I was getting into and I knew what this was all about. I knew it had been done before and people had survived and no ill effects would come. I guess I was just so wrapped up in getting it right that I didn't think about it."

Cole has worked this summer with Thorn through UA's Minority High School Student Research Apprenticeship Program. She said the experience has her strongly considering changing her major from math to pre-medicine.

Thorn has done lots of clinical studies where she works with chronic pain patients — like those with chronic headaches — and tries different treatment approaches to try to help alleviate



University of Alabama

Research scientist Beverly Thorn, left, and her apprentice, Latryce Cole, use a blood pressure cuff to intentionally put people in pain at the University of Alabama.

their pain.

She tries ideas in the laboratory. If they work, she takes them to UA's psychology clinic.

Thorn said she's found that if you put someone in a painful state and ask them to stand it a certain amount of time, they can last longer than someone asked to just last as long as they can.

The experiment Cole has been most involved in this summer involves the blood pressure cuff.

"It gives a pretty painful stimulation," Cole said, going on to explain that she knows from having to go through it herself that first the arm tingles, then aches, then turns colors, then the fingers curl up.

"We're really looking at the effect of anxiety on pain," Cole said.

Thorn and Cole also have the subject view one of three videos —

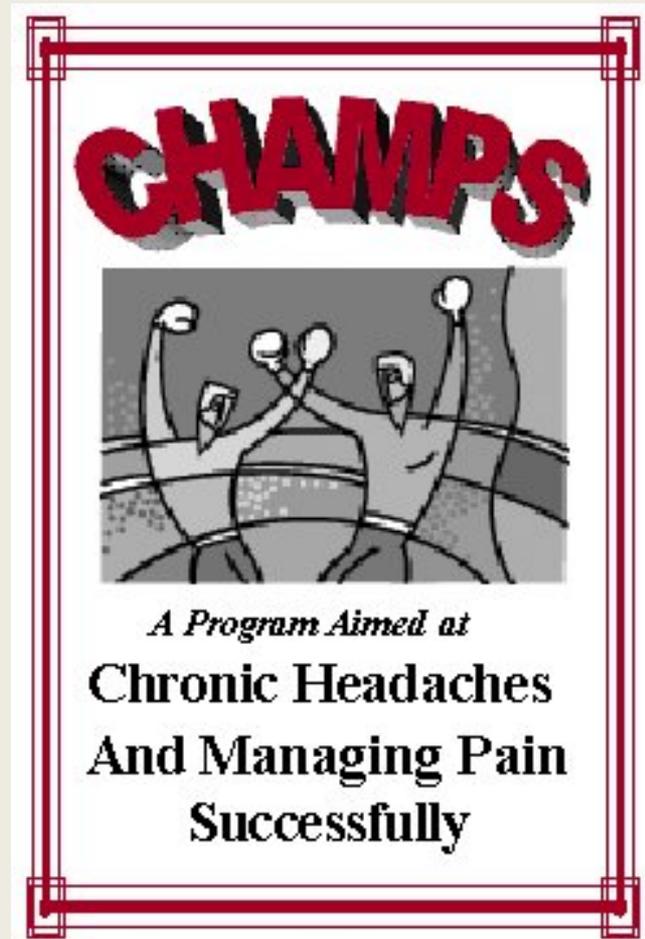
either a travelogue about Australia, or one of people going through the same experiment as them and who are obviously in pain, or the horror movie, "Halloween."

"We have a clue that people watching the "Halloween" video will actually last longer and report less pain than the people watching the Australia video," Thorn said. The clue came from literature she read on anxiety and how it influences pain.

She guesses that if someone is distracted they are less aware and less concerned about what's happening right here and now. The scary scenes are much more of a distraction from the pain than the pleasant travelogue scenes.

If it were not a voluntary or free-choice experiment, Thorn said it would more closely resemble what the chronic pain sufferers she works with experience.

Human Clinical Pain Research (Psychosocial Treatment Research) Does it work? (efficacy)



Psychosocial Pain Research: Why Do Psychosocial Pain Treatments Work? (mechanism)



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Psychosocial Treatments for Chronic/Recurrent Pain

- What is chronic/recurrent pain?
- What are psychosocial treatments?
- Why use them?
- What are the common treatments?
- What populations are served?

Defining “Pain”

An unpleasant experience that accompanies both sensory and emotional modalities; may or may not be accompanied by identifiable tissue damage; and is influenced by multiple factors, including cognitive, affective, and environmental .

Mersky & Bogduk, 1994; International Association for the Study of Pain (emphasis added)

Acute/Recurrent/Chronic

Acute pain – elicited by injury & activation of pain receptors, usually short-lived, remits when tissue is healed. Health care intervention sought and often effective.

Recurrent Pain – episodic, but occurring across extended time period; shares characteristics of both acute and chronic pain. Because the problems extend over a long period of time, social and behavioral factors may be more influential over illness behavior than they are with acute pain.

Chronic pain – often elicited by injury but worsened by factors removed from the original cause, usually lasts a long time, and is not explained by underlying pathology. Health care intervention sought and rarely effective.

Turk & Okifuji (2001). Pain terms and taxonomies of pain. In Bonica's Management of Pain.

Chronic Pain Distinction

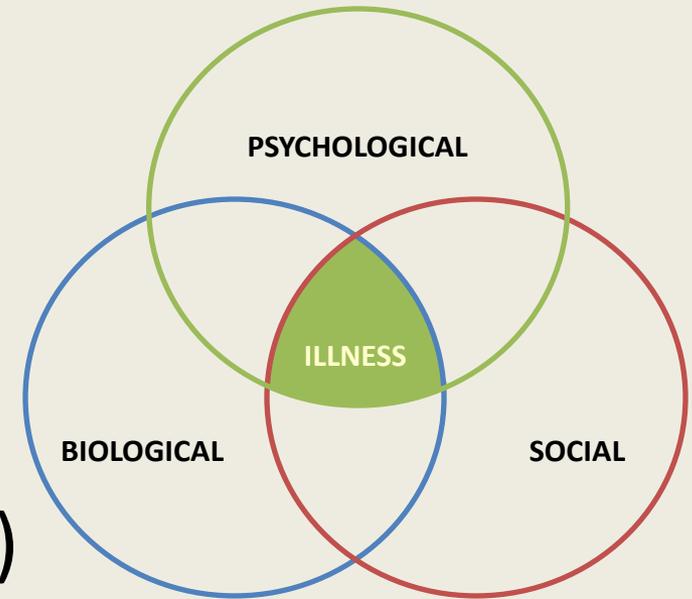
- Pain that is persistent (long-lasting) – at least 3 mo. or 6 mo.
- (and/or) Based on clinical judgment of whether pain extends beyond the expected healing period
- Social/behavioral factors assumed to influence illness behavior

What are Psychosocial Treatments?

- Focused on cognitive, behavioral, and social processes to enhance function
- Primary aim is not to eradicate pain (or cure the disease process)
- Primary aim is to help patient live a meaningful life despite the presence of pain

Based on Biopsychosocial Model

- Acknowledges biological processes
- **And** highlights the importance of experiential factors (e.g., psychological & social)

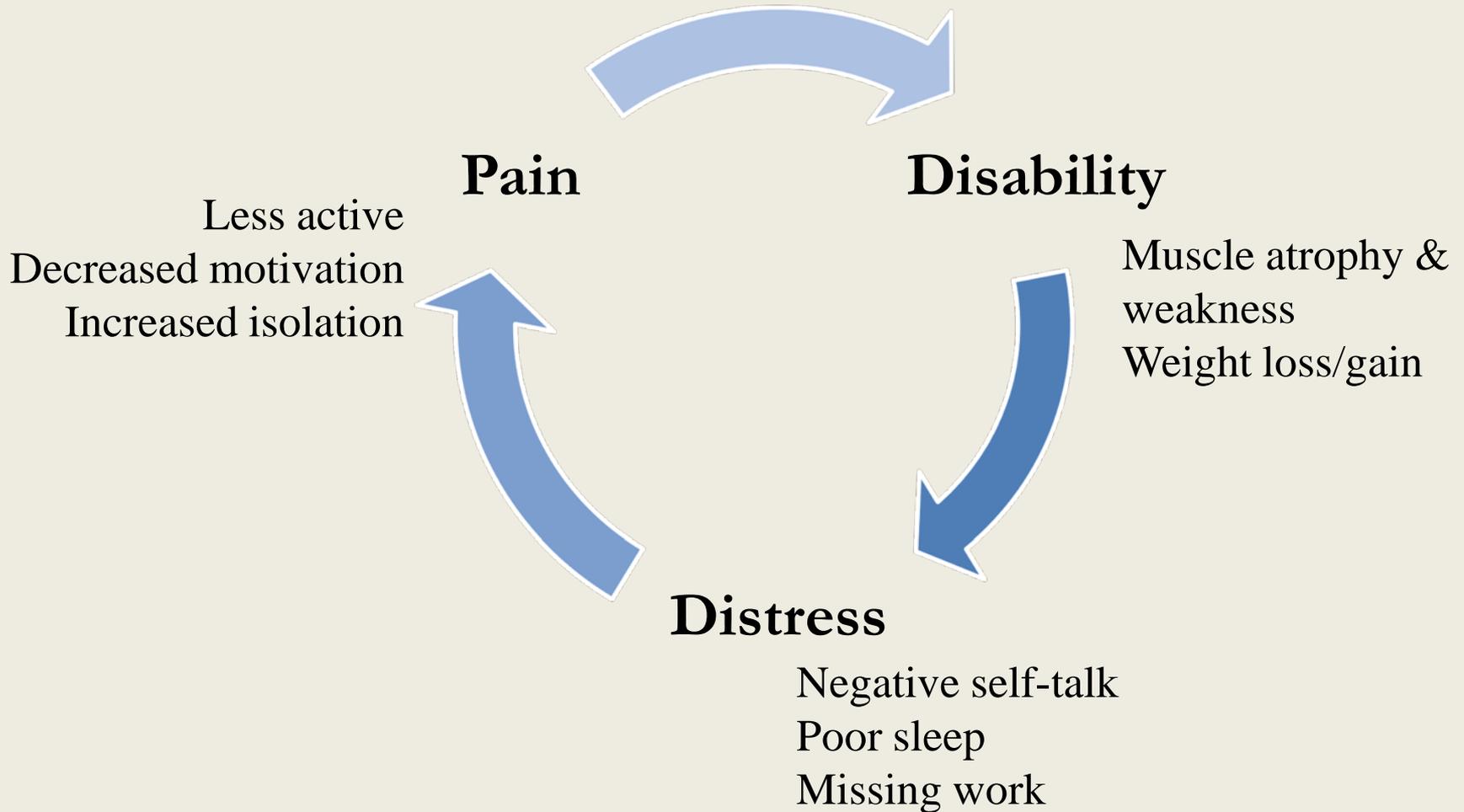


Engel (1977). The need for a new medical model: A challenge for biomedicine. *Science*, 196, 129-136.

Why Use Psychosocial Treatments?

- Chronic pain - often worsened by factors removed from the original cause... not explained by underlying pathology... health care intervention rarely effective (Turk & Okifuji)
- Tissue damage is not the best predictor of symptoms
- Finding/eliminating the pain generator is often difficult/impossible
- “end organ treatment” (e.g. surgery) is often not effective
- Analgesic medications produce tolerance/dependence
- It's not just about the pain....

The Pain Cycle



Self-Management Behaviors are Essential for Positive Adaptation to Chronic Pain

- Positive adjustment to chronic pain is “more dependent on effective self-care (e.g., exercise, sustaining work activities, appropriate use of pain medications) than on the quality of the diagnostic or therapeutic interventions of the physicians.”

Von Korff, M. (1999). Pain management in primary care: An individualized stepped-care approach. In Psychosocial Factors in Pain. NY: Guilford Press, pg. 363.

Patient Presentation

(increasing with chronicity)

- Medication management issues
- Compromised activities of daily living
- On or seeking disability or unemployed
- Social isolation
- Muscles deconditioned from non-use
- Distrust of clinician
(especially if physician referral is for “psychological help,” leading patient to assume you think it’s psychogenic)

Core Tasks of Self-Care in Pain Management

- Restore/maintain work & family activities
- Engage in (and pace) regular physical activity
- Use effective body mechanics
- Use health care & pain meds appropriately
- Adopt attitude of acceptance (willingness to accept presence of pain) and identity of a “well-person with pain” (if appropriate)
- Manage the effects of pain on thoughts/emotions & on interaction with others

(adapted from Von Korff, 1999)



A

NO PAIN

ALABAMA
SEP

ALABAMA

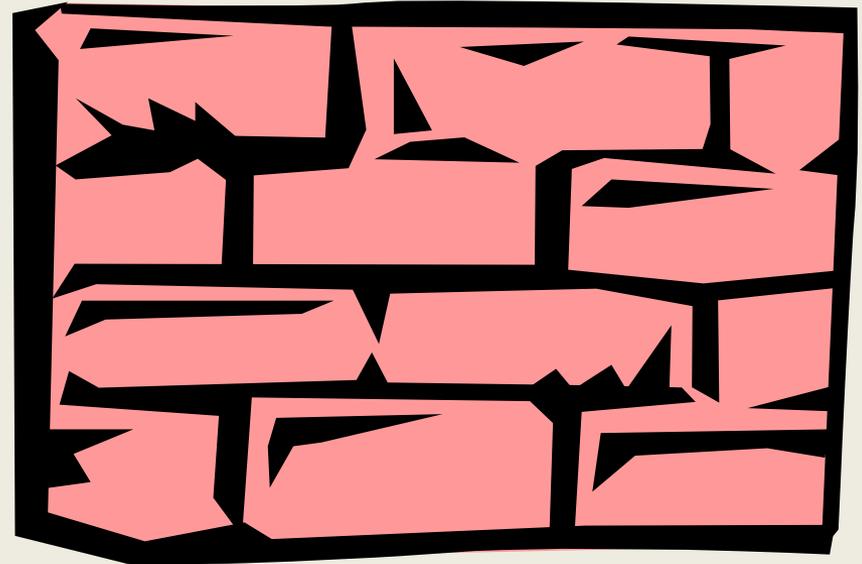
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Important Corollary:

“Information is to behavior change as spaghetti is to bricks” (Bill Fordyce)



?



“Information is a low power
way of changing behavior”

W.E. Fordyce

What are the Common (efficacious) Psychosocial Pain Treatments?

- **Behavioral Therapy (Operant Conditioning) – Bill Fordyce**
- **Cognitive Therapy (thoughts → emotions → behavior) – Aaron Beck**
- **Cognitive-Behavioral Therapy – Dennis Turk, Frank Keefe**
- **Mindfulness-Based Stress Reduction (attention/acceptance of present moment) – Jon Kabat-Zinn**
- **Biopsychosocial Pain Education – Lorimer Mosely**
- **Acceptance & Commitment Therapy (ACT) – Steve Hayes**

What are the Populations Served?

- Musculoskeletal pain
- Headache
- Arthritis
- Fibromyalgia
- Neuropathic pain
- Cancer pain
- Spinal cord injury-related pain
- Patients with multiple pain conditions
- Children, older adults, low-literacy patients
- Etc.....

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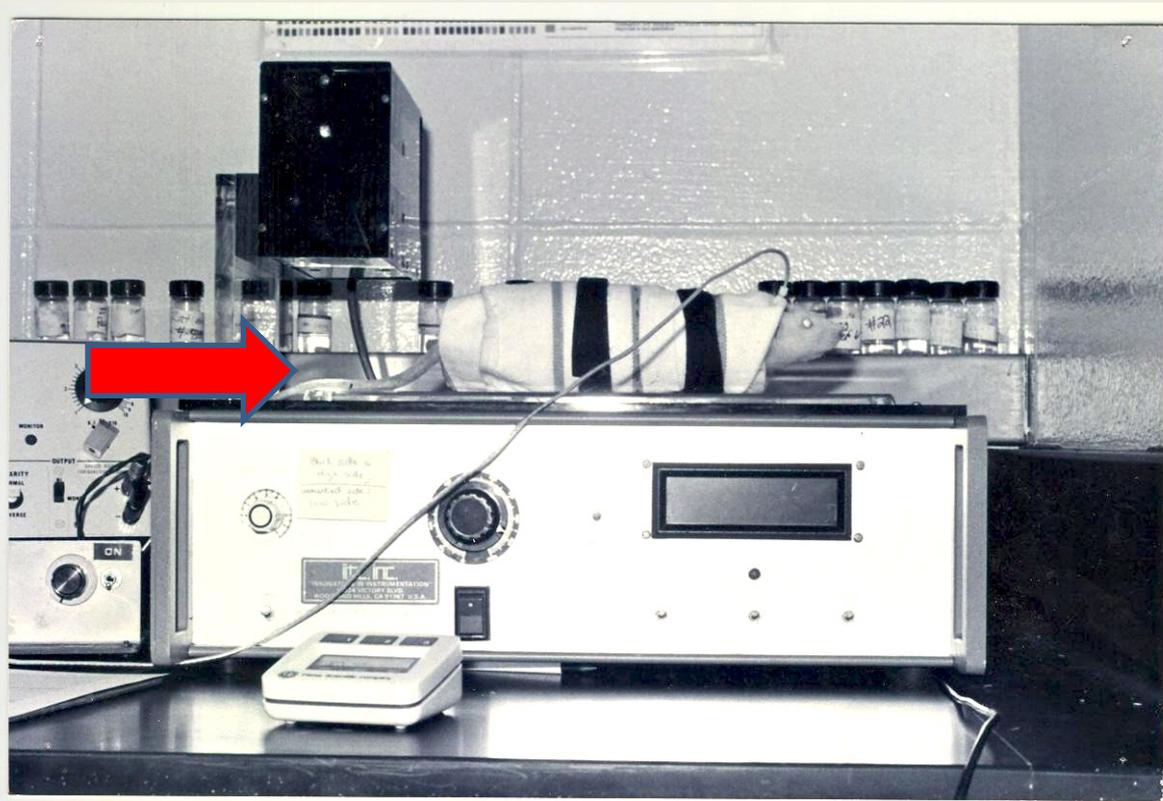
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Measuring our Constructs

- How do we measure pain in humans?
- How do we measure our outcomes (and potential mechanisms)?

Measuring Pain in Humans (not as straight-forward as the tail- flick!)



The Search for Pain Biomarkers: Two Examples

- Tissue damage?

Jensen, Brant-Zawadzki, Obuchowski, Modic, Malkasian, & Ross (1994). Magnetic resonance imaging of the lumbar spine in people without back pain. *N Engl J Med.* 331(2): 69-73.

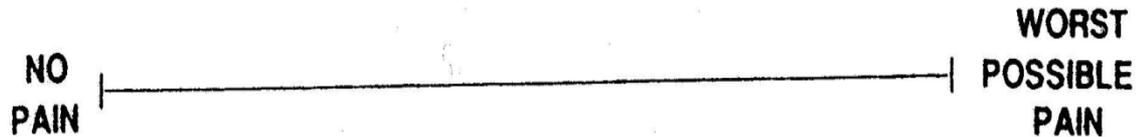
- Vital signs?

Marco, Plewa, Buderer, Hymel, Cooper (2006). Self-reported pain scores in the Emergency Department: Lack of association with vital signs. *Academic Emergency Medicine*, 13: 974–979.

Reliance on Pain Self- Report

- Visual Analogue Scales, Numeric Rating Scales, Verbal Descriptor Scales, Pain Thermometers, Pain Faces, Intensity/Unpleasantness Distinctions

Example – McGill Pain Questionnaire – Present Pain Intensity



PPI

- 0 NO PAIN _____
- 1 MILD _____
- 2 DISCOMFORTING _____
- 3 DISTRESSING _____
- 4 HORRIBLE _____
- 5 EXCRUCIATING _____

© R. Melzack, 1984

McGill Pain Questionnaire – Short Form (taps sensory, affective, evaluative)

SHORT-FORM MCGILL PAIN QUESTIONNAIRE
RONALD MELZACK

PATIENT'S NAME: _____

DATE: _____

	<u>NONE</u>	<u>MILD</u>	<u>MODERATE</u>	<u>SEVERE</u>
THROBBING	0) _____	1) _____	2) _____	3) _____
SHOOTING	0) _____	1) _____	2) _____	3) _____
STABBING	0) _____	1) _____	2) _____	3) _____
SHARP	0) _____	1) _____	2) _____	3) _____
CRAMPING	0) _____	1) _____	2) _____	3) _____
GNAWING	0) _____	1) _____	2) _____	3) _____
HOT-BURNING	0) _____	1) _____	2) _____	3) _____
ACHING	0) _____	1) _____	2) _____	3) _____
HEAVY	0) _____	1) _____	2) _____	3) _____
TENDER	0) _____	1) _____	2) _____	3) _____
SPLITTING	0) _____	1) _____	2) _____	3) _____
TIRING-EXHAUSTING	0) _____	1) _____	2) _____	3) _____
SICKENING	0) _____	1) _____	2) _____	3) _____
FEARFUL	0) _____	1) _____	2) _____	3) _____
PUNISHING-CRUEL	0) _____	1) _____	2) _____	3) _____

Assessment of Pain-Related Constructs

- Pain Catastrophizing
- Fear of Pain
- Pain Anxiety
- Pain Acceptance
- etc

Negative Illness-Related Thoughts (Pain Catastrophizing)

I cannot bear this pain

My life is ruined

I am desperate



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I am worthless

Pain Catastrophizing Scale, Sullivan et al., 1995

0 – not at all 1 – to a slight degree 2 – to a moderate degree 3 – to a great degree 4 – all the time

When I'm in pain ...

- 1 I worry all the time about whether the pain will end.
- 2 I feel I can't go on.
- 3 It's terrible and I think it's never going to get any better.
- 4 It's awful and I feel that it overwhelms me.
- 5 I feel I can't stand it anymore.
- 6 I become afraid that the pain will get worse.
- 7 I keep thinking of other painful events.
- 8 I anxiously want the pain to go away.
- 9 I can't seem to keep it out of my mind.
- 10 I keep thinking about how much it hurts.
- 11 I keep thinking about how badly I want the pain to stop.
- 12 There's nothing I can do to reduce the intensity of the pain.
- 13 I wonder whether something serious may happen.

...Total

Instructions for Pain Catastrophizing Scale

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

The Construct of Catastrophizing

- Dispositional Measure?
- Situation-specific Measure?
- Construct overlap with depressive symptoms?
- Capturing all relevant domains (e.g., worst case scenario thoughts)?
- Method variance?
- Item wording?

How is Efficacy Measured in Psychosocial Treatment Trials?

- **Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (Dworkin, Turk, et al., 2006)**
- **Assess Multiple Dimensions**
 - Pain
 - Interference in physical functioning due to pain
 - Emotional functioning (mood or mood state)
 - Participant ratings of global improvement and satisfaction with treatment
 - Symptoms and adverse events

Dworkin, et. al. (2006). Developing outcome measures for pain clinical trials: IMMPACT recommendations. *Pain*, 2006;125:208-215.

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Why Study Mechanisms?

- To test treatment-specific theories that underlie the rationale for undertaking a particular intervention
- To test whether the things we deliberately target to bring about outcomes are actually among the “active ingredients”
- To facilitate translation/dissemination of efficacious treatments from controlled RCTs to real world clinical practice (i.e., identify aspects of tx that are ***critical and cannot be diluted*** vs. those that are not critical to tx success)

Specific Mechanisms for Treatment Efficacy?

Different therapies propose different theoretically- specific mechanisms for achieving positive outcomes:

- **Behavioral therapy** – increases in functional behavior (what a patient does)
- **Cognitive therapy** – reduces maladaptive thoughts and beliefs (what a patient thinks)
- **Mindfulness-based stress reduction** – increases attention toward/acceptance of the present moment (*how* a patient thinks)

Non-specific (shared) Mechanisms?

- Similar efficacy across treatments, despite different proposed mechanisms
- Common factors include patient expectancy, therapeutic alliance.
- Common factors as (possibly) necessary, but not sufficient?

What is needed in psychosocial mechanism research?

- Prospective studies of mechanism of change (different from efficacy studies)
 - E.g., must measure putative mechanisms at multiple time points)
- Certain methodologies and statistical analyses are necessary to study mechanism of change
 - E.g., measure multiple putative mechanisms (theory-specific and not) for each tested treatment

To build the case for a mechanism, at least 5 conditions should be examined

- Changes in mechanism and outcomes are correlated
- Substantial change in mechanism precedes substantial change in outcome
 - “cause” (e.g., decreased maladaptive cognitions) must precede “effect” (e.g. decreased pain severity).
- Early change in mechanism predicts later change in outcome (i.e., lagged correlation), but not vice versa
 - “cause” predicts “effect,” but “effect” does not predict “cause”
- Change in mechanism is specific to the treatment approach
 - cognitive restructuring as part of CBT invokes greater decreases in maladaptive cognitions than meditation does as part of MBSR
- Mechanism change has some degree of unique relationship with outcome changes beyond effects of general mechanisms (e.g., working alliance, patient expectations)

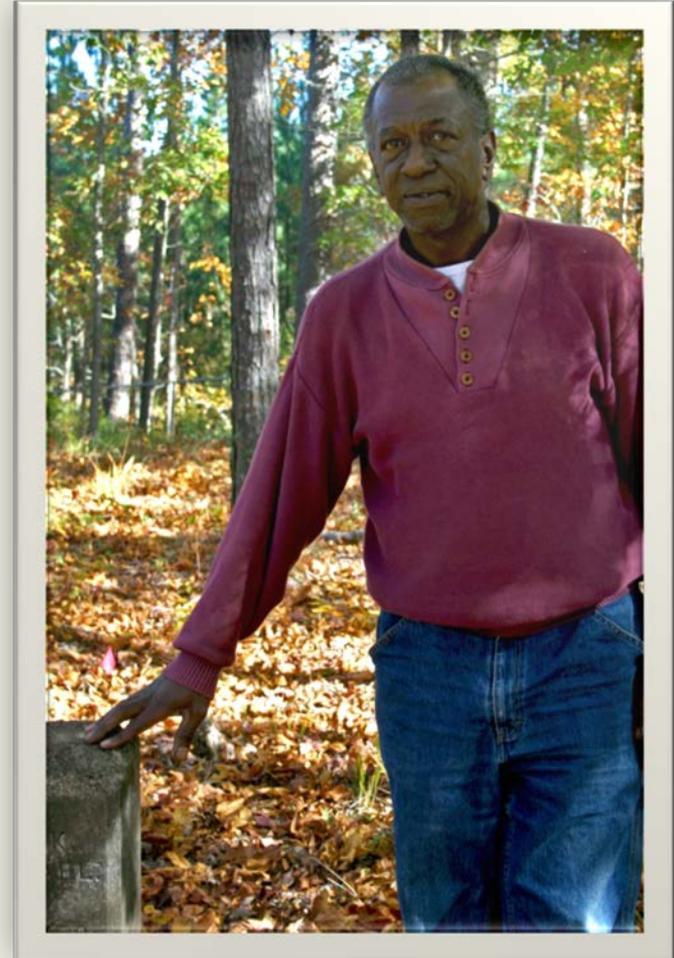
http://bthorn.people.ua.edu/uploads/1/3/8/0/13808171/sbm_2012_-_mechanisms_of_change_in_psychosocial_treatments_for_pain_-_thorn_burns_davis_-2012.pdf

So What? What's Next?

- Identifying the critical treatment components
- Maximizing their delivery
- Disseminating to real-world clients

Cognitive-Behavioral Chronic Pain Trial Among Rural Minorities and non-Minorities

Thorn, B.E., Day, M.A., Burns, J.,
Kuhajda, M., Gaskins, S.,
Sweeney, J., McConley, R.,
Ward, L.C., & Cabbil, C. (2011).
Randomized trial of group
cognitive-behavioral therapy
compared to a pain education
control for low literacy rural
people with chronic pain. Pain,
152, 2710-2720.



Thank you!

