



**ZUCKERBERG
SAN FRANCISCO GENERAL**
Hospital and Trauma Center



Yoga & Meditation Program for Individuals with Traumatic Brain Injuries

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Neurotrauma Outcomes Coordinator



Objectives



Discuss incidence of traumatic brain injuries (TBI) and effects post- injury



Discuss structural and physiological changes, benefits, and existing literature supporting use of yoga and meditation as a therapy for TBI survivors



Discuss the Love Your Brain (LYB) Organization and the integration of the LYB yoga & meditation program at ZSFG



Experience a guided mindfulness exercise and gentle chair yoga

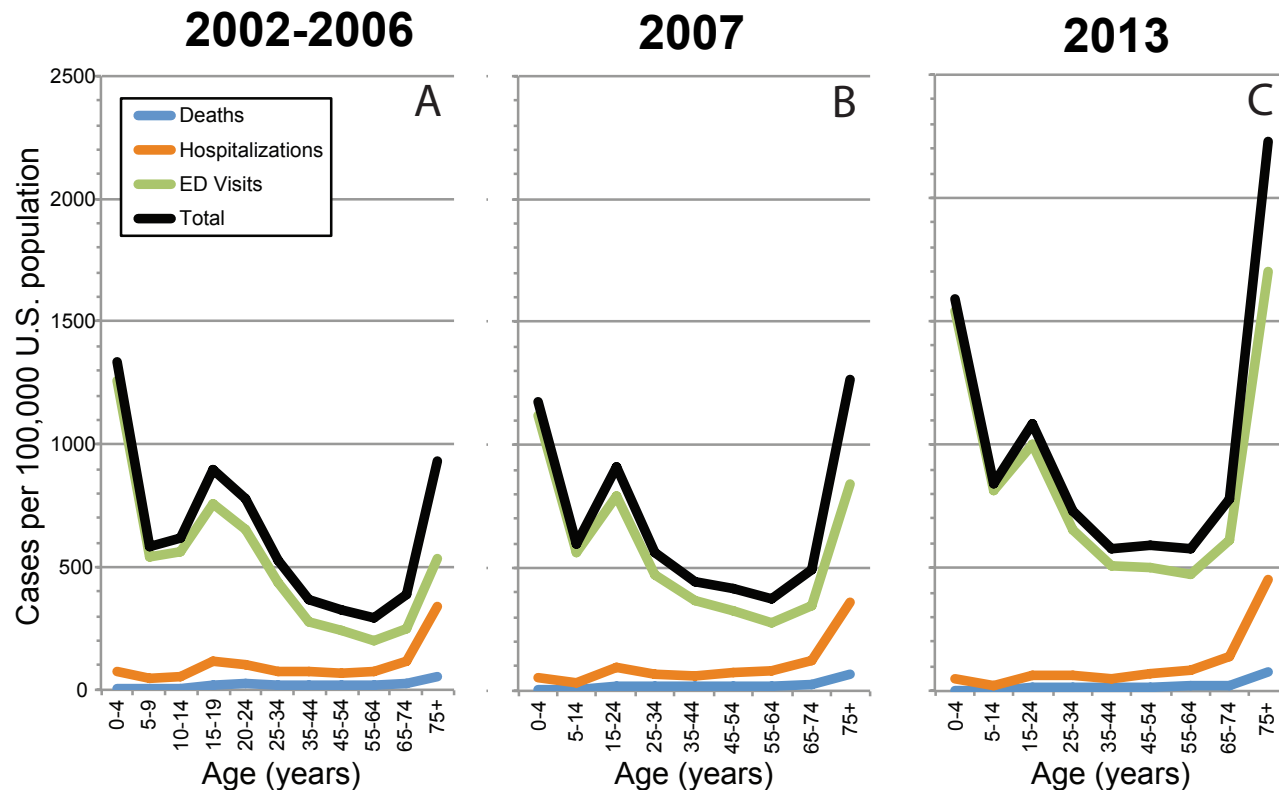
TBI Epidemiology

Traumatic brain injuries (TBI) are a **leading** cause of death and disability worldwide

Annually ~**2.8 million** Americans experience a TBI^{1,2} and seek hospital-based care

3.2 to 5.3 million people **live** with long-term TBI-related disability³

Rising Incidence of TBI



Faul et al. TBI in the US 2002-2006. Injury Prev 2010

Taylor et al, TBI Related ED Visits, Hospitalizations, and Deaths US 2007-2013. MMWR Surveill Summ 2017

Gardner et al. Geriatric Traumatic Brain Injury: Epidemiology, Outcomes, Knowledge Gaps, and Future Directions. J Neurotrauma. 2017

Living with a TBI

Post-injury effects are wide-ranging³:

- Cognitive
- Physical
- Emotional
- Behavioral symptoms

Evidence-based treatments:

- Physical Therapy
- Psychotherapy
- Cognitive rehabilitation
- Occupational Therapy

Whole-person post-injury effects



Physical: limited mobility, muscle atrophy, balance and gait difficulties, poor vision, headaches, chronic pain, dizziness

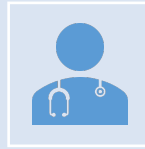


Mental/Cognitive: memory loss, difficulty concentrating and communicating, impulsivity, irritability, anxiety, lack of self-efficacy, denial

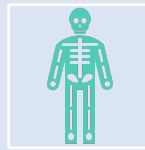


Reduced quality of life, depression, failed relationships, lack of motivation, low self-efficacy, unemployment

Challenges “Living” with a TBI



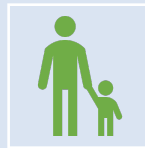
Treatments offered during acute phase of recovery and often are short-term



Long-term effects are heterogenous



Limited community-based resources



Caregiver/Family strain

Factors that Influence TBI Outcomes

Individual Patient Characteristics	Social-Environmental Factors	Access to Care Post-hospitalization
<ul style="list-style-type: none">• Age• Genetic influences• Pre-injury functional status• TBI Severity	<ul style="list-style-type: none">• Caregiver/Family support• Socioeconomic status• Social support• Ability to live independently• Ability to maintain employment	<ul style="list-style-type: none">• Various rehabilitation programs/facilities• Discharge disposition• Insurance coverage predictor• Continuity of Care

Yoga & Meditation as Therapy to Improve TBI Outcomes

- Mind-body holistic medicine
- Adaptable regardless of TBI severity
- Self-empowerment
 - Individual assumes active role in healthcare treatment
- Survivor and caregiver participation
- Numerous structural, physiological, mental health, and social benefits
 - Improve functional independence (work, leisure, community)
- Community reintegration

What is therapeutic yoga (union)?

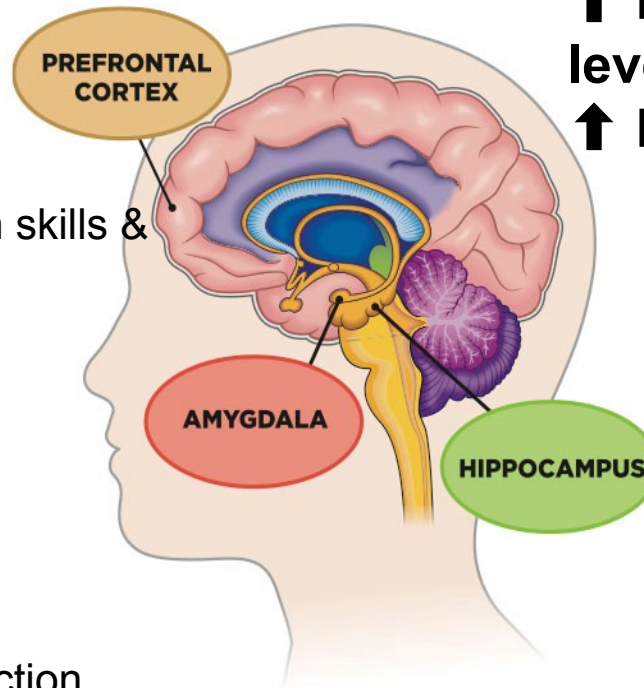
“The application of yoga postures and practice to the treatment of health conditions. It involves instruction of yoga practices and teachings to **prevent, reduce, or alleviate structural, physiological, emotional and spiritual pain, suffering or limitations**⁹.



Yoga & Meditation: Changes in the Brain

↑ Cortical thickness

- Self-regulation
- Decision making
- Improve attention skills & focus



↑ Neuroplasticity

↑ Dopamine & Serotonin levels

↑ Relaxation

↓ Amygdala

- Promote stress reduction
- Reduce mental fatigue

Structural Changes

- Augment memory

Yoga & Meditation: Healing Benefits for TB



Cognition

- Self-regulation
- Improve attention skills
- Promote stress reduction
- Improve memory



Physical

- Enhance muscular strength
- Improve respiratory and cardiovascular function
- Build flexibility and coordination
- Reduce pain
- Improve sleep
- Improve parasympathetic nervous system function



Behavioral

- Improve mood
- Reduce stress, anxiety, depression, mental fatigue
- Promote recovery from treatment and addiction



Psychosocial

- Improve self-confidence and interpersonal relationships
- Enhance community integration
- Enhance well-being and overall quality of life

Existing Literature: Yoga & Meditation Intervention among TBI Participants

Strength and Balance

(Schmid et al, Disabil Rehabil, 2015)

Quality of life

(Donnelly et al, Brain Injury, 2016)

Reduced stress

(Silverthorne et al, Int J Yoga Therapy, 2012)

Mental Fatigue & Information Processing

(Johansson et al, Brain Injury 2012)

Attention

(Cole et al, Mil Med 2015)

Self-Efficacy

(Azulay et al, J Head Trauma Rehabil, 2013)

YOGA AND MEDITATION HAVE MANY
HEALING BENEFITS FOR TBI
and can change the structure and function of the brain



IMPROVE ATTENTION SKILLS

by increasing the thickness of the pre-frontal cortex, associated with focus and decision-making
(BROOKS ET AL., SOC COGN AFFECT NEUROSCI 2016)

AUGMENT MEMORY

(AZULAY ET AL., J HEAD TRAUMA REHABIL 2013)
by changing brain structures associated with memory, including the hippocampus
(BROOKS ET AL., SOC COGN AFFECT NEUROSCI 2016)



ENHANCE SELF-ESTEEM

(DONNELLY ET AL., BRAIN INJURY 2016)



ENHANCE COMMUNITY INTEGRATION

(DONNELLY ET AL., BRAIN INJURY 2016)

REDUCE MENTAL FATIGUE

by supporting better information processing
(JOHANSSON ET AL., BRAIN INJURY 2012)



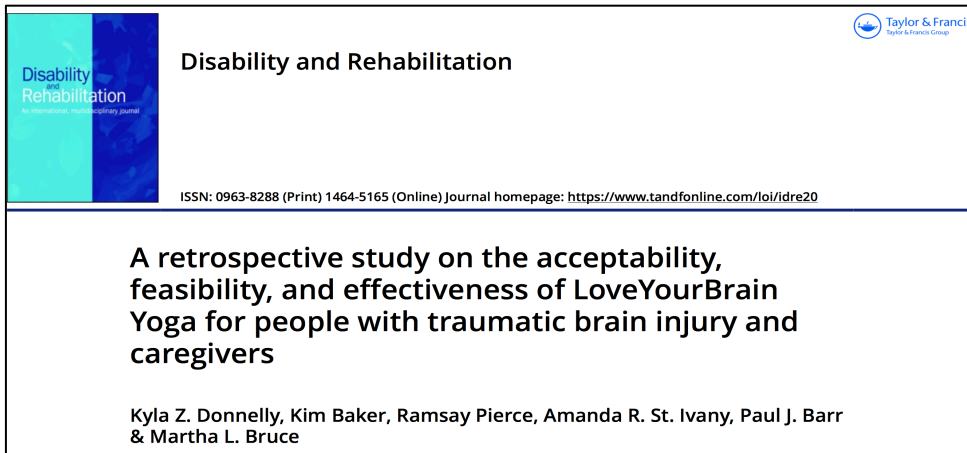
REDUCE STRESS

by shrinking the amygdala, our fear and anxiety response center
(BROOKS ET AL., PSYCHIATRY RES 2016)

BOOST STRENGTH BALANCE ENDURANCE & FLEXIBILITY

(SCHMID ET AL., DISABIL REHABIL 2015)





TBI Survivors

- 705 with TBI
- Average age was 43 (SD 12.8)
- Sustained TBI 4.8 years prior (SD 7.7)
- Significant improvement from baseline to post intervention scores
 - **QOLIBRI** ($p < 0.00$)
 - **Resilience** ($p = 0.0004$)
 - **Cognition** ($p < 0.00$)
 - **Positive effect and well-being** ($p < 0.00$)

Caregivers

- Observed changes in the ability for person with TBI to self-regulate.
- Perceived improvements in ability to relax, improved sleep quality, and physical strength.
- Reported enhanced self-care

Community-based TBI Yoga Program at ZSFG



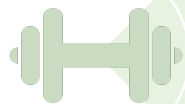
Became clinical affiliates with Love Your Brain Organization



Trained, multidisciplinary clinical staff to facilitate yoga, mindfulness, and psychotherapy



Integrated into Community Wellness Center



ZSFG is offering free, ongoing, 6-week yoga and psychoeducation program

Yoga Session Structure

10 minutes

- **Welcome & Breathing Exercises**
- Enhance nervous system regulation and attention control

45 minutes

- **Gentle Yoga**
- To improve strength flexibility and balance

15 minutes

- **Guided Meditation**
- Enhance attention control, mood, nervous system regulation

20 minutes

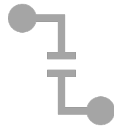
- **Discussion with psychoeducation**
- Build community connection and skills in resilience



Yoga & Meditation: Adapted for TBI Patients



1. Slow, simple, poses, gentle movement, modifications for all



2. Proprioception and interoception OVER alignment



3. Transitions-slow and safe, trained clinical staff



4. Integration of class themes and psychoeducation to address psychological challenges



ZSFG Pilot Series

- TBI survivor or caregiver
- **18 participants** (12 TBI survivors, 6 caregiver family/friend) participants
- Mean program satisfaction was **9.8** out of **10**
- **100%** would recommend to a friend

Characteristics Mean (range) or N (%)	(n=18)
Demographics	
Age, y	52.4 (20-78)
Female	11 (61%)
TBI Severity	(n=12)
Mild	3 (25%)
Moderate	4 (33%)
Severe	5 (42%)
Participation	
Less than 3 sessions	5 (28%)
3 or more sessions	13 (72%)



BRAIN AND SPINAL INJURY CENTER

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University of California at San Francisco



Yoga & Mindfulness Guided Experience

ZSFG Pilot Series



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WELCOME!

ZSFG Love Your Brain Yoga & Meditation Series

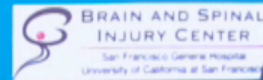
Michele Diaz, RN, MS

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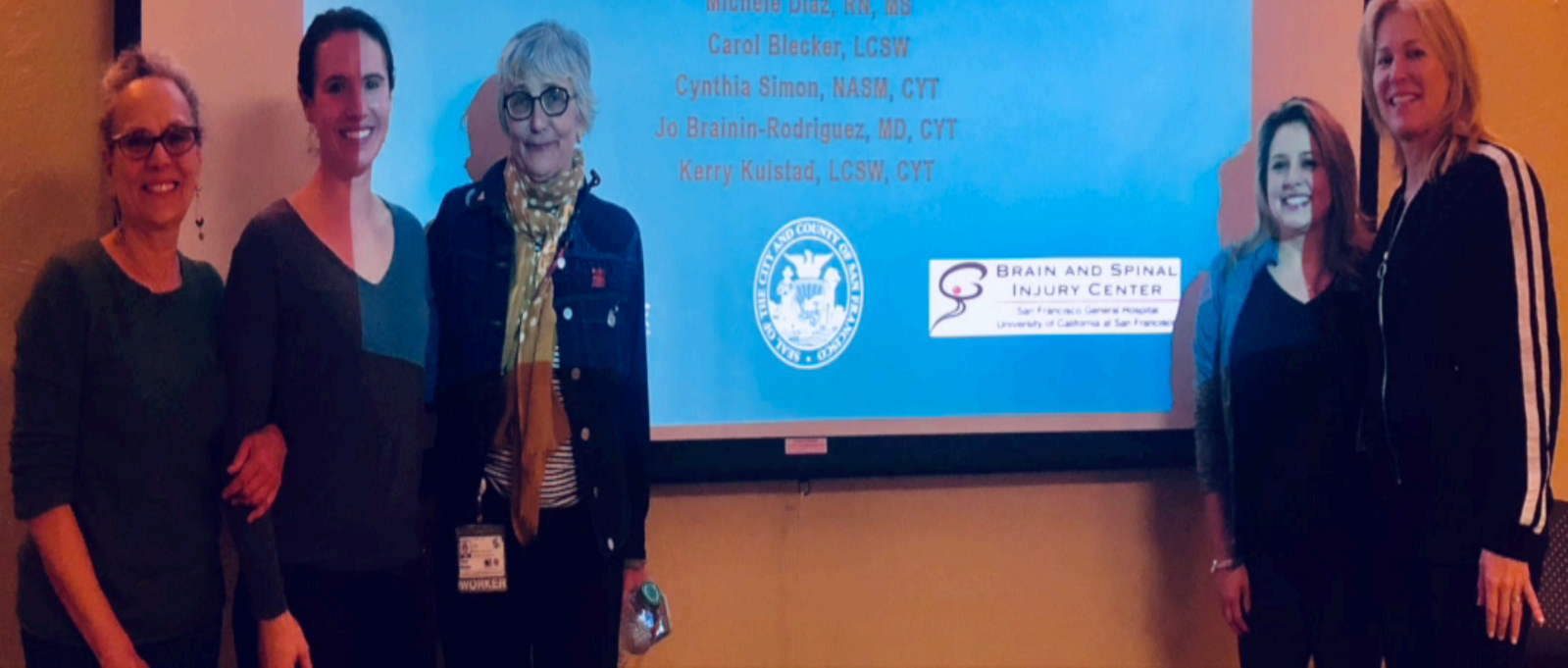
Cynthia Simon, NASM, CYT

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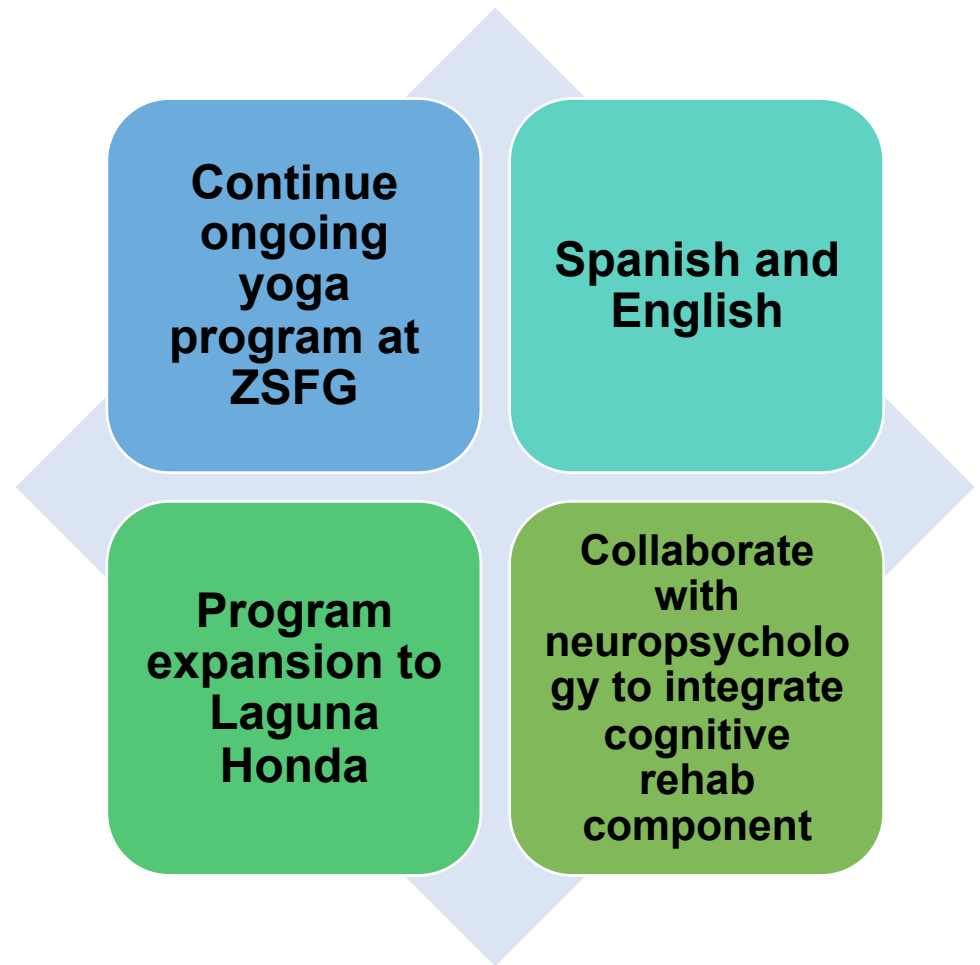
Kerry Kuistad, LCSW, CYT



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Future Directions





Thank You!
Questions?



References

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8. Gardner, R. C., Dams-O'Connor, K., Morrissey, M. R., & Manley, G. (2017). Geriatric Traumatic Brain Injury: Epidemiology, Outcomes, Knowledge Gaps, and Future Directions. *J Neurotrauma*. doi: 10.1089/neu.2017.5371