# Care for Patients with Complex and High-Impact Chronic Pain

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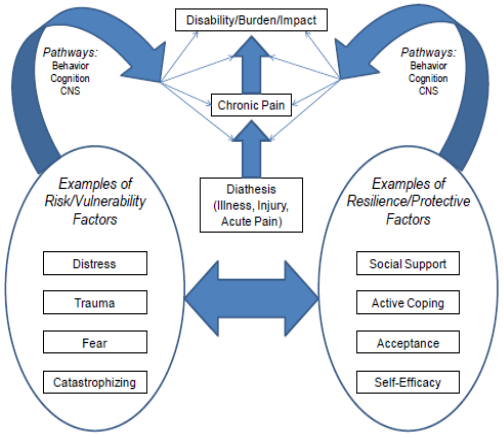
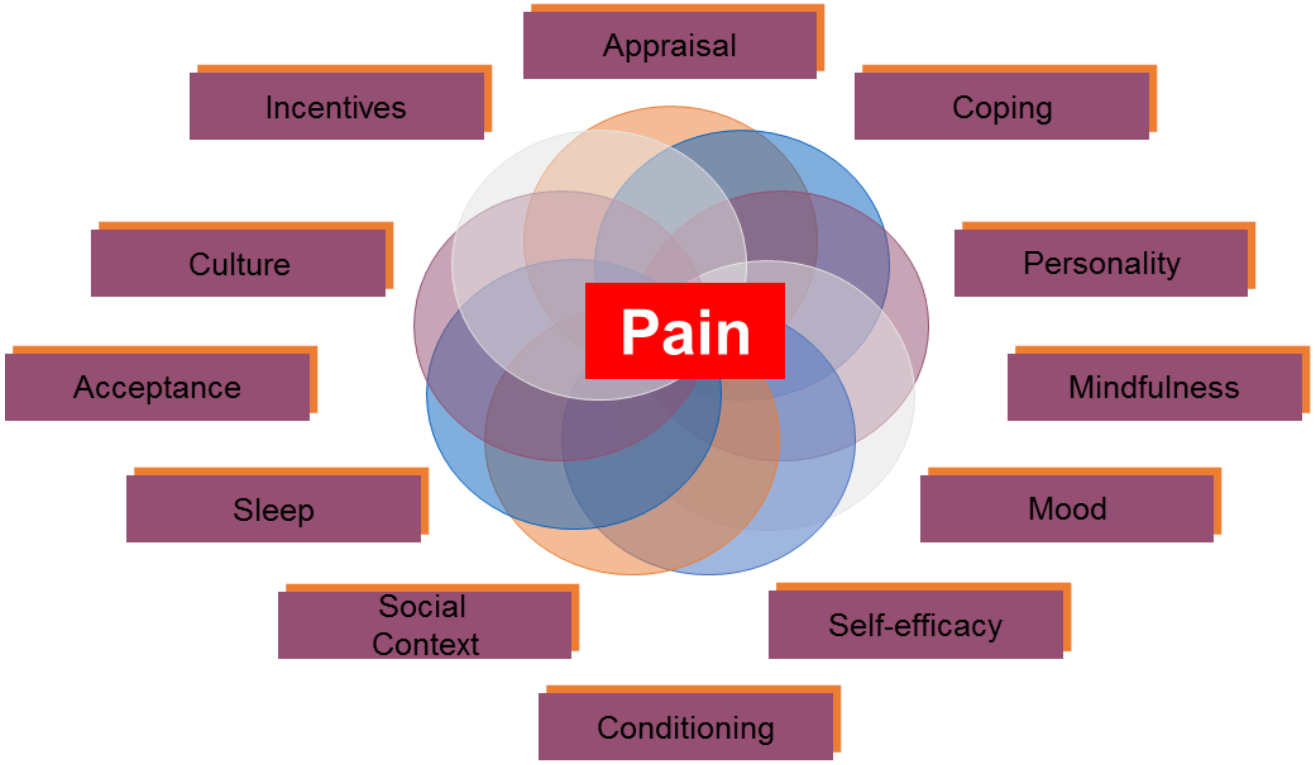
# Disclosures

## Research Support

- National Institutes of Health
- Patient-Centered Outcomes Research Institute

# Depicting the Biopsychosocial Model of Pain

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The Role of Psychosocial Processes in the Development and Maintenance of Chronic Pain

Robert R. Edwards,* Robert H. Dworkin,† Mark D. Sullivan,‡ Dennis C. Turk,§ and Ajay D. Wasan¶

# Clusters of risk factors are associated with high-impact chronic pain

Women
Older age
Minority
HS Edu
Not married
Poverty
Rural

Public Health
Insurance

Comorbid medical conditions

Past surgeries

Depression
Anxiety
Fatigue

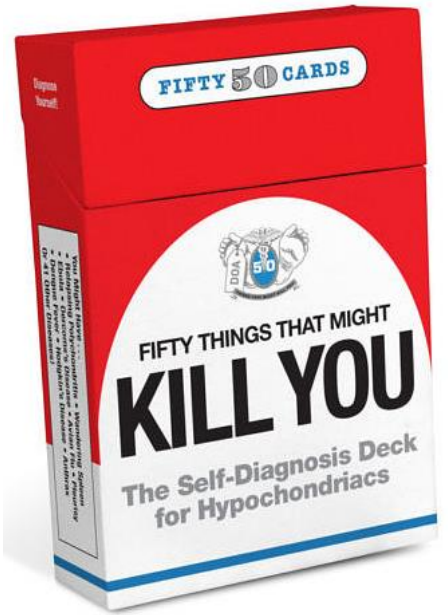
Cognitive limitations

# Catastrophizing

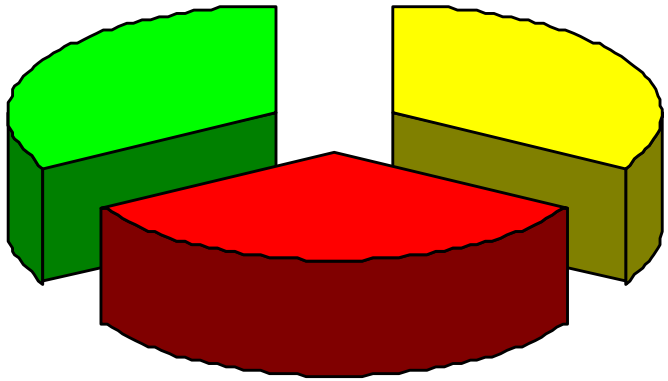
*I worry all the about wheth pain will e*

*I feel I ca the pain*

*I wonder whether something serious may happen*







Rumination

Magnification

Helplessness

# Risk factor for poor treatment outcomes

Journal of Pain Research

Dovepress
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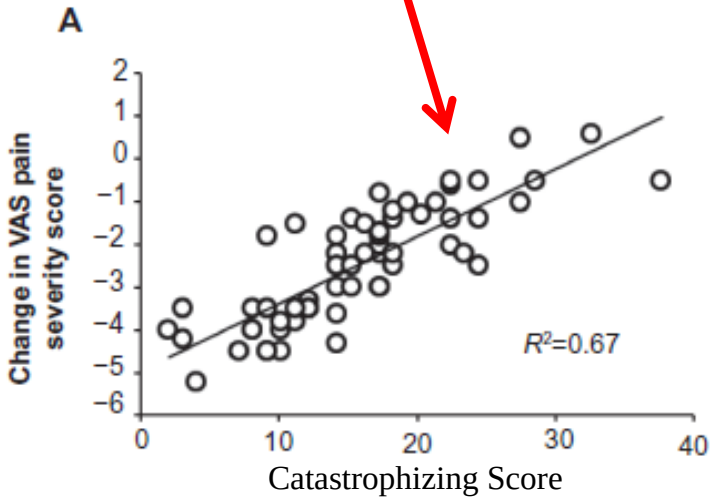
ORIGINAL RESEARCH

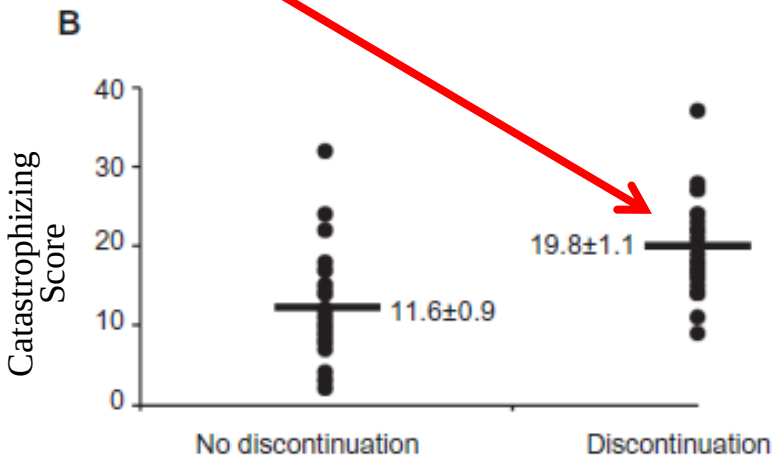
## The importance of catastrophizing for successful pharmacological treatment of peripheral neuropathic pain

Cory Toth
Shauna Brady
Melinda Hatfield

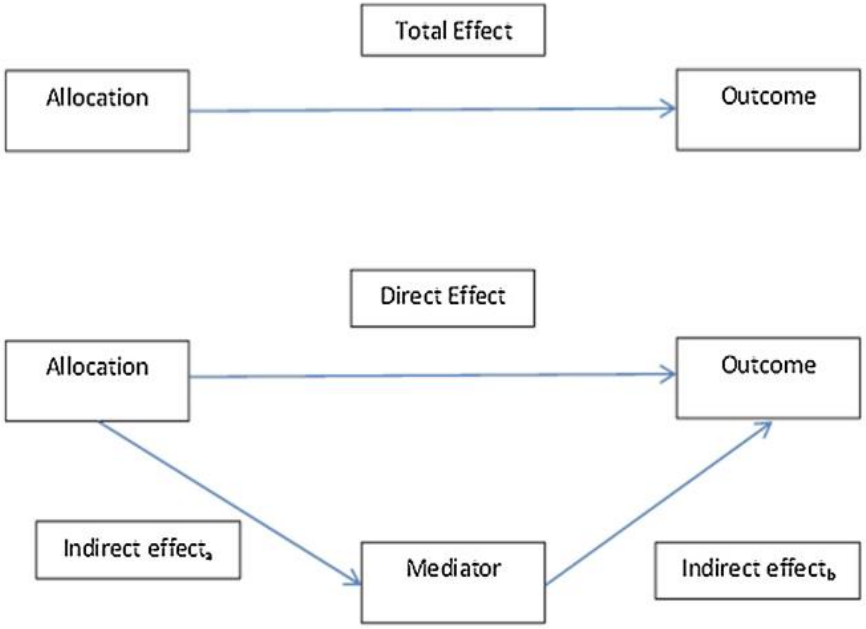
**Table 3** Medication interventions provided to patients

| | Number of patients receiving specific medication | Initial medication daily dose | Final medication daily dose | Discontinuations |
|---|---|---|---|---|
| Amitryptyline | 25 (40%) | 15.0±5.2 mg | 37.3±12.7 mg | 14/25 (56%) |
| Nortryptyline | 10 (16%) | 25.5±11.3 mg | 55.7±13.3 mg | 5/10 (50%) |
| Gabapentin | 17 (27%) | 667.0±112.3 mg | 1,562.7±147.8 mg | 7/17 (41%) |
| Pregabalin | 10 (16%) | 120.5±62.3 mg | 363.3±78.8 mg | 4/10 (40%) |

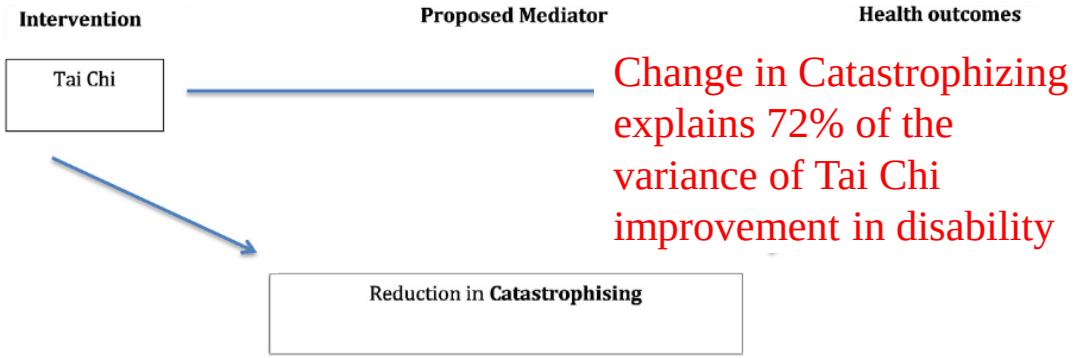


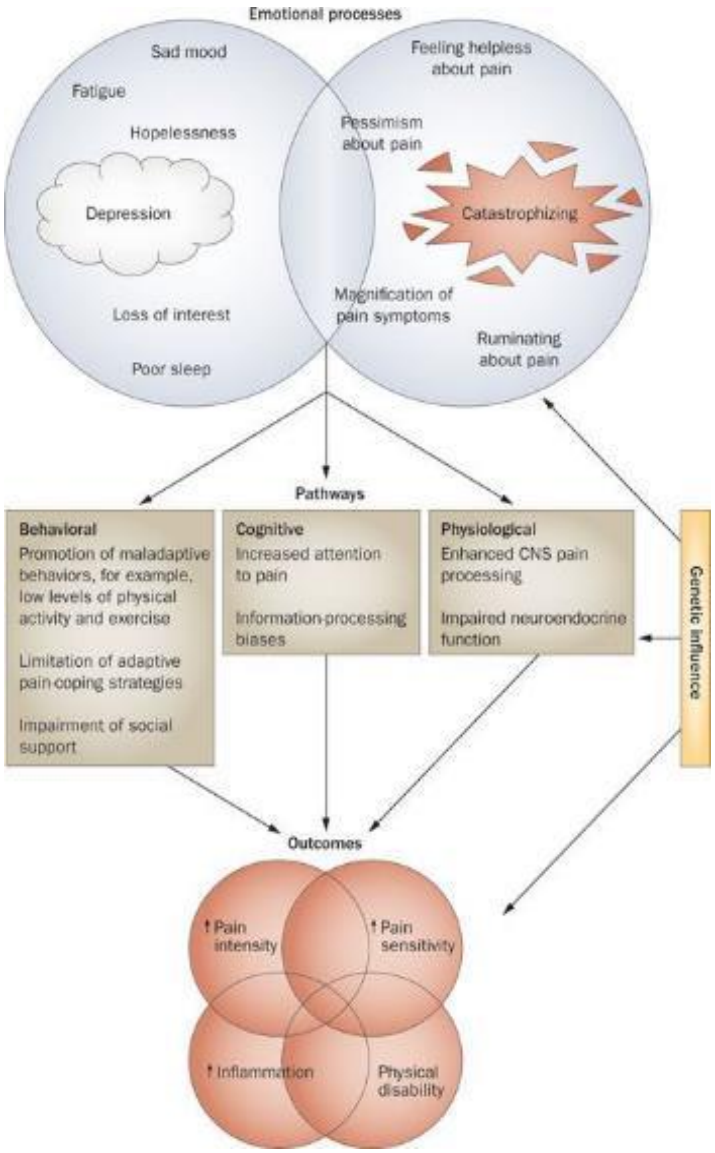
# Process Variable




*A.M. Hall et al. / Complementary Therapies in Medicine 25 (2016) 61–66*




Change in Catastrophizing explains 72% of the variance of Tai Chi improvement in disability



# Neural Underpinnings/ Biomarkers?

Review

The Neural Code for Pain: From Single-Cell Electrophysiology to the Dynamic Pain Connectome

The Neuroscientist
2017, Vol. 23(4) 397–414
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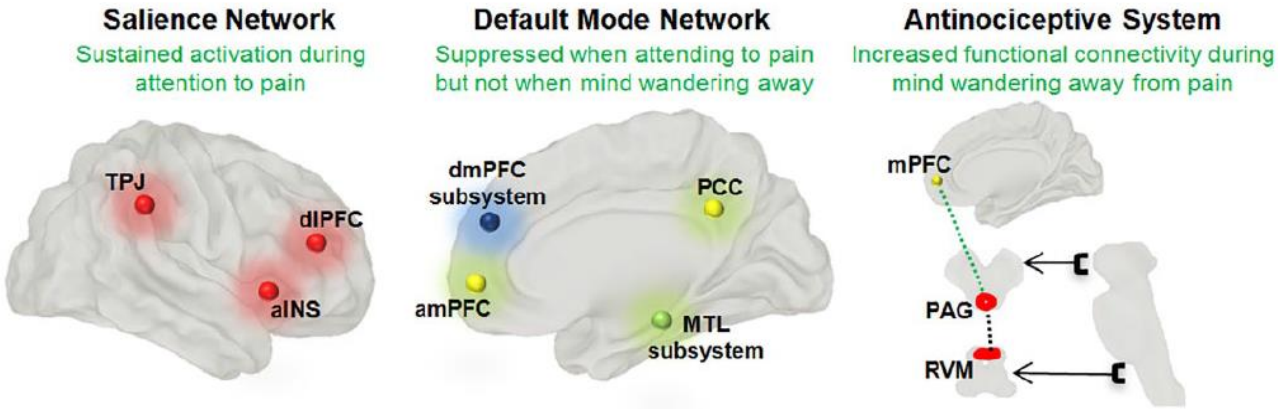
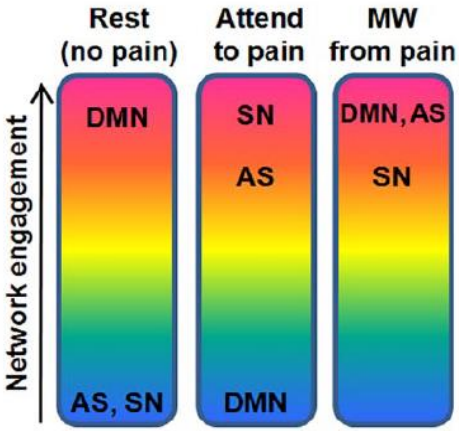
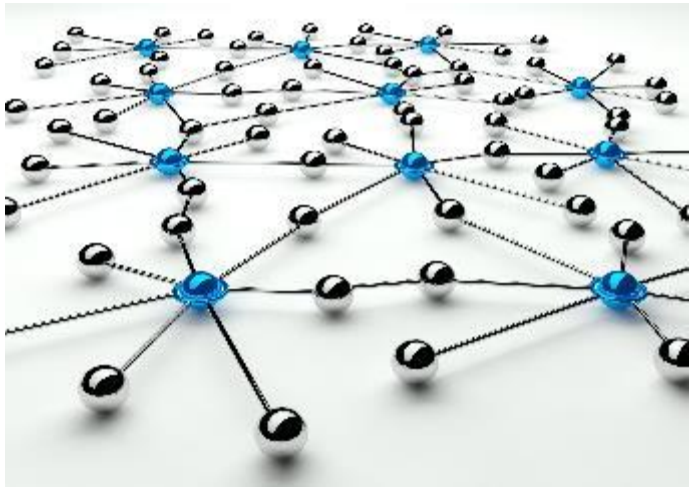
Aaron Kucyi[1] and Karen D. Davis[2,3,4]

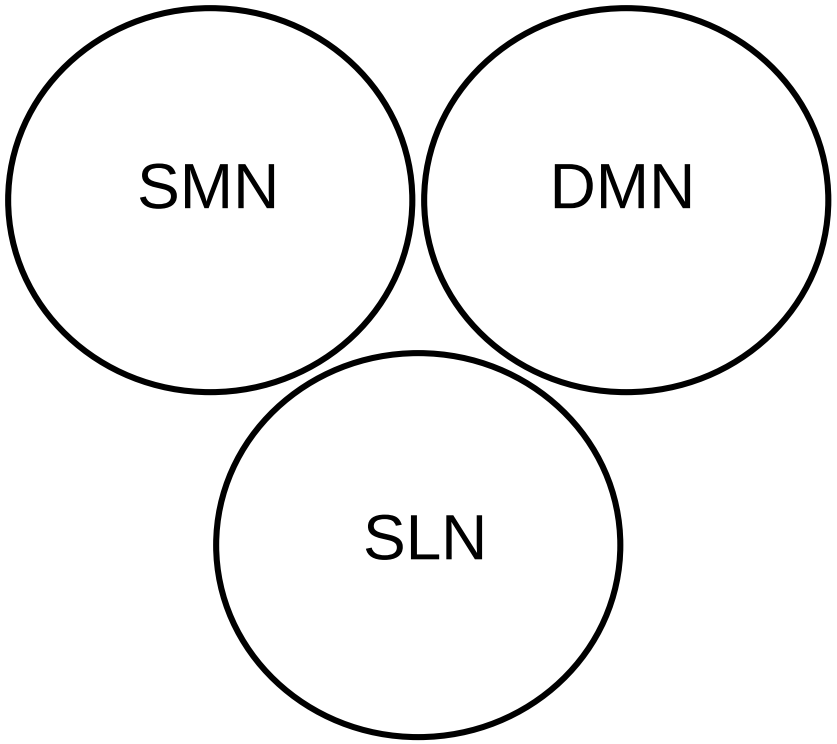


# Chronic Pain → Blurred Network Connectivity

Healthy

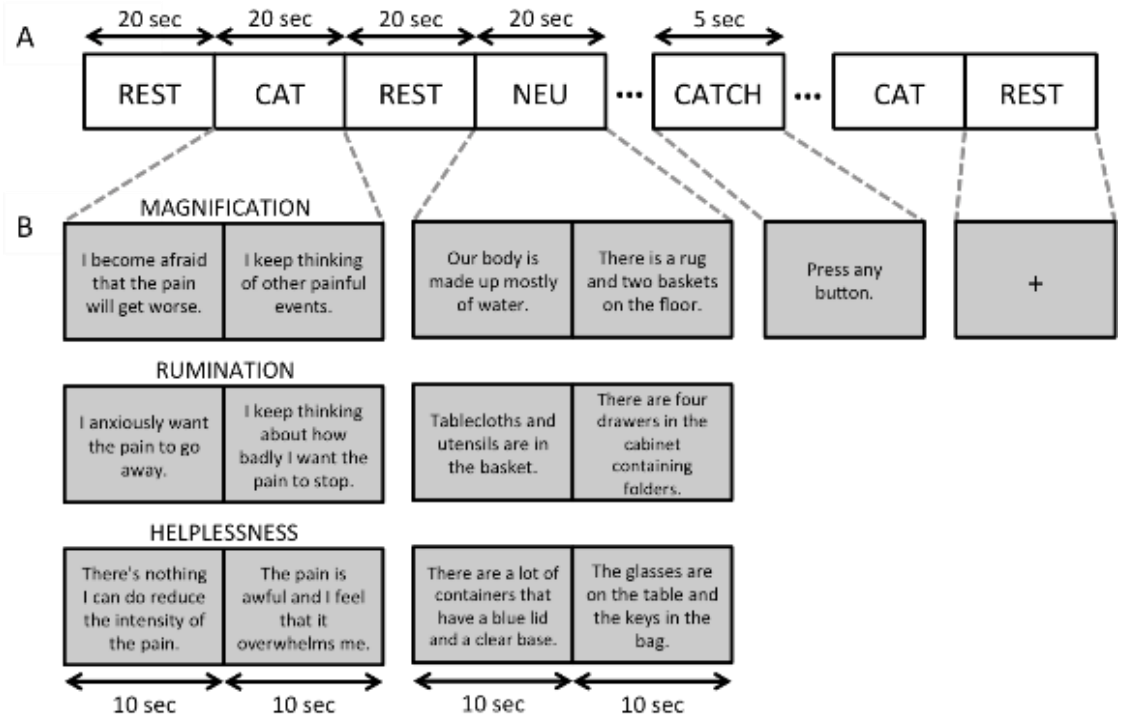



Chronic Pain

**Do pain-related catastrophizing and overlapping psychosocial processes contribute to this blurring?**

Athinoula A. Martinos Center For Biomedical Imaging

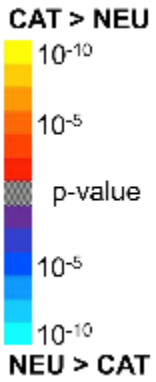
# Catastrophizing cognitions in FM patients activate DMN circuits

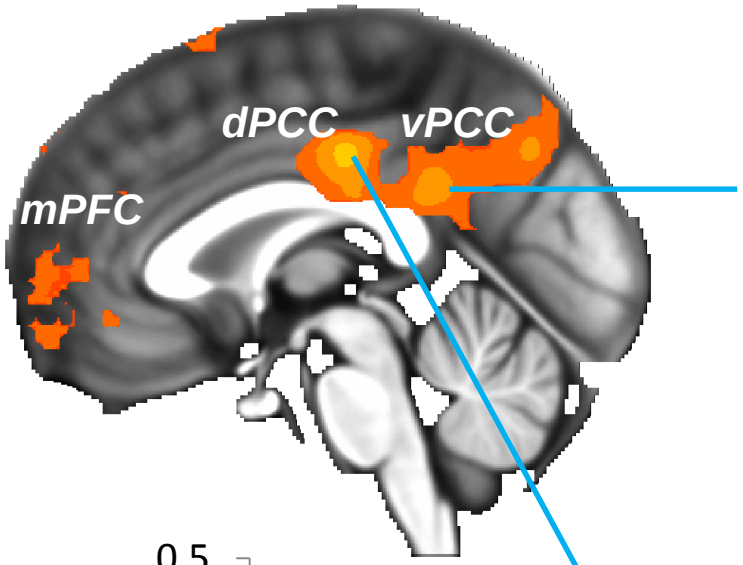


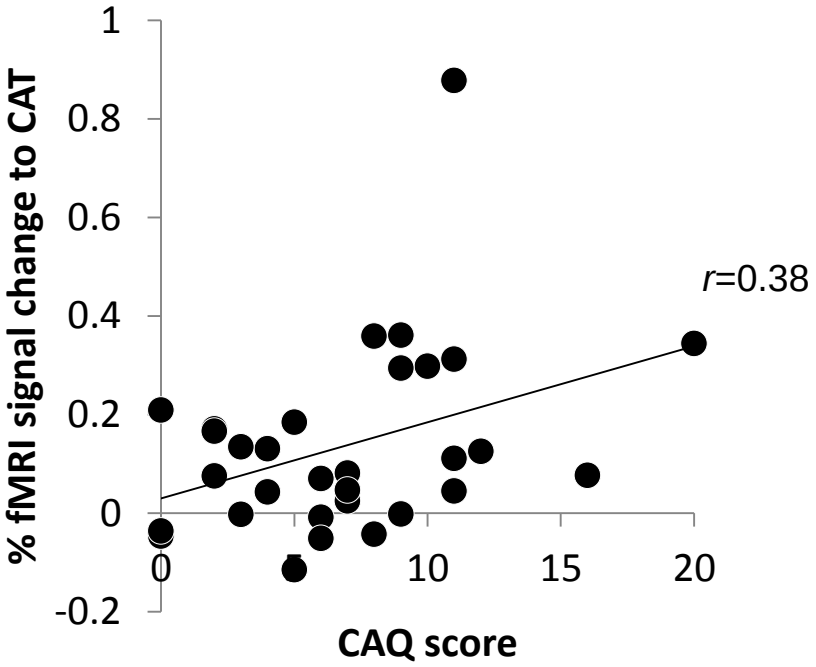

*Objective*. We designed a functional MRI-based pain catastrophizing task whereby patients with chronic pain engaged in catastrophizing-related cognitions compared to affectively neutral cognitions.

*Methods*. FM patients (n=31) reflected on how catastrophizing statements (CAT) impact their typical fibromyalgia pain experience. Response to CAT statements was compared to matched neutral statements (NEU).

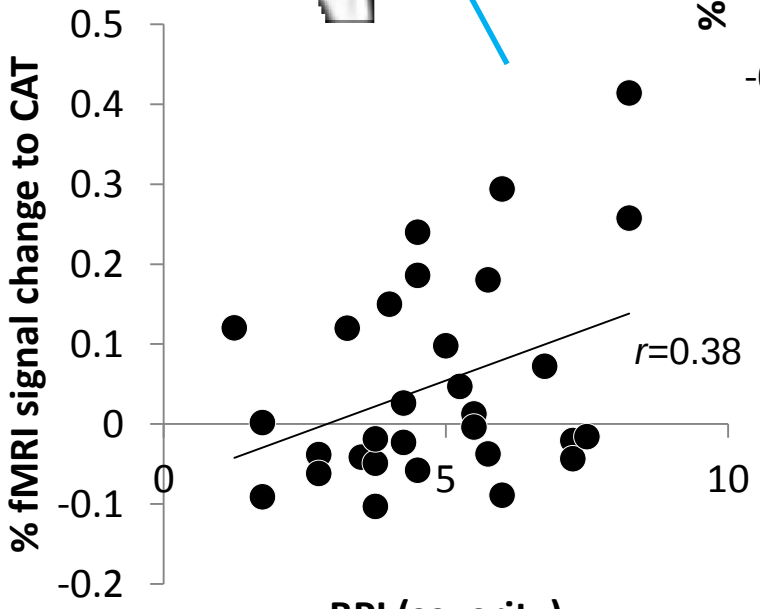
# Neural circuitry supporting catastrophizing



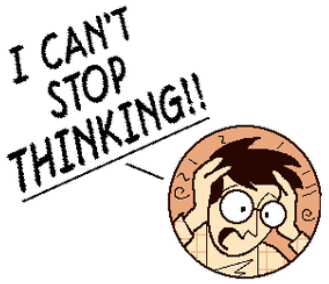




*CAQ = catastrophizing applicability questionnaire*




*BPI = brief pain inventory*

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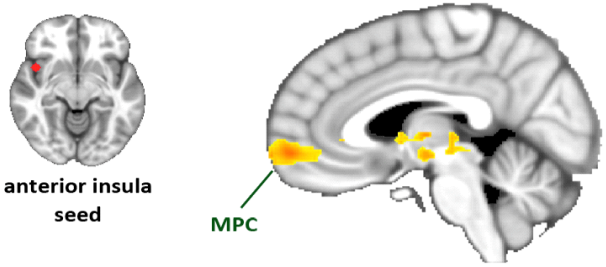
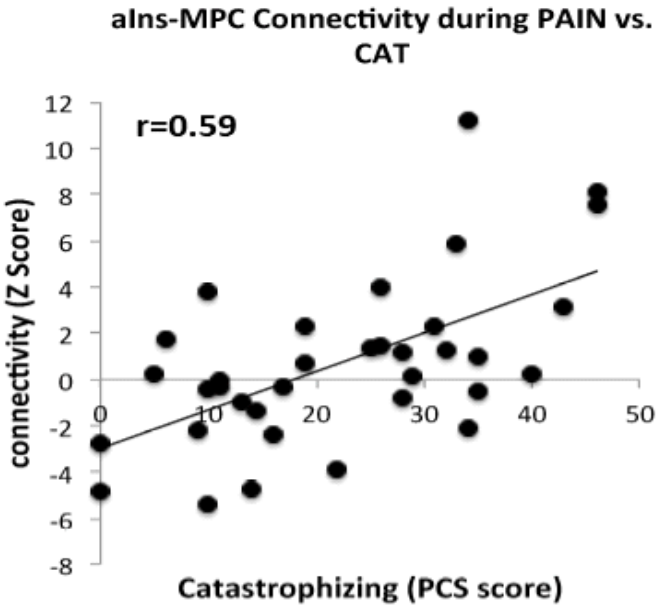
Lee et al., A&R 2018

# Catastrophizing: Associations with connectivity between salience network (Insula) and DMN

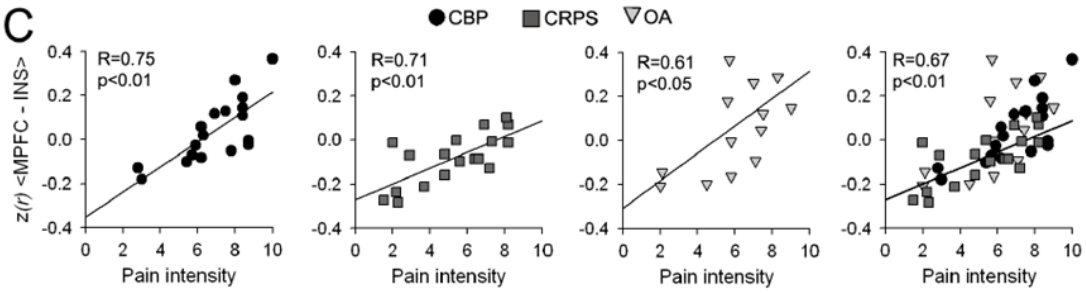



OPEN ACCESS Freely available online
PLOS ONE

Functional Reorganization of the Default Mode Network across Chronic Pain Conditions

Marwan N. Baliki[1], Ali R. Mansour[1], Alex T. Baria[1], A. Vania Apkarian[1,2,3]*

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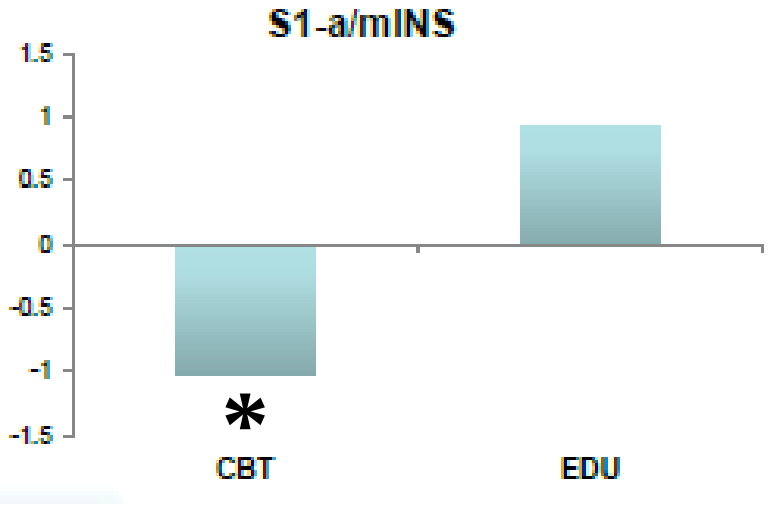
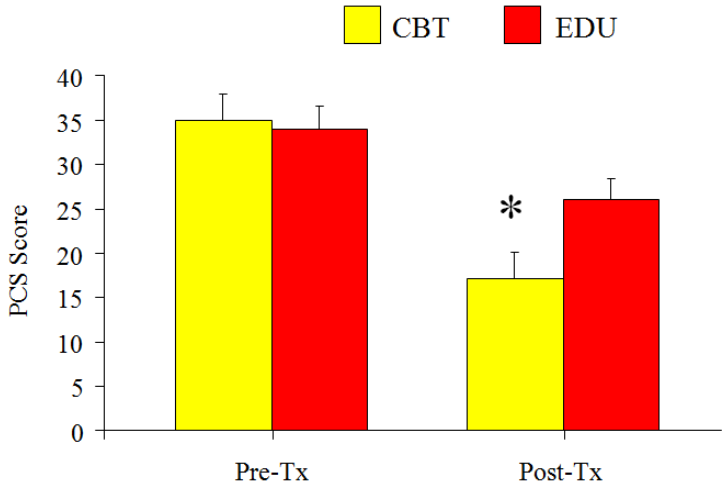
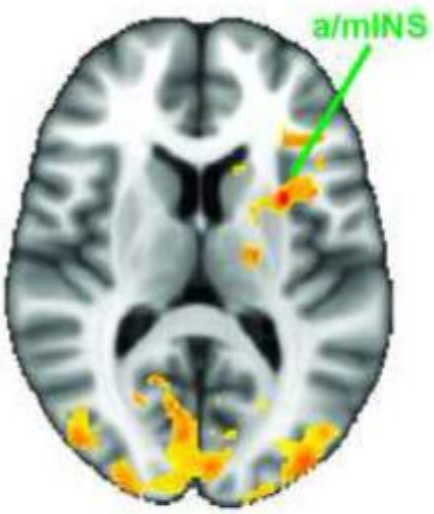
# CBT reduces catastrophizing, which contributes to partial resolution of maladaptive connectivity (Lazaridou et al., 2017):

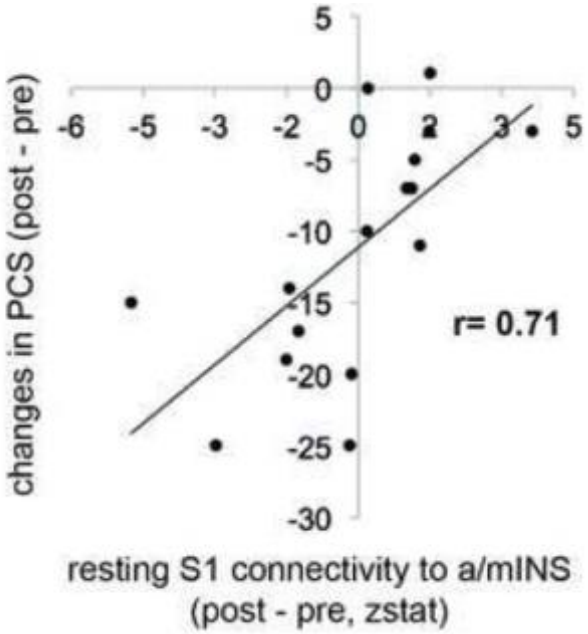
Patients in the CBT group show reductions in functional connectivity between S1 and anterior/medial insula at post-treatment:




And those who exhibit the largest reductions in catastrophizing also have the most substantial decreases in that connectivity . . .



# CBT and Catastrophizing

American Pain Society RESEARCH EDUCATION TREATMENT ADVOCACY
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The Journal of Pain, Vol 19, No 3 (March), 2018: pp 233-256
Available online at www.jpain.org and www.sciencedirect.com

Critical Review

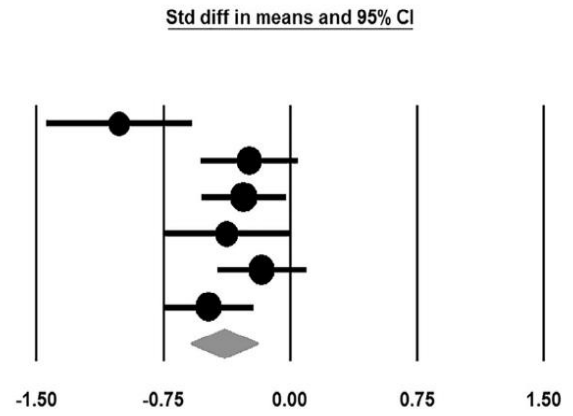
How Can We Best Reduce Pain Catastrophizing in Adults With Chronic Noncancer Pain? A Systematic Review and Meta-Analysis

Robert Schütze,* Clare Rees,* Anne Smith,† Helen Slater,† Jared M. Campbell,‡,§ and Peter O'Sullivan†

Long-term effects at 6- to 12-months post-treatment:

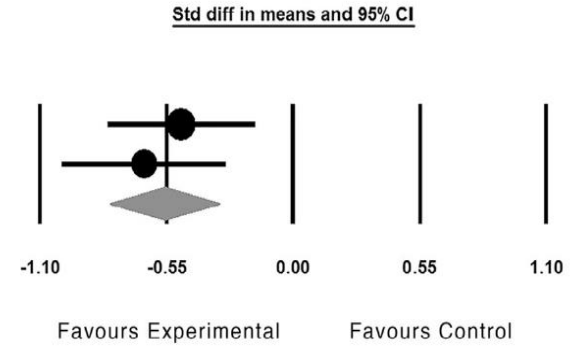
**Cognitive Behavior Therapy**

| Study name | Std diff in means | p-Value | Sample size: Experimental | Control | Total |
|---|---|---|---|---|---|
| Alda 2011 | -1.01 | 0.00 | 49 | 46 | 95 |
| Amris 2014 | -0.24 | 0.10 | 96 | 96 | 192 |
| Broderick 2014 | -0.28 | 0.03 | 129 | 127 | 256 |
| Bromberg 2012 | -0.38 | 0.05 | 46 | 74 | 120 |
| Trudeau 2015 | -0.17 | 0.20 | 113 | 115 | 228 |
| Turner 2016 | -0.48 | 0.00 | 112 | 113 | 225 |
| | -0.39 | 0.00 | 545 | 571 | 1116 |




**Multimodal treatment**

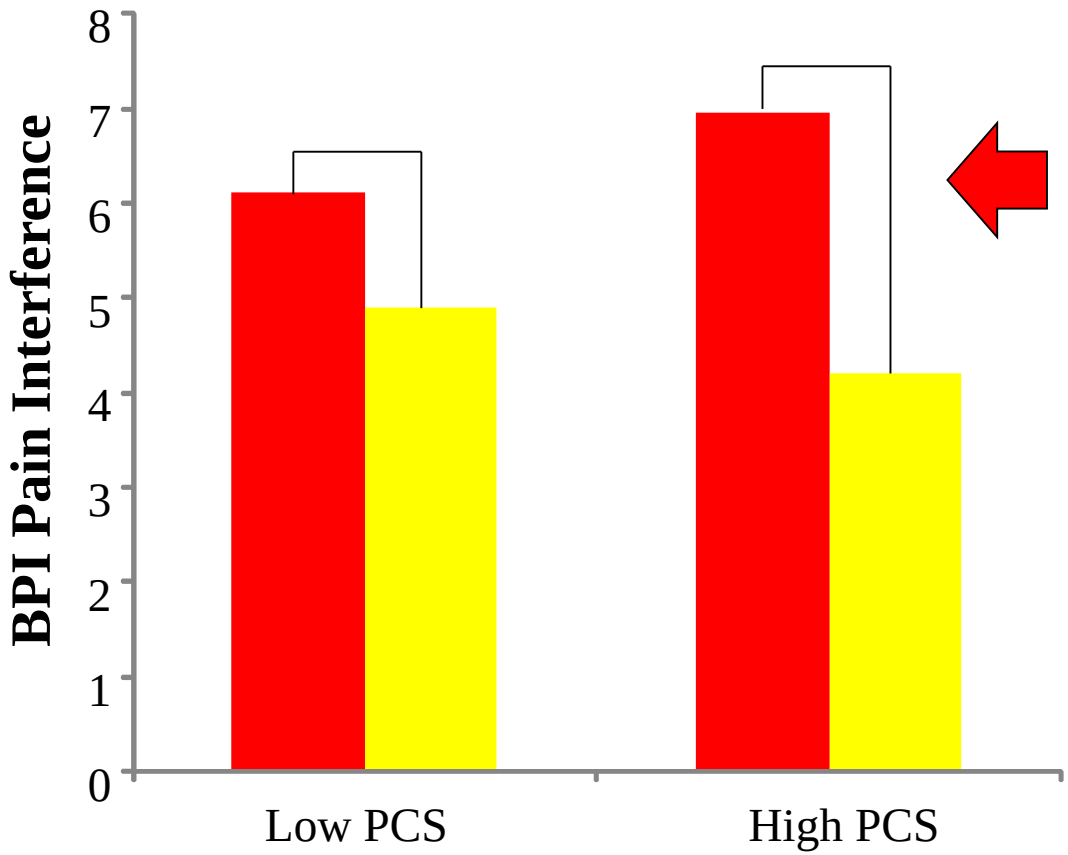
| Study name | Std diff in means | p-Value | Sample size: Experimental | Control | Total |
|---|---|---|---|---|---|
| Castel 2013 | -0.49 | 0.00 | 81 | 74 | 155 |
| Castel 2015 | -0.65 | 0.00 | 69 | 61 | 130 |
| | -0.56 | 0.00 | 150 | 135 | 285 |




Significant, moderate-sized effects of CBT on reduction in catastrophizing. Some evidence that effects are largest in those with the highest baseline PCS scores.

# CBT: Largest effects in High Catastrophizers

## *Ongoing BWH Trial*




% reduction in Pain Interference is almost twice as large in the high PCS group

Pre-Treatment

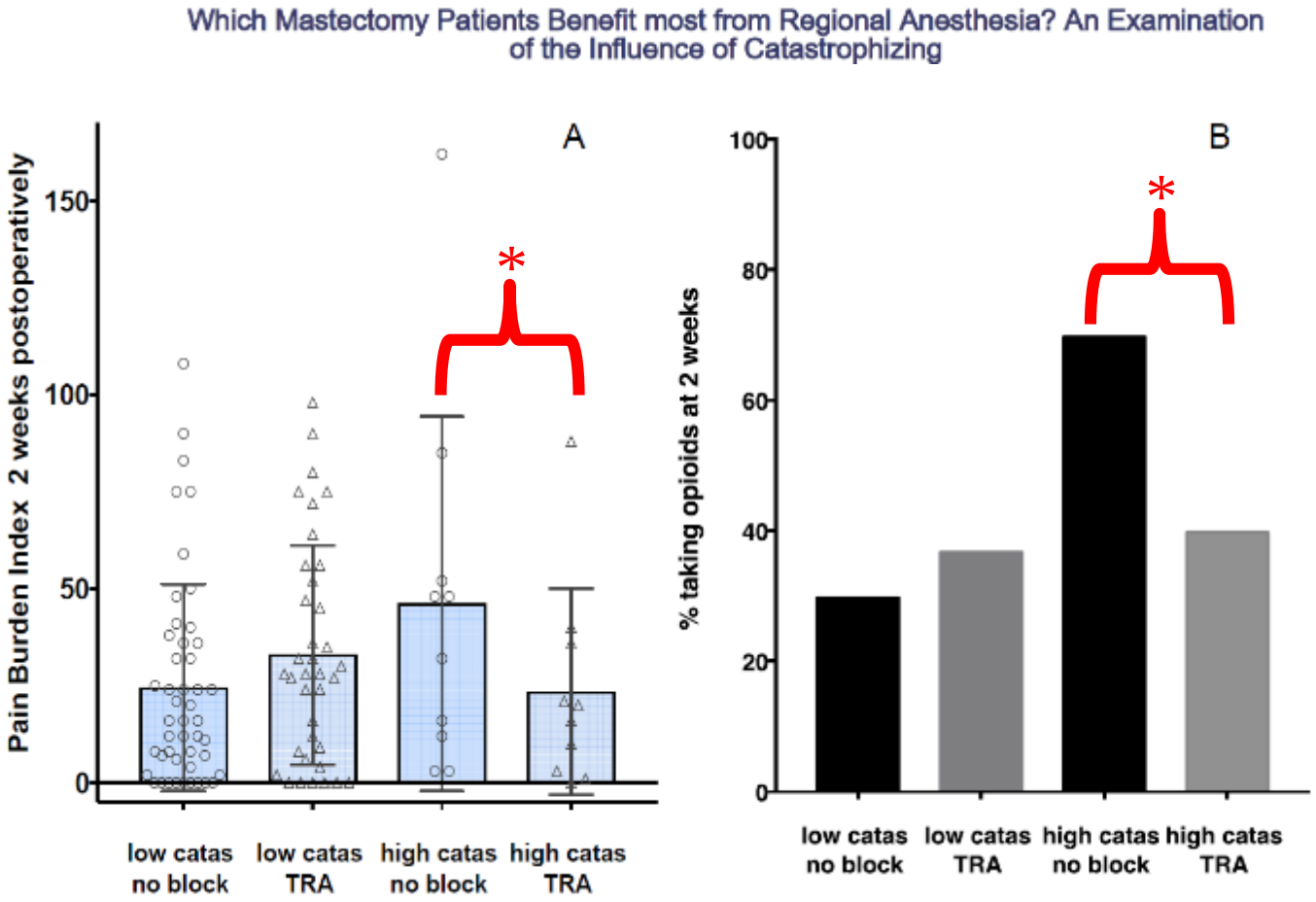
Post-Treatment

# High catastrophizing may be a phenotype associated with enhanced benefit from certain interventions (and reduced benefit from others)

Significant interaction between catastrophizing and the application of regional anesthesia:

High catastrophizers get more benefit than low catastrophizers for pain and opioid outcomes at 2 weeks post-op:

*Schreiber et al., Under Review*




Enrichment

# Conclusions

- Patients with complex, high-impact chronic pain have clusters of risk factors, many of them linked with cognitive/affective processes.
- Psychosocial phenotypes such as catastrophizing are reflective of brain/neurobiological phenotypes contributing to chronic pain.
- Non-pharmacologic interventions exert some of their benefits by acting on catastrophizing and related process variables.
- *Eventually, such mechanism-based research should help us to move in the direction of "precision pain medicine" in which psychosocial and neurobiological phenotypes are employed to optimize treatment selection for individual patients.*