

Mindful movement for chronic pain



Exploring the Treatment and Management of
Chronic Pain and Implications for Disability
Determination: A Presentation to the
Social Security Administration

April 17-18, 2025

Peter Wayne, PhD

**OSHER CENTER
FOR INTEGRATIVE HEALTH**



Disclosure

Peter Wayne, PhD is the founder and sole owner of the Tree of Life Tai Chi Center. Dr. Wayne's interests were reviewed by the Brigham and Women's Hospital and Partners HealthCare in accordance with their conflict of interest policies.

"Chronic pain is not all about the body, and it's not all about the brain—it's everything. Target everything. Take back your life."
—Sean Mackey, MD, PhD

"Chronic pain is not all about the body, and it's not all about the brain—it's everything. Target everything. Take back your life."
—Sean Mackey, MD, PhD

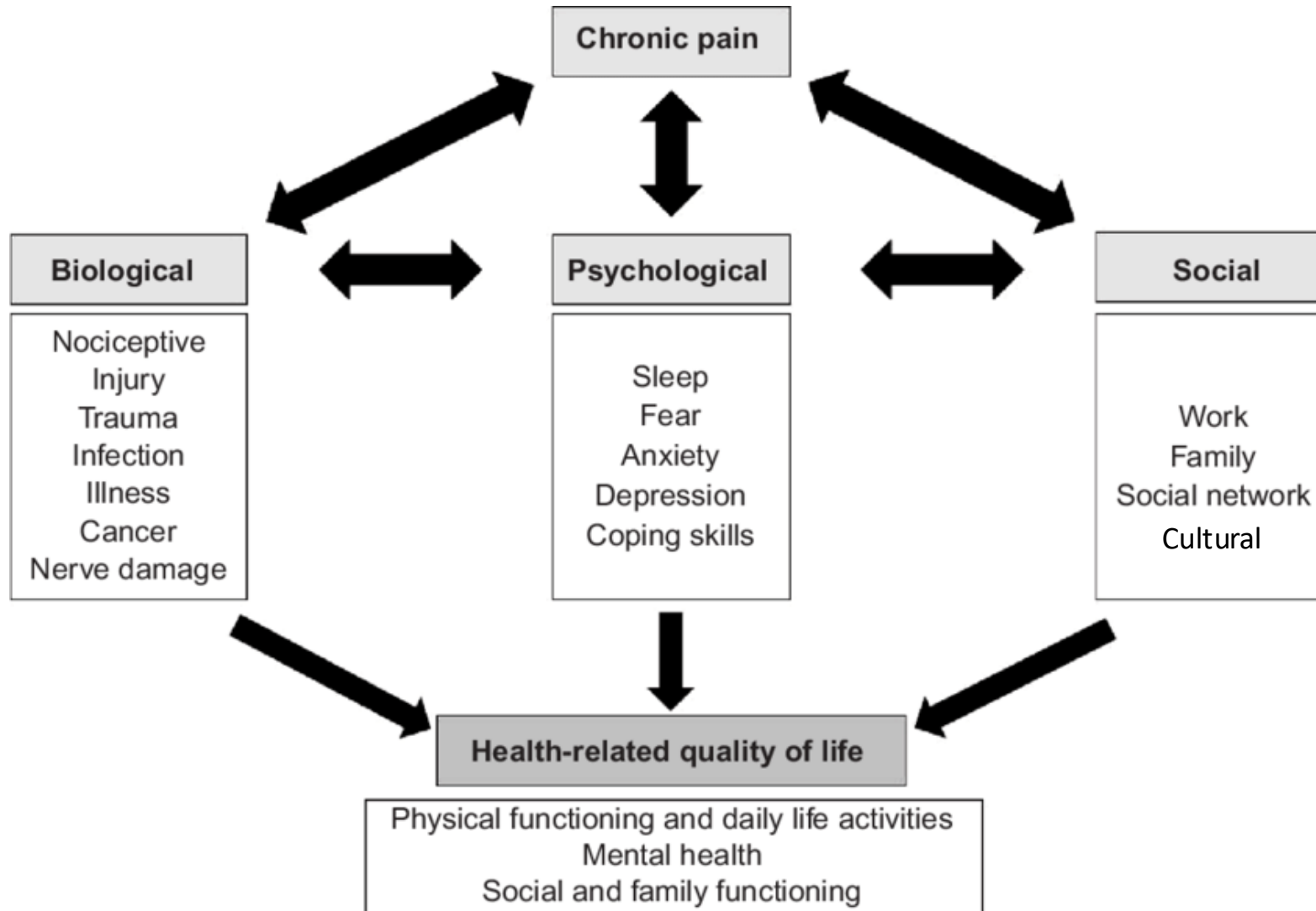
"Chronic pain is not all about the body, and it's not all about the brain—it's everything. Target everything. Take back your life."
—Sean Mackey, MD, PhD



Overview

- ❖ Chronic musculoskeletal pain and the promise/need for non-pharmacological biopsychosocially-informed interventions
- ❖ Mindful movement (MM) interventions
- ❖ Clinical trials evidence of Tai Chi & Qigong for chronic musculoskeletal pain conditions (knee osteoarthritis, low back, neck)
- ❖ MM-specific mechanisms that contribute to clinical benefits:
 - Enhanced somatosensory awareness
 - Healthy pain appraisal

Chronic pain is best viewed from a biopsychosocial framework



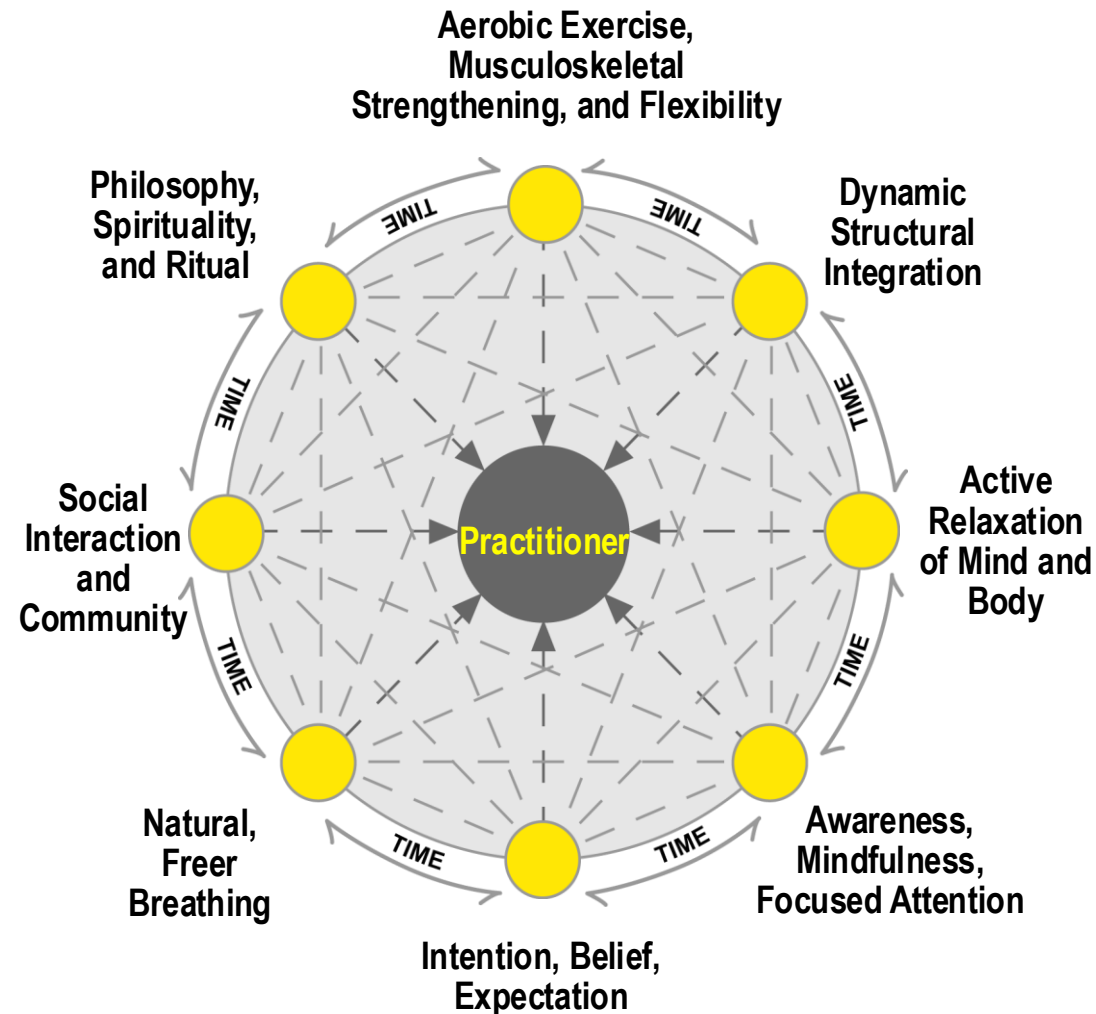
Mindful movement (MM)

- Distinct from conventional exercise and seated meditation^{1, 2}
- Some form of movement or body positioning, plus:
 - ❖ Cleared or calmed state of mind, with a goal of deep states of relaxation and breathing¹
 - ❖ Heightened body and psychophysiological awareness²
- Best viewed from embodied cognition framework—mental and physical experiences co-create one another^{2,3}

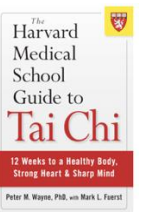


1. Larkey et al. J Phys Act and Health 2009
2. Osypiuk et al. Front Human Neuro 2018
3. Schmalzl et al; Front Human Neuro 2016

Mind-body movement practices are multimodal biopsychosocially-informed interventions



*From Wayne 2013:
Harvard Medical School Guide to Tai Chi*

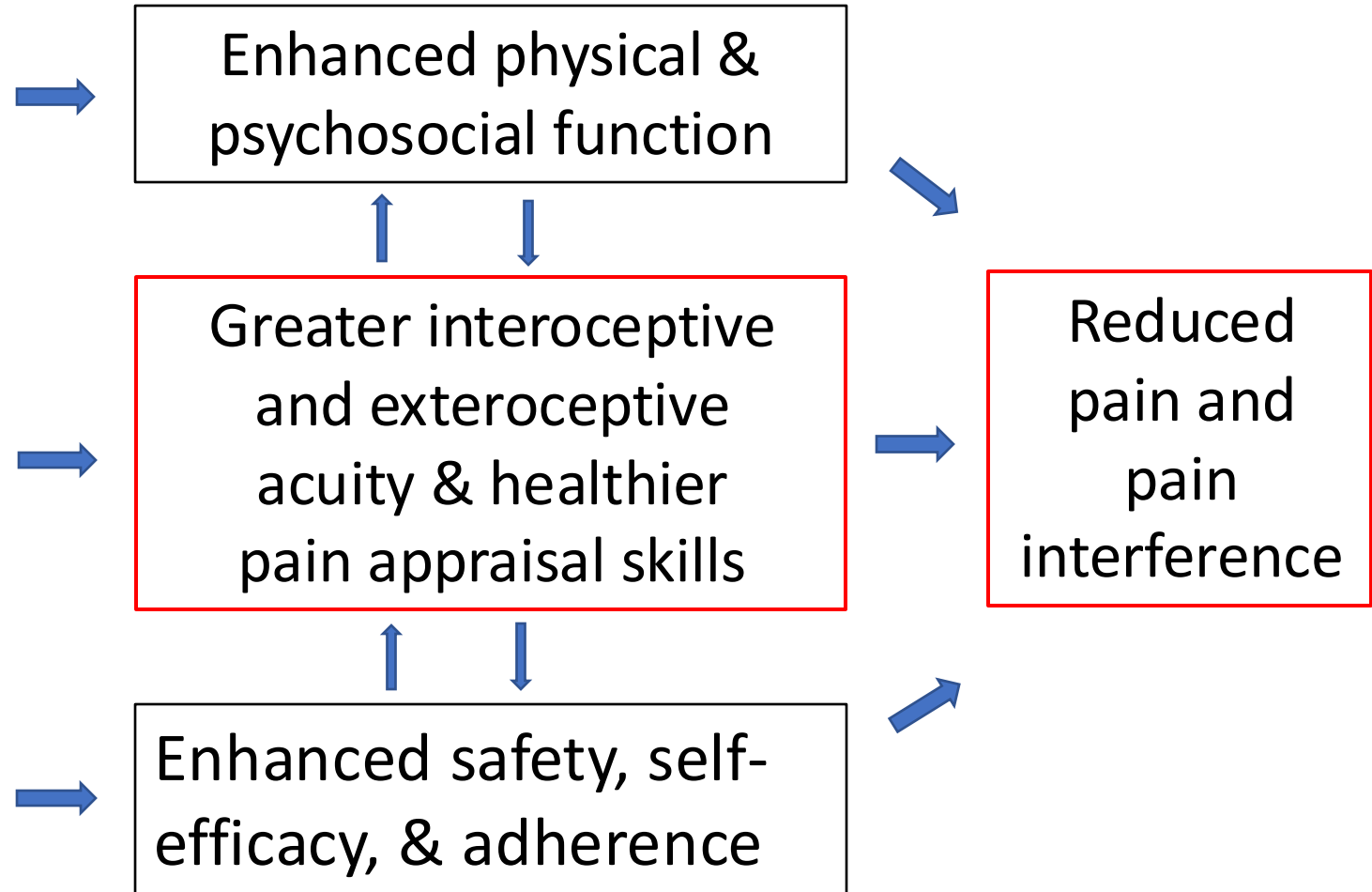


Conceptual framework for pain

Multimodal therapeutic components



- Stimulation of musculoskeletal tissues and through movement and diverse postures
- Heighted somatic attention and mental focus
- Imagery/visualization
- Breathing and autonomic regulation
- Higher level cognitive strategies (e.g., non-judgmental curiosity vs. fearful rumination; kindness; self gratitude)
- Psychosocial and physical interactions



Overview of Evidence



Evidence considered

- Meta-analyses and systematic reviews in past 5 years
- Recent scoping reviews
- Newer large scale RCTs

Evidence:

> 3,000 peer-reviewed scientific publications on Tai Chi and Qigong¹⁻³

RESEARCH

Open Access

Determining the safety and effectiveness of Tai Chi: a critical overview of 210 systematic reviews of controlled clinical trials



Guo-Yan Yang^{1†} , Jennifer Hunter^{2†}, Fan-Long Bu³, Wen-Li Hao⁴, Han Zhang⁵, Peter M. Wayne⁶ and Jian-Ping Liu^{7,8}

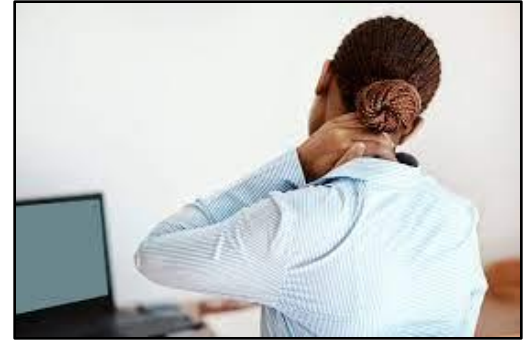
Conclusions: “The findings suggest Tai Chi has multidimensional effects, including physical, psychological and quality of life benefits for a wide range of conditions, as well as multimorbidity. Clinically important benefits were most consistently reported for Parkinson’s disease, falls risk, knee osteoarthritis, cerebrovascular, and cardiovascular disease including hypertension. For most conditions, higher quality SRs with rigorous primary studies are required”.

*** Multi-system effects of TCQ results in multiple direct and indirect benefits for pain conditions

1. Yang GY 2015 PLoS ONE
2. Yang GY 2021 CTIM
3. Zhang YP 2020 CTIM

Chronic low back pain, neck pain, and knee osteoarthritis

- Chronic OA, LBP, NP and are among most prevalent causes for pain and disability^{1,2,3}
- Direct annual medical expenditure for OA > \$65 billion; LBP and NP >\$87 billion ^{3,4}
- Multiple guidelines support conservative, non-pharmacological therapies as first line approaches; associated with reduced costs and risk of opioid addiction^{4,5,6}



Meta-analyses and systematic reviews for pain conditions: Past 5 years

Tai Chi + Qigong*

- ❖ Total: n=21
- ❖ Osteoarthritis (10); Low back (2); Neck (2); MSK general (7)



General limitations:

- Great variability in methodological quality/rigor of MAs, SRs;
- High heterogeneity (interventions, populations, outcomes)
- Many studies of short duration (3-6 months)
- For some reviews (e.g. TCQ for LBP) >80% studies conducted in Asia

* Excludes review of TCQ for more general health conditions or general reviews of integrative therapies for pain

TCQ for knee OA



Clinical relevance of Tai Chi on pain and physical function in adults with knee osteoarthritis: An ancillary meta-analysis of randomized controlled trials

George A Kelley¹ , Kristi S Kelley¹ and Leigh F Callahan²

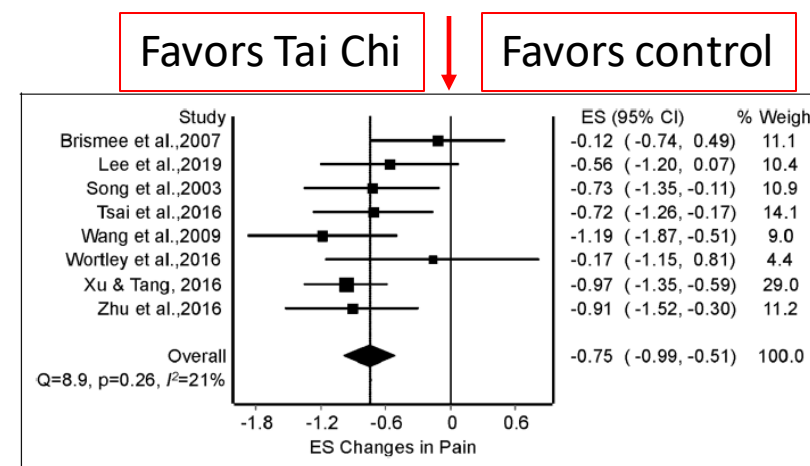
Science Progress
2022, Vol. 105(2) 1–19
© The Author(s) 2022
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/00368504221088375
journals.sagepub.com/home/sci


Summary of findings

- 16 RCTs (n=986)
- **Pain**: TCQ vs all interventions (majority passive) moderate to large effect size; no evidence of difference vs exercise.
- **Physical function**: Moderate to large effect size

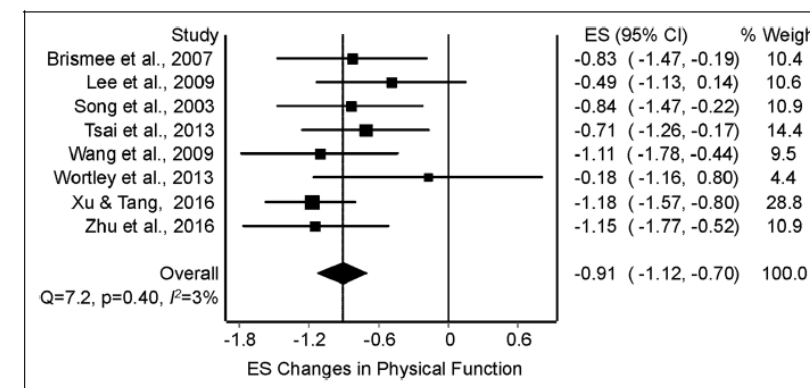
Also see Zeng et al. Compl Ther Med 2020
Li et al. Int J Pub Health 2020
Hu et al. Clin Rehab 2021

Pain



SMD*
-0.75

Physical Function

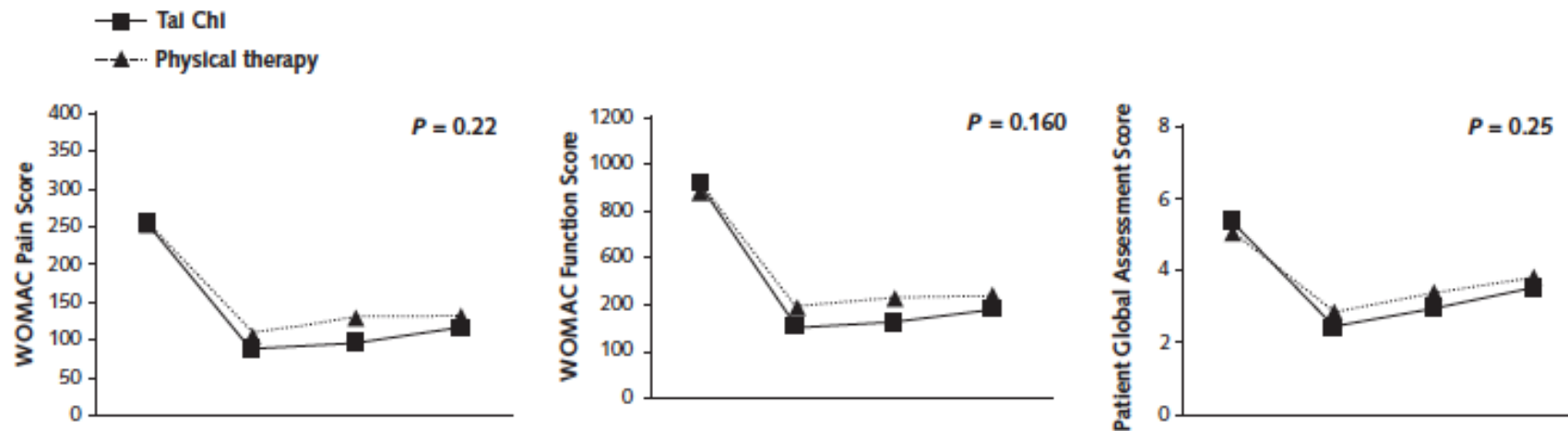


SMD
-0.91

Comparative Effectiveness of Tai Chi Versus Physical Therapy for Knee Osteoarthritis

A Randomized Trial

Chenchen Wang, MD, MSc; Christopher H. Schmid, PhD; Maura D. Iversen, SD, DPT, MPH; William F. Harvey, MD, MSc; Roger A. Fielding, PhD; Jeffrey B. Driban, PhD; Lori Lyn Price, MAS; John B. Wong, MD; Kieran F. Reid, PhD, MPH; Ramel Rones; and Timothy McAlindon, MD, MPH



Only Tai Chi showed improvement in depression

TCQ for low back pain

Summary of findings

- 10 RCTs, n=959;
9 studies from China

Also see:

Zhang et al. Appl Bionic and Biomech 2022

Zhang et al. Medicina 2019



Systematic Review and Meta-Analysis

2019

Medicine®

OPEN

Effect of Tai Chi alone or as additional therapy on low back pain

Systematic review and meta-analysis of randomized controlled trials

Jiawei Qin, PhD^{a,b}, Yi Zhang, MMED^b, Lijian Wu, BSc^b, Zexiang He, BSc^b, Jia Huang, PhD^a, Jing Tao, PhD^a, Lidian Chen, PhD^{a,c,*}

Effect Sizes for Pain

- SMD: -1.71 TCQ vs Passive control
- SMD -1.07 TCQ + routine therapy (e.g. PT, acupuncture vs routine therapy)

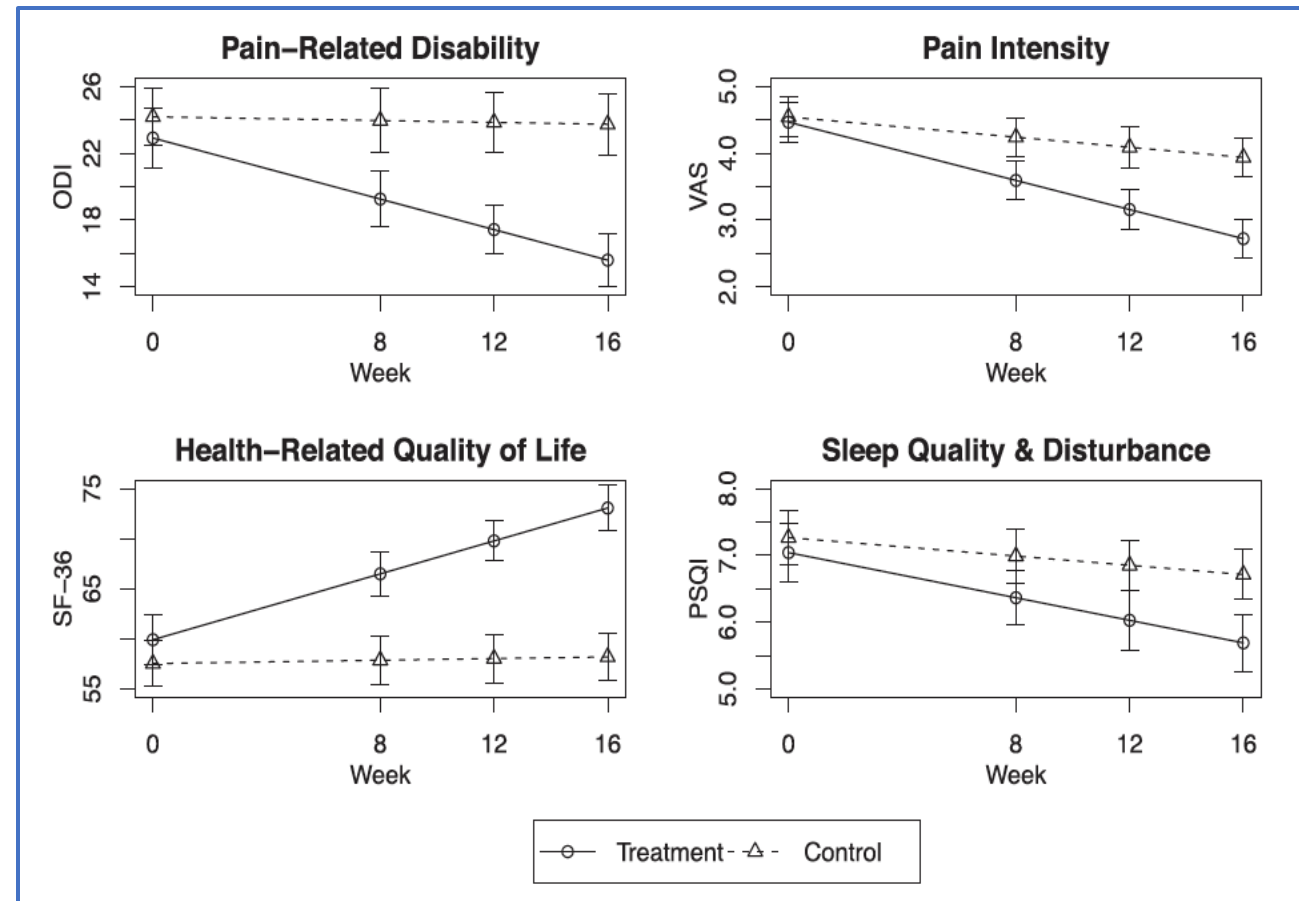


Clinical Studies

A Tai chi and qigong mind-body program for low back pain: A virtually delivered randomized control trial

Yang Yang, PhD^{a,*}, Sydne McCluskey, PhD^b, Mohamad Bydon, MD^c, Jaspal Ricky Singh, MD^d,

- RCT (n=350)
- Virtual Tai Chi+Qigong+meditation vs. Waitlist control
- 12 week intervention; 2X's/wk; 60 min



TCQ for neck pain



Traditional Chinese Exercises on Pain and Disability in Middle-Aged and Elderly Patients With Neck Pain: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Lingjun Kong^{1,2†}, Jun Ren^{1†}, Sitong Fang^{1†}, Tianxiang He¹, Xin Zhou^{1,2*} and Min Fang^{1,2,3*}

Summary findings

- 21 RCTS (n=1770)
- 18/21 China

Effect Sizes for Pain

- SMD: -0.81 TCQ vs. waitlist control
- SMD -0.07 TCQ vs. active exercise

Also see:

Girard and Girard. Compl Ther in Clin Practice 2019

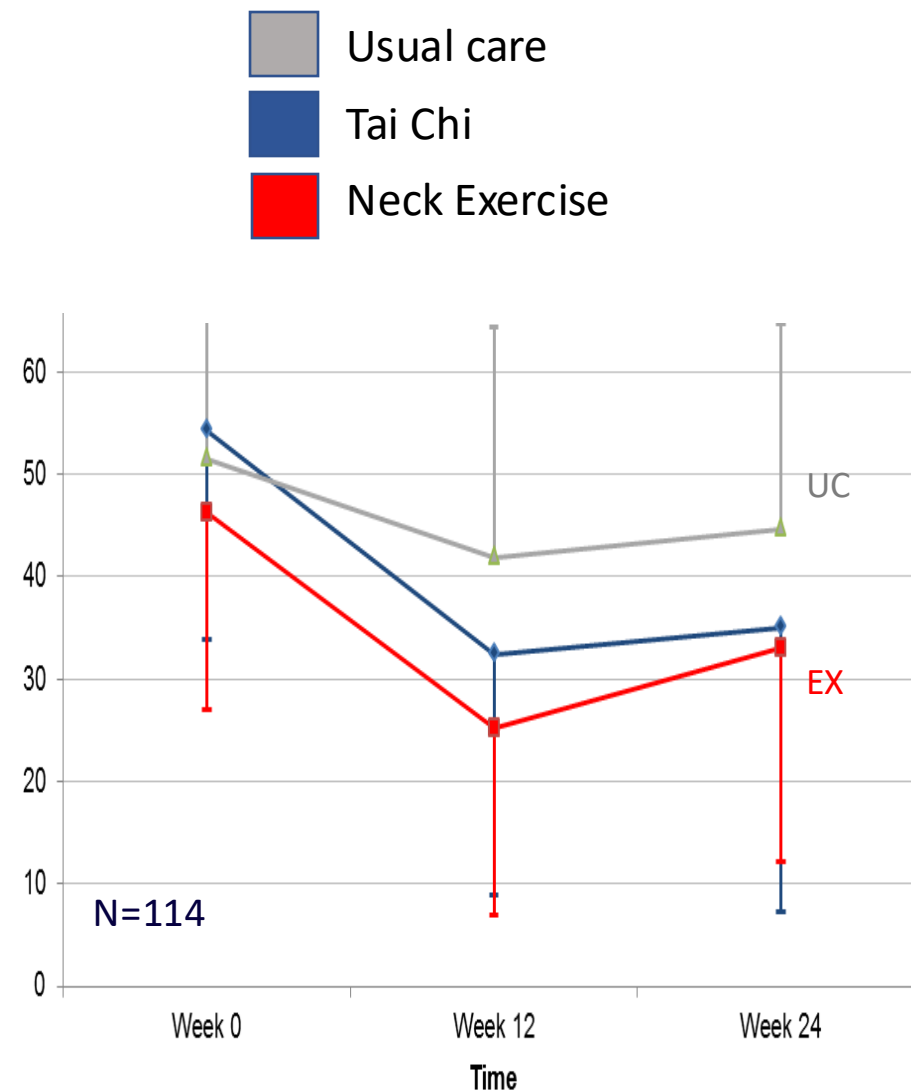
Xie et al. Pain Res and Mgmt 2021

The Effects of Tai Chi and Neck Exercises in the Treatment of Chronic Nonspecific Neck Pain: A Randomized Controlled Trial

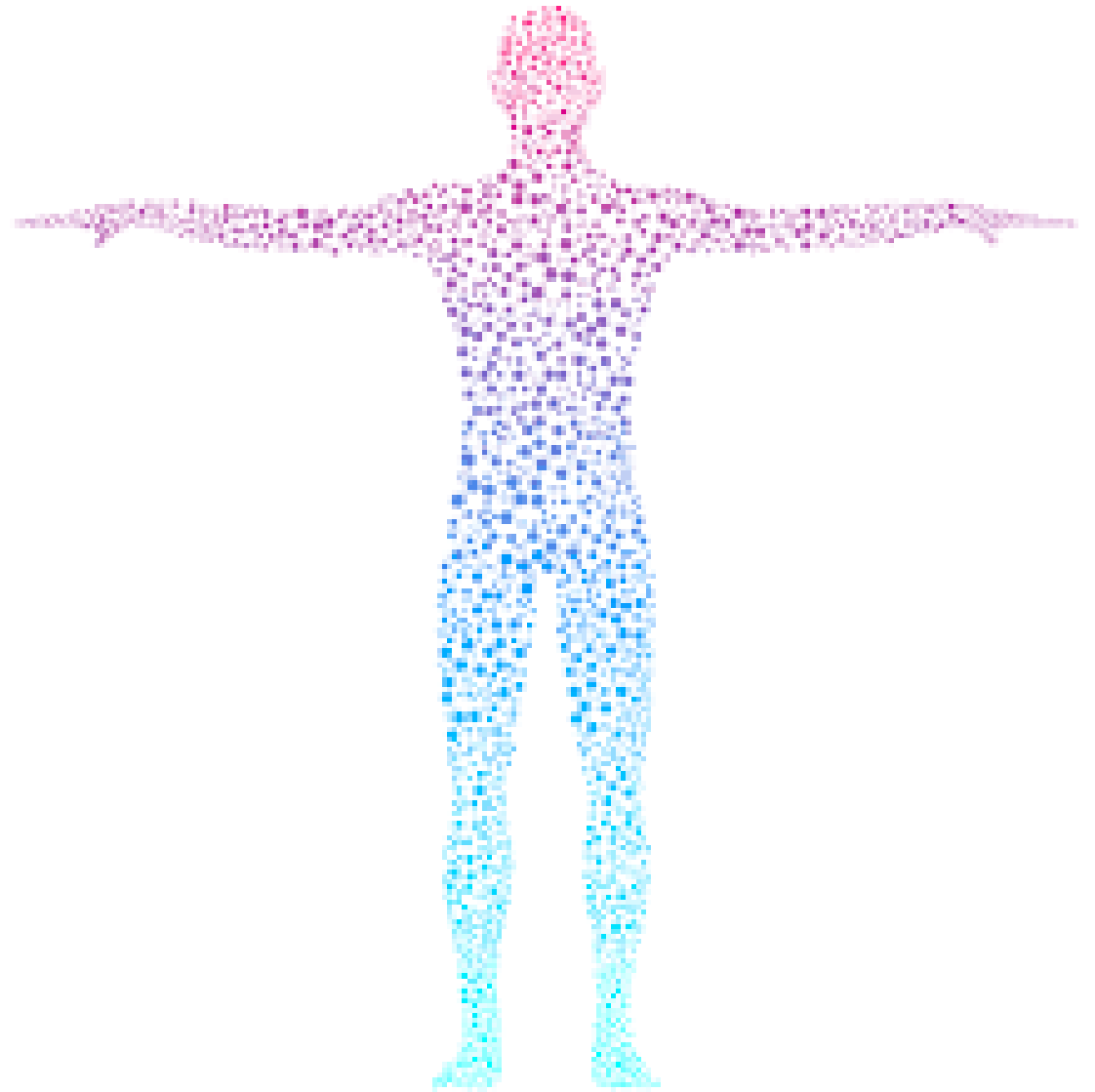
Romy Lauche,^{*,†} Christoph Stumpe,^{*} Johannes Fehr,^{*} Holger Cramer,^{*,†} Ying Wu Cheng,[‡] Peter M. Wayne,[§] Thomas Rampp,^{*} Jost Langhorst,^{*} and Gustav Dobos^{*}

- ❖ N=114
- ❖ 3 groups
- ❖ 12 weeks intervention w/ follow-up

Pain Intensity



Does Mindful Movement
Make “Sense”?



Mind-body practices, interoception and pain: a scoping review of behavioral and neural correlates

Stephanie Voss^{a,b} , Daniel A. Boachie^a, Norberto Nieves^a and Neha P. Gothe^{a,c,d}

Conclusion: This review relied on the broader mind-body literature to inform our analyses as the literature examining yoga, pain and interoception remains limited. Interoceptive techniques including attending to and acceptance of bodily sensations, appear to be key therapeutic mechanisms in mind-body practices for chronic pain. Future yoga-based interventions would benefit examining interoceptive outcomes and integrating interoceptive strategies to facilitate the pain-modulating benefits of yoga.

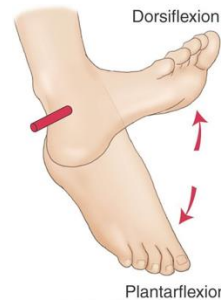
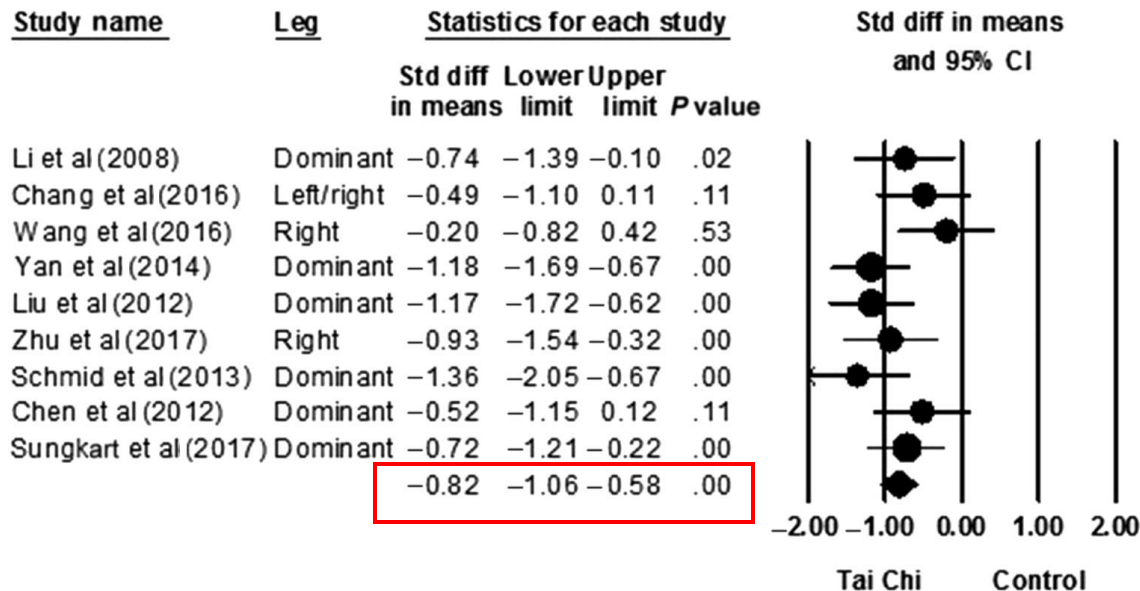
REVIEW ARTICLE (META-ANALYSIS)

Effects of Tai Chi on Lower Limb Proprioception in Adults Aged Over 55: A Systematic Review and Meta-Analysis (Zou et al 2019)

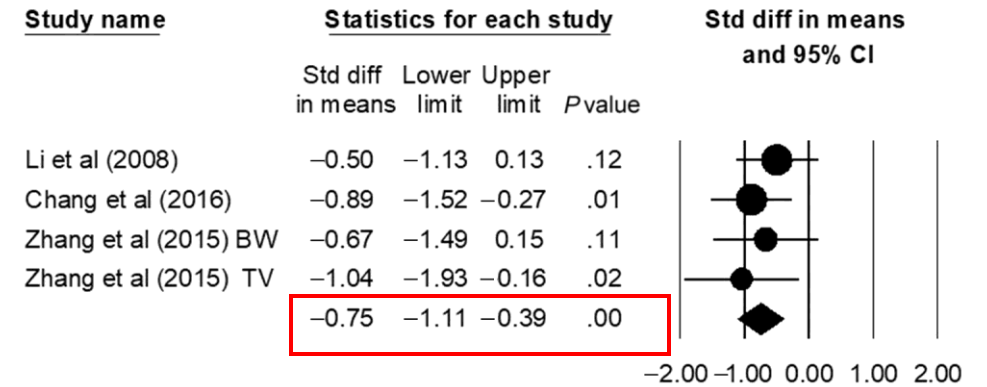
* All RCTs



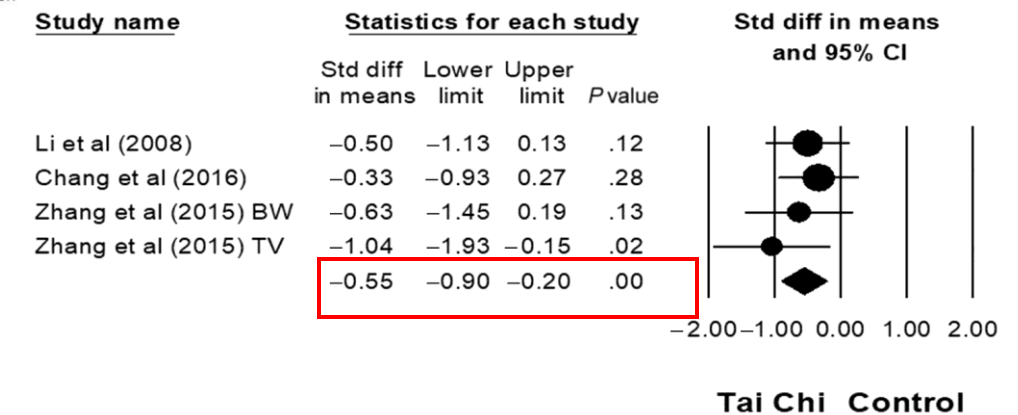
Effects of Tai Chi on Dominant/Right Knee Flexion



Effects of Tai Chi on Dorsal Flexion (Ankle)



Effects of Tai Chi on Plantar Flexion (Ankle)



Plantar sensation

Manor et al. *BMC Complementary and Alternative Medicine* 2013, **13**:87
<http://www.biomedcentral.com/1472-6882/13/87>



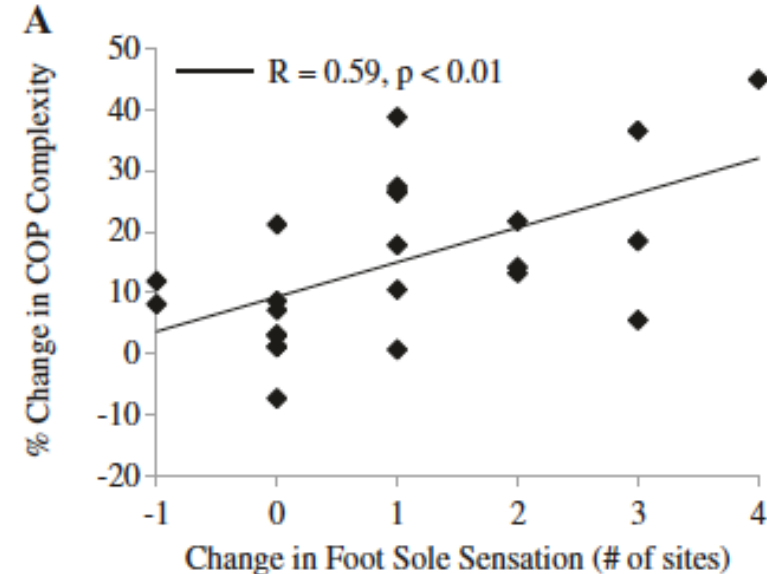
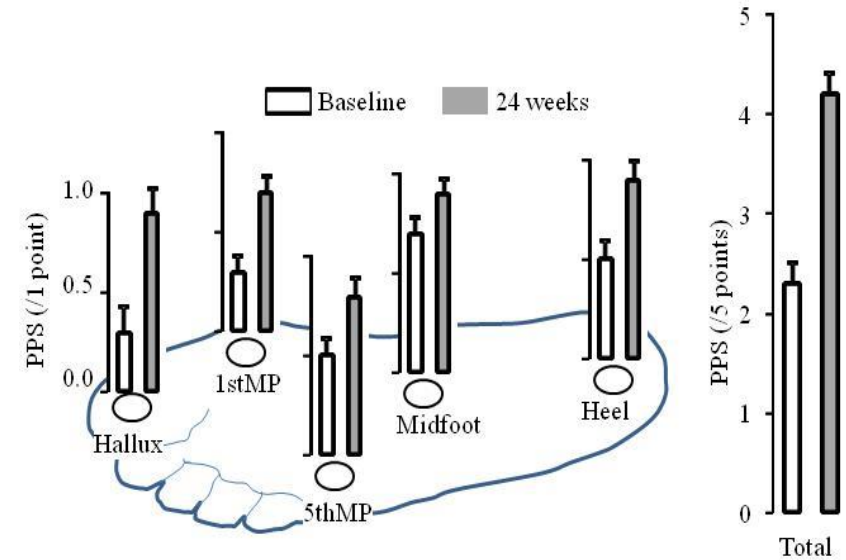
RESEARCH ARTICLE

Open Access

Complexity-based measures inform tai chi's impact on standing postural control in older adults with peripheral neuropathy

Brad Manor^{1,2,3*}, Lewis A Lipsitz^{1,2,3,4}, Peter M Wayne^{2,3,5}, C-K Peng^{2,3,6} and Li Li⁷

- Pre-post single arm study
- 25 older adults with peripheral neuropathy
- 24 weeks of Yang-style Tai Chi
- Monofilament acuity tests



Also see: Li and Manor 2010 *A J Chin Med*; Cavegan 2015 *EBCAM*

Tai Chi Exercise for Treatment of Pain and Disability in People With Persistent Low Back Pain: A Randomized Controlled Trial

AMANDA M. HALL,¹ CHRIS G. MAHER,¹ PAUL LAM,² MANUELA FERREIRA,¹ AND JANE LATIMER¹



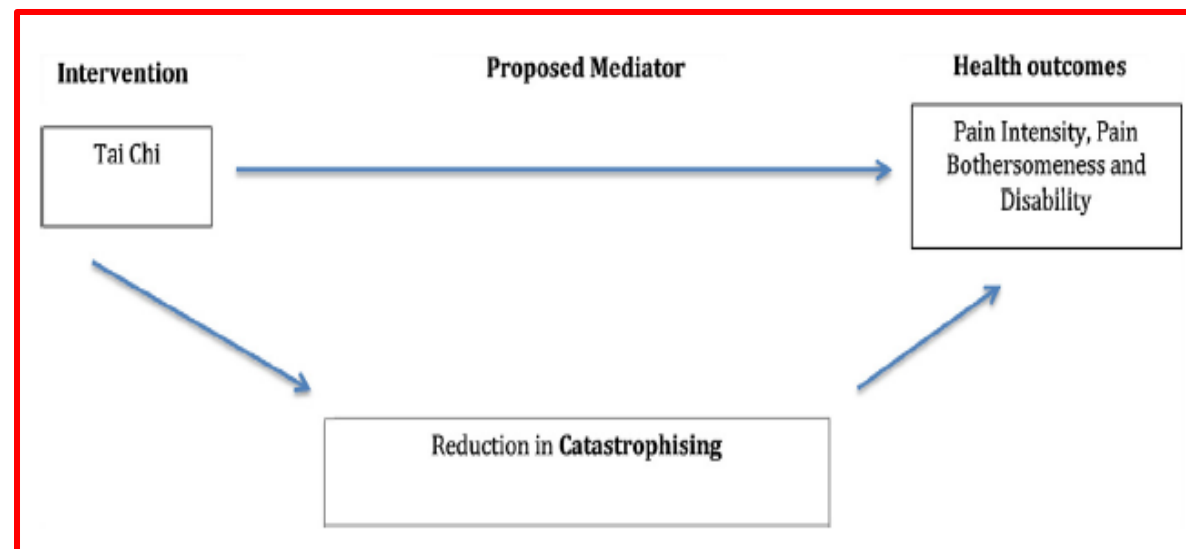
Does pain-catastrophising mediate the effect of tai chi on treatment outcomes for people with low back pain?



Amanda M. Hall^{a,*}, Steven J. Kamper^{b,c}, Richard Emsley^d, Christopher G. Maher^b

2016

RCT TC vs waitlist (n=160)
Tai Chi reduces both
bothersomeness of cLBP
pain and disability by 30%¹



Mediation analyses suggest reductions in **pain catastrophizing** explains approximately 1/3 of the effect on pain intensity and bothersomeness and 2/3 of the effect on disability.

Conclusions

1. MM interventions are promising for reducing pain and disability across multiple MSK conditions. High quality RCTs warranted. Unclear if MM interventions are more efficacious or safer vs. conventional exercises.
2. Heightened body awareness and affective attention may enhance somatosensation and pain appraisal, which may mediate clinical benefits directly (e.g. biomechanical efficiency) and indirectly (e.g. safety, enjoyability, adherence, mood). Larger studies powered for mediation analysis, factorial trial designs, and mechanistic studies (e.g., neuroimaging) needed to inform relevance of ‘top-down’ vs. ‘bottom-up’ training components.

Thanks for listening

