



2021 Annual Report

Osher Center for Integrative Medicine

at Harvard Medical School and Brigham and Women's Hospital



A message from our director

As I reflect back on 2021, and the unique challenges and suffering caused by the COVID-19 pandemic, climate-related crises, and the deep health disparities these have revealed, I remain committed to our center's vision and mission—which at its core, emphasizes the role of 'integration' and interconnectedness at all levels of health. As is highlighted in our updated 2021 Five-year Strategic Plan:

We are committed to advancing a model of health that recognizes the interconnections of the body, mind and spirit to enhance resilience and promote health and healing in individuals and communities.

Strong scientific evidence supports interconnected and interdependence for all dimensions of health, and why the whole is more than the sum of its parts. Mind-body research has shown that what and how we think and feel—the levels of stress or happiness, social connection or isolation that we experience—deeply impact every aspect of our physiology, including the health of our heart and brain, our ability to cope with pain, and even how long we live. Conversely, even modest changes in lifestyle, exercise, diet, exposure to nature and practices that enhance mindfulness, not only impact health and our reliance on medication, but also impact how we interact with others, and the demands we make on the healthcare system and our environment.

It's all connected!

Leveraging our 'center without walls', we continue to bring members of our community together to work synergistically towards our shared goals of healthy individuals and communities. In this 2021 Annual Report, we highlight how our Grand Rounds and other educational initiatives have convened experts across Integrative Medicine and Health to share insights, spark synergy, and train the next generation of health care providers, researchers, and leaders. We provide an update on how our pilot research grants program, which to date has disbursed more than 1.1 million dollars, continues to seed new collaborations, ranging from studies evaluating the impact of stress reduction on inflammation and atherosclerosis to novel brain health programs to prevent age-related cognitive decline. In combination with the collaborative studies being led by our research directors, we are proud to share how our research is generating evidence to inform clinical care and new models of healing that target the whole person, body, mind and spirit.

As always, my team and I remain immensely grateful to the Osher Foundation as well as other foundations and philanthropic partners for their vision and generous support, and their trust in us to make a difference in the health of today's and future generations.

With best wishes,



Peter M. Wayne, Ph.D.

Bernard Osher Associate Professor of Medicine in the
Field of Complementary and Integrative Medical Therapies
Harvard Medical School

Director

Osher Center for Integrative Medicine
Brigham and Women's Hospital and Harvard Medical School

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STRATEGIC PLAN

One significant accomplishment in 2021 was the completion of a new Five-year Strategic Plan. Through a series of coordinated retreats and focus groups, the Osher Center leadership team, in collaboration with its advisory teams and stakeholders across Brigham and Women’s Hospital (BWH), Harvard Medical School (HMS) and collaborating institutions, renewed the vision and mission of the Osher Center, and created a roadmap to guide the center over the next five years. The plan is designed as a “living document” and is expected to grow and evolve as the Center moves forward, and as it adapts to meet new challenges and opportunities in medicine and healthcare. An executive summary of this plan is accessible on the Osher Center website: www.oshercenter.org.

Mission

The mission of the Osher Center for Integrative Medicine is to advance leading-edge research, education and clinical care to promote an integrative model of health, healing and well-being.

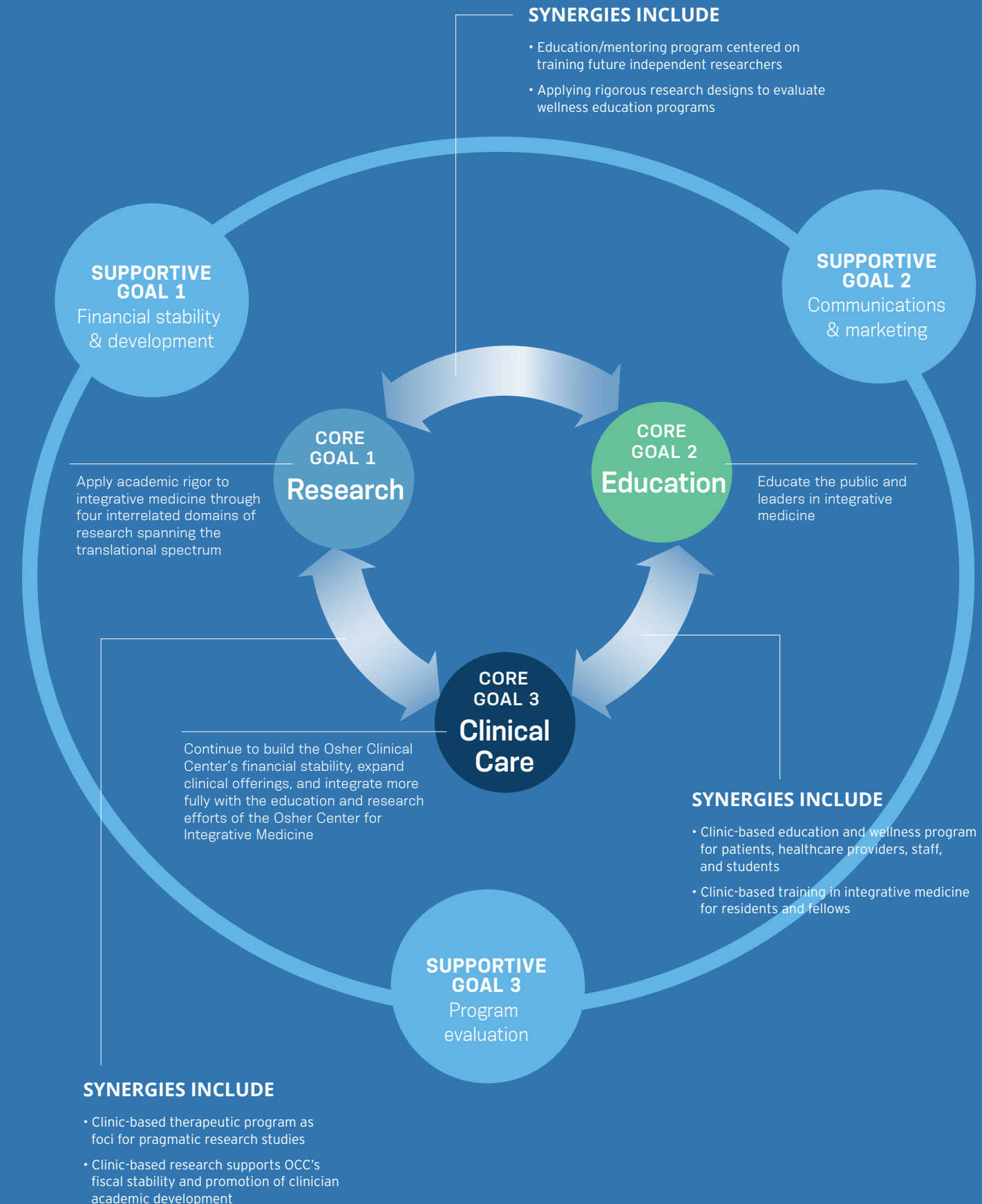
Vision

The Osher Center for Integrative Medicine envisions a systems-based, integrative model of health that recognizes and leverages interconnections of body, mind, and spirit to enhance resilience and promote health, healing and well-being in individuals and their communities.

Integrating medicine, health and healthcare at the Osher Center

Advances in molecular biology and translational research have led to remarkable progress in medicine – especially in our understanding of pathogenesis and the diagnosis and treatment of diseases. However, less progress has been made in understanding how individuals transition from a state of disease back to health. Fundamentally, health is more than the simple absence of disease. The siloed nature of medicine today, organized around medical specialties (e.g., cardiology, neurology), has hindered our ability to ‘see’ and treat the whole person. Integrative approaches appreciate the complex multi-system dynamics that underlie health and disease – including body, mind and spirit – in both prevention and rehabilitation. It values and integrates the technological successes of disease curing along with the patient-centered exploration of healing.

At the Osher Center, we strive to integrate medicine, health and healthcare on many levels. We recognize, seek to understand, and embrace the complexity inherent within and across all levels of health, healing, and well-being, from molecular and physiological systems to individuals and communities. Through rigorous and innovative research, we strive to be thought leaders bridging a variety of healthcare professions and paradigms. Our educational programs advance this knowledge through the training of the next generation of researchers, healthcare professionals, and leaders in the field of integrative medicine. Our Osher Clinical Center aims to provide the highest quality, transdisciplinary patient-centered care through a health equity lens. Our Integrative Medicine Network Forums, Grand Rounds and conferences convene scientists, practitioners and the public together to exchange ideas, advance research and best practices, and inform policy.



RESEARCH

Creatively adapting to the challenges posed by COVID-19, core Osher Research faculty and their teams maintained a robust portfolio of studies including 24 funded by the National Institutes of Health (NIH) and an additional 12 funded by foundations or philanthropy. Here we highlight the findings from three lines of research that came to fruition in 2021.

Multimodal chiropractic care for episodic migraine in women

Migraine headaches affect approximately 15% of the US population and are among the top five causes of lifetime disability. Although medications are often used as first-line treatments for migraine, these treatments may have intolerable side effects and are not effective for all patients. Over 75% of migraine patients report neck pain and muscle tension, suggesting that treatments that target musculoskeletal complaints may be effective in managing migraine.

Migraine headaches are among the top five causes of lifetime disability

A study led by Drs. Pamela Rist (Osher Core Leader of Clinical Trials, Epidemiology and Biostatistics) and Peter Wayne (Center Director), along with Osher Clinical Center (OCC) providers, Drs. Kowalski and Bernstein, evaluated the benefits of a multimodal chiropractic intervention in combination with migraine education, compared to migraine education alone. Both groups also received usual medical care. The study found that, compared with the control group, 10 sessions of chiropractic care delivered over 14 weeks led to greater reductions in migraine days along with decreases in self-reported migraine disability. The study was published in the journal *Cephalalgia*.¹

A parallel qualitative study led by research intern Julie Connors, highlighted patients' appreciation for the integrative and team-based approach to migraine care offered through the Osher Clinical Center, which included patient encounters with both a chiropractor and neurologist.² The research was funded by generous grants from the NCMIC Foundation, the Inter-Insti-



tutional Network for Chiropractic Research through Palmer College Foundation, and the Crimson Lion Foundation.

The team has submitted an NIH grant in partnership with colleagues from VA Connecticut Health Care System and Yale University that aims to confirm and expand these findings to a larger sample including men and women veterans.

1. Rist PM, Bernstein C, Kowalski M, Osypiuk O, Connor JP, Vining R, Long CR, Macklin EA, Wayne PM. Multimodal Chiropractic Care for Migraine: A Pilot Randomized Controlled Trial. *Cephalalgia* 2020
2. Connor J, Bernstein C, Kilgore K, Rist PM, Osypiuk K, Kowalski M, Wayne PM. Perceptions of chiropractic care among women with migraine: A qualitative study. *J of Manip and Physiol Therapeutics* 2021

Understanding the effect of open-label placebo in irritable bowel syndrome

Since Henry Beecher's landmark article in 1955, "The Powerful Placebo," the conventional belief is that patients must be blinded to treatment assignment and placebos concealed in order for them to be effective. In earlier work, members of the Osher Center reported in a pilot study the positive effects of non-concealed, "open-label" placebo (OLP) as treatment for irritable bowel syndrome (IBS) that challenged this widely-held assumption.

Most recently, the team including Osher's Director of Basic and Translational Research, Dr. Kathryn Hall, conducted an innovative and provocative NIH-funded extension of the earlier research. Patients with moderately-severe stable IBS (N=262) were randomized to receive OLP pill, no pill placebo, or double-blind placebo.³ At the end of six weeks, IBS symptom severity was significantly improved in those who received OLP compared to no pill placebo, and similar to those who received double-blind placebo. The study suggested that OLP could play

a role in the management of symptoms in patients with IBS and that blinding may not be necessary for placebos to be effective.

The study suggested that OLP could play a role in the management of symptoms in patients with IBS

As the largest OLP clinical trial to date and the first to directly compare the effects of OLP and double-blind placebo, this landmark study significantly advances our understanding of the therapeutic encounter and contextual effects in medicine.

3. Lembo A, Kelley JM, Nee J, Ballou S, Iturrino J, Cheng V, Rangan V, Katon J, Hirsch W, Kirsch I, Hall K, Davis RB, Kaptchuk TJ. Open-label placebo vs double-blind placebo for irritable bowel syndrome: a randomized clinical trial. *Pain* 2021



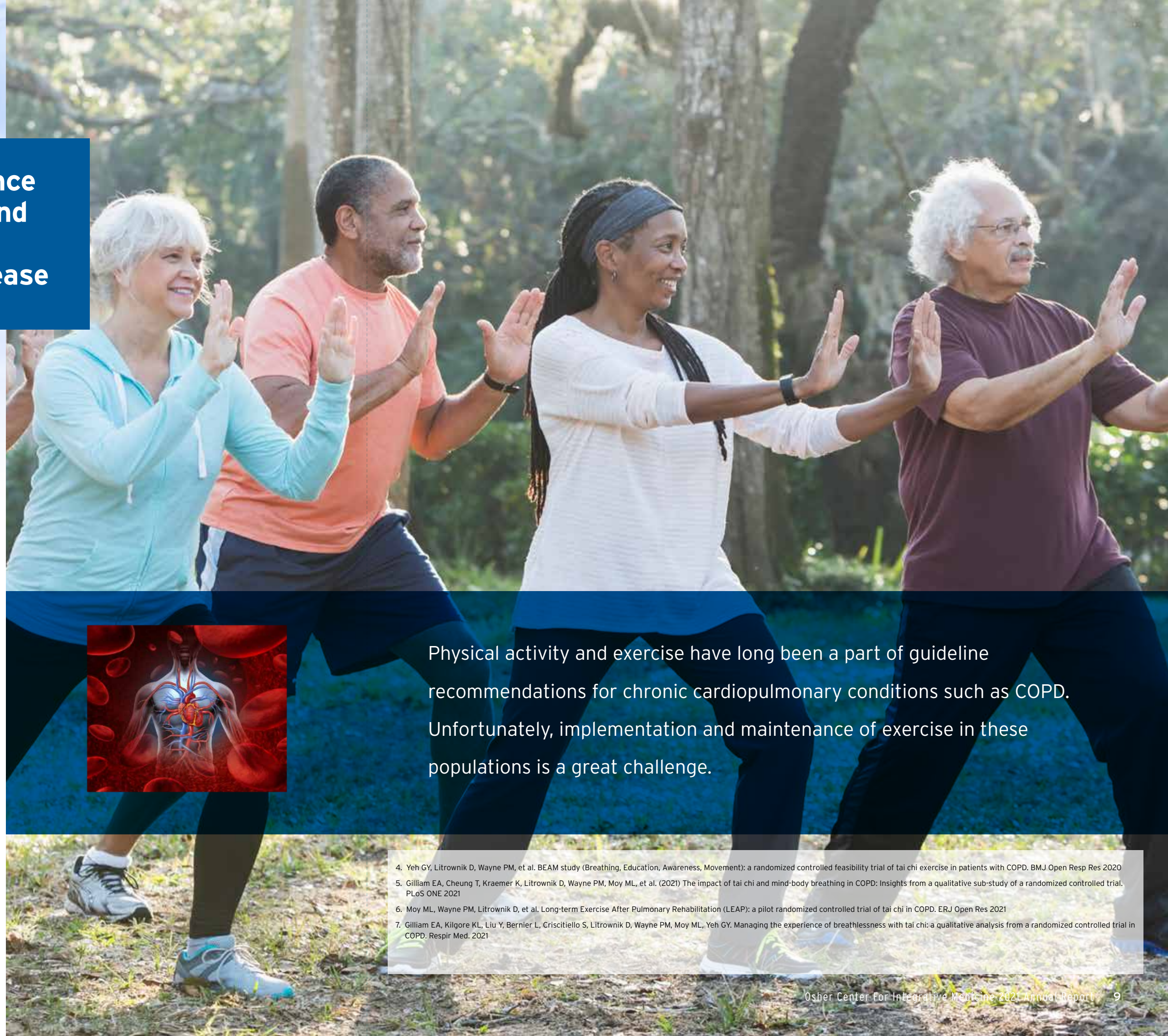
Mind-body practices to enhance long-term physical activity and self-efficacy in patients with chronic cardiopulmonary disease

Physical activity and exercise have long been a part of guideline recommendations for chronic cardiopulmonary conditions such as Chronic Obstructive Pulmonary Disease (COPD). Unfortunately, implementation and maintenance of exercise in these populations is a great challenge. Two companion studies led by Dr. Gloria Yeh (Director of Clinical Research), together with Peter Wayne (Center Director), have examined how mind-body movement therapies can be utilized to support self-efficacy, physical activity, and positive behavior change in patients with cardiopulmonary disease.

One study in patients with COPD provides preliminary support for tai chi and improved quality of life, emotional health, fatigue, and dyspnea after 12 weeks.⁴ Continuing tai chi beyond 12 weeks may further affect self-efficacy, exercise capacity, and lower body strength. In qualitative narratives, patients reported increases in overall body awareness, self-care knowledge/skills, behavior-related neurocognitive processes, physical function, and psychological well-being.⁵

In another COPD study, tai chi was examined as an exercise maintenance strategy after patients engaged in conventional pulmonary rehabilitation.⁶ More individuals who participated in tai chi improved their exercise capacity compared to controls. In qualitative interviews, patients described how tai chi promoted physical and mental wellbeing by diminishing fear and embarrassment associated with breathlessness, facilitating continued physical activity and thus improvement in quality of life.⁷

These findings highlight the interdependence of mind and body in a holistic, biopsychosocial manner and the promise of mind-body exercise for long-term behavior change. Collectively, these studies have led to several NIH grant submissions to further study integrated mind-body movement approaches to improve outcomes in cardiopulmonary populations.



Physical activity and exercise have long been a part of guideline recommendations for chronic cardiopulmonary conditions such as COPD. Unfortunately, implementation and maintenance of exercise in these populations is a great challenge.

4. Yeh GY, Litrownik D, Wayne PM, et al. BEAM study (Breathing, Education, Awareness, Movement): a randomized controlled feasibility trial of tai chi exercise in patients with COPD. *BMJ Open Res* 2020
5. Gilliam EA, Cheung T, Kraemer K, Litrownik D, Wayne PM, Moy ML, et al. (2021) The impact of tai chi and mind-body breathing in COPD: Insights from a qualitative sub-study of a randomized controlled trial. *PLoS ONE* 2021
6. Moy ML, Wayne PM, Litrownik D, et al. Long-term Exercise After Pulmonary Rehabilitation (LEAP): a pilot randomized controlled trial of tai chi in COPD. *ERJ Open Res* 2021
7. Gilliam EA, Kilgore KL, Liu Y, Bernier L, Criscitiello S, Litrownik D, Wayne PM, Moy ML, Yeh GY. Managing the experience of breathlessness with tai chi: a qualitative analysis from a randomized controlled trial in COPD. *Respir Med*. 2021

EDUCATION

Education remains one of the three pillars of our Center’s mission. In addition to providing education through our Grand Rounds, Network Forums, and scientific and public presentations delivered by our leadership, we are also committed to training the next generation of clinicians and researchers in integrative medicine. In 2021, we continued our successful National Institutes of Health (NIH)-funded HMS Research Fellowship in Integrative Medicine (T32) into its 22nd consecutive year and initiated novel programs to train healthcare providers and researchers with life-long resiliency skills.

Training the Next Generation in Integrative Medicine Research and Leadership

Our NIH-funded post-doctoral research fellowship continues to thrive. It is the longest standing training program in integrative medicine research in the United States. Our four current fellows-in-training are tackling leading edge research topics ranging from brain responses to meditation in patients with chronic pain to the scientific basis for acupuncture points. Their work has led to multiple peer reviewed publications and awards. Recent graduates have joined Harvard faculty, and earlier graduates of the Fellowship continue to have an important presence in integrative medicine leadership roles nationally. In addition, in 2021, we secured funding from NCMIC Foundation to support training for our first chiropractic research fellow. Meet our current research fellows:

RESEARCH FELLOWS



WREN BURTON, DC, is one of our newest fellows supported by a generous gift from the NCMIC Foundation. Dr. Burton’s research focuses on the relationship between chronic musculoskeletal pain, mobility and fall risk, and the potential use of chiropractic care for fall prevention.



MICHAEL DATKO, PHD, is a 2nd year T32 fellow. His work examines the neurophysiology of multi-modal therapies including vagal nerve stimulation and mindfulness meditation for chronic pain.



JAMES DOORLEY, PHD, is a 1st year T32 year fellow. His research focuses on mind-body and psychologically-informed physical therapy for chronic pain, and developing web-based mind-body interventions for pain to increase access in diverse, underserved populations.



JACKLYN FOLEY, PHD, is a 2nd year T32 Fellow. Her research evaluates mindfulness and cardiovascular health among people living with HIV. Her work is supported by a Harvard University Center for AIDS Research (CFAR) Developmental Award. She was also awarded an Innovative Early Career Pilot Award in Aging and Palliative Care at the Massachusetts General Hospital to study cognitive behavioral therapy-based group interventions to reduce inflammation in older people with HIV.



EUNMEE YANG, PHD, MPH, MS, LICAC, is a 3rd year T32 Fellow. Her research focuses on understanding the biophysical properties of acupoints, using sophisticated measures of blood flow, skin temperature and pressure sensitivity, within the context of inflammatory bowel disease.



YAN MA, PHD, graduated from the fellowship in 2021 and is now a junior faculty member at the Osher Center. Her research explores the use of non-linear physiological markers of heart and brain wave dynamics to characterize sleep quality, and how bedtime mind-body practices can improve sleep onset and quality in patients with insomnia.



DENNIS MUNOZ-VERGARA, VMD, PHD, MPH, graduated from the fellowship in 2021. He studies the impact of yoga-like stretching in both animal models and humans to understand the effect of mechanical forces on tissue remodeling, inflammation and its resolution.



KRISTEN KRAEMER, PHD, graduated from the T32 program in 2020 and joined Beth Israel Deaconess Medical Center as a Harvard faculty member. She was awarded a K23 career development award from the National Institutes of Complementary and Integrative Health (NCCIH) to study components of mind-body exercise for physical activity engagement in metabolic syndrome.

“This course has revolutionized my world view—that seems like a strong statement, but I have truly learned so much about managing my stress and anxiety. I think these tools are ABSOLUTELY ESSENTIAL to navigating a high stress academic environment. I always believed that lowering stress meant lowering productivity, but this class taught me just the opposite.

- STEM PARTICIPANT



Osher post-doctoral research fellows and faculty visiting the HMS Arnold Arboretum as part of a forest bathing workshop

EARLY T32 GRADUATES ASSUMING NEW NATIONAL LEADERSHIP ROLES IN 2021



DR. ROBERT SAPER (2004) was named as Chief Wellness Officer at the Cleveland Clinic.



DR. PAULA GARDINER (2007) became the new Director of Primary Care Implementation Research at the Cambridge Health Alliance, Center for Mindfulness and Compassion, Harvard Medical School.



DR. GURJEET BIRDEE (2009) was appointed the Director of the Osher Center for Integrative Medicine at Vanderbilt University.

Building lifelong resiliency skills for healthcare providers and researchers

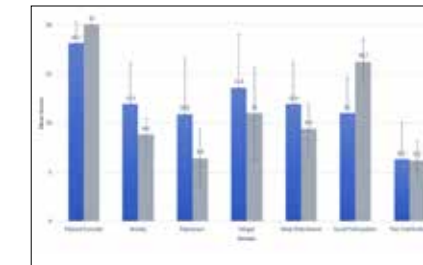
Mounting evidence points to the tremendous levels of stress experienced by health care providers and researchers. The COVID-19 pandemic and underlying systemic inequities continue to exacerbate stress levels. Without the provision of tools to mitigate and mediate these impacts, providers and researchers will continue to experience high levels of anxiety, suicide and burnout. In 2021 the Osher Center continued to build on and develop new programs to care for medical trainees and professionals. This included (1) adapting and continuing the HMS required course in resilience, (2) developing a new program for students graduating from the Science Technology Engineering and Mathematics (STEM) program, (3) leading virtual meditation sessions for the hospital community across Mass General Brigham and (4) establishing TedxMGH.



Harvard Medical School Resiliency Course (BRDG)

The Building Resiliency, Depth and Grit in Medicine program (BRDG) is a required resiliency training course for all first-year students at Harvard Medical School. Developed in 2019 by

Dr. Darshan Mehta, Osher Center’s Education Director, the course continues to be taken by all 180 first year medical students each year.



Adding some SMART to STEM

In 2021, the Osher Center piloted an eight-week resiliency training program based on the Stress Management and Resiliency Training (SMART) program developed at Harvard Medical School. The curriculum was tailored to the needs of Science, Technology,

Engineering and Mathematics (STEM) doctoral and master’s students. The results from this pilot study, which suggest marked changes in many domains of well-being, are being leveraged to seek funding for a national demonstration project in 2022.

Virtual Meditations for hospital community

With the onset of the pandemic, Dr. Darshan Mehta was asked to lead virtual meditation sessions. In 2021, these sessions became a regular offering for the MGB community—available to all employees. In addition, the sessions expanded to include guest leaders from the MGB community—fostering diversity and inclusivity amidst the sessions.



TEDxMGH

In 2021, Dr. Darshan Mehta built out a new Tedx speaker series, showcasing inspirational stories from the Mass General community, including how people have handled challenges through innovation, resilience, vulnerability, and connection.

Osher Clinical Center highlights

We are proud to share some of the notable achievements of the Osher Clinical Center (OCC) in 2021. These include professional and public recognition of our providers, considerable financial growth, despite the COVID 19 pandemic, and expanded and new clinical programming. New grant funding allowed the clinic to establish resiliency programs for Mass General Brigham (MGB) employees and their families and new resiliency-based public classes were also made available for the public. We optimized provider schedules in order to see more patients and took steps to recruit new providers to expand our team. Finally, as a pillar of our current financial model, the clinic continued to provide co-locating space to other MGB departments and services, such as neurology and pulmonary. The above combination of novel programming and logistical optimization contributed to healthy and sustained financial growth of the clinic in 2021.

OCC Practice and providers recognized for quality care



Dr. Levy was named in Boston Magazine's "Best Doctors" 2021 for his 14th consecutive year!



Dr. Kowalski received the MGB 2021 Pillars of Excellence Award in recognition of outstanding performance and commitment to excellence.

Dr. Kowalski was also identified as a **Top Performer in Patient Experience** at BWH, ranking above the 90th percentile nationally.



Caring for our caregivers during COVID

Subsidizing wellness resiliency classes for MGB employees

Our clinical team values being able to provide resources to care providers across MGB to fortify their resilience and protect against burnout. Towards this end, we successfully competed for a cross-institutional grant that supported delivery of a variety of self-care mind-body courses for employees and their families at no cost. The resulting \$22.5k MGB Wellness Grant allowed us to deliver Mindfulness-Based Stress Reduction (MBSR) and tai chi training to over 100 employees and their families. Success of these programs led to a larger renewal grant in 2022 that will allow us to expand and extend the program's reach.



"This is a great session by Dr. Wayne, he is well prepared and very patient in teaching and answering questions throughout the class. I definitely learned a lot about tai chi."

- PROGRAM PARTICIPANT

"[Dr.] Matt Kowalski is a professional with broad knowledge of how to handle individual issues. His ability to connect with patients is phenomenal. I always look forward to my visits and know I will feel a hundred times better after my treatment."

- OCC PATIENT

Managing chronic neck pain for nurses: A clinical research study

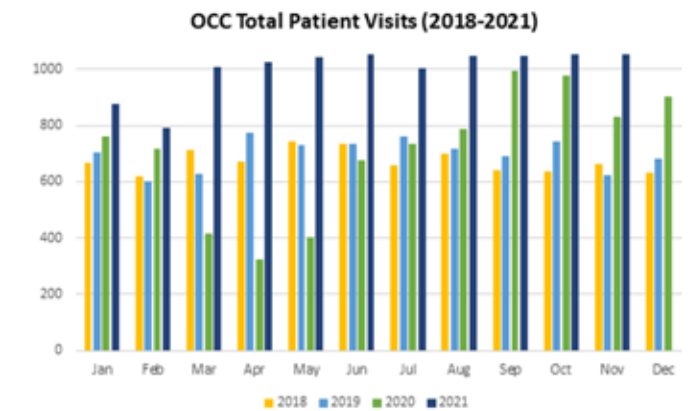
The high stress experienced by nurses not only impacts mental health, but also takes a toll on the physical body. An estimated 30-40% of nurses report chronic neck pain, which impacts all aspects of daily function, quality of life and their ability to deliver quality care. Supported by grants from multiple funders including the Inter-Institutional Network for Chiropractic Research through Palmer College Foundation and the Van Sloun Foundation, in 2021 the OCC was able to provide BWH nurses experiencing chronic neck pain a coordinated regimen of tai chi and chiropractic care at no cost. Outcomes of this program are being used to inform the design of a future study. Initial qualitative interviews indicate positive benefits experienced by participating nurses.



"This was great. Well done! The pace, quantity and quality of information and demonstrations in the workshop were all perfect. Thank you so much!"

- PROGRAM PARTICIPANT

Increased patient traffic despite COVID-19 challenges



A combination of the introduction of new programs, optimizing our service provider availability and providing co-locating space helped boost the clinic's financial growth in 2021. The measures taken to build provider capacity and engage our patient community are listed below and the above graph shows the patient flow trends over recent years, including the bounce back after 2020 pandemic impacts.

Optimizing provider availability

- All integrative health practitioner schedules booked consistently over 95%; most at 100%; Growing waiting list.
- Increased current acupuncturist's schedule by 50%.
- Extra session per month added to craniosacral therapist's schedule on patients' request.
- Two additional sessions added to junior chiropractor's schedule.

Engaging OCC community

- Increased sessions for MBSR and Tai Chi programs.
- Introduced new Mindfulness-Based Cognitive Therapy program.
- Relaunched OCC newsletter for patient base.

Building our team

- Two additional acupuncturists credentialed and integrated into team.
- One massage therapist, with movement-based therapy training, and new chiropractic research fellow undergoing credentialing.
- Started search for a second craniosacral therapist.

NETWORK BUILDING

Strengthening and Stewarding the IM Community through Our Center Without Walls

As a 'Center Without Walls,' one of our primary aims is to connect and strengthen the integrative medicine community across Harvard Medical School—and beyond. We did this in a myriad of ways throughout 2021 despite the limitations on in-person gathering that the COVID-19 pandemic presented. We continued to support innovative research through our signature Osher Pilot Research Grants and provide opportunities for learning and connection through our monthly Grand Rounds, co-sponsored events, and online presence.



Pilot Research Grants

Since the Osher Pilot Research Grant program was launched in 2015, we have distributed over \$1 million in seed funding to the HMS community. The program supports innovative, cross-disciplinary and collaborative projects in integrative medicine that are consistent with the research domains within our Strategic Plan:

- The Science of Mind-Body Connections;
- Clinical Effectiveness of Multimodal and Integrative Interventions;
- Systems and Translational Biology in Integrative Medicine; and
- Placebo and the Science of Human Connections.

We provide discretionary and competitive awards. To date, over 50% of funds have supported competitive grant applicants. All projects are scored against strategic and scientific merit, with competitive applications undergoing an additional formal peer-review process.

Each year we award \$100,000 in competitive grants, generally across three projects. Studies are followed for up to three years post-award to determine outcomes beyond the initial research results, such as leveraged new research funds, publications, scientific presentations and new collaborations.

Notable outcomes from past Pilot Project Awards



Olivia Okereke, MD (2017: BWH)
Relation of DNA methylation and molecular markers to health and well-being in aging
Publication: Transl. Psychiatry, 2019
Poster: Alzheimer's Association International Conference, July 2019. LA, CA, USA.

R01 Grant Award: (NIH/NIMH): Neuropsychiatric Symptoms, Cognitive Aging and DNA Methylation Age in the VITAL-DEP cohort. Total award: \$341,815 (2018)

New collaboration: Former Osher Pilot Award recipient, Dr. Eric Bui: Bui as PI and Okereke as Co-PI for NIH R34 grant submission April, 2018.



Michelle Dossett, MD, PhD, MPH (2018: MGH)
A SMART approach to reducing atrial fibrillation symptoms
Publication: Heart Rhythm O2, Clinical Atrial Fibrillation, 2021
R01 Grant Submitted: (NIH, June 2021) for a multi-site trial

New collaborations: at University of California, Davis (UCD)
New pilot-funded: (UCD Academic Senate) study of the SMART program in patients following an acute myocardial infarction with some sophisticated imaging technology.



Ahmed Tawakol, MD (2019: MGH)
Impact of stress reduction on inflammation and atherosclerosis
K23 Grant Award: Critical feasibility data from Osher pilot secured funding for companion study.
Publications: Five resulting scientific papers published in 2021

Abstracts: Seven resulting research abstracts published in 2021.

2021 Awards

Competitive awards



Ana-Maria Vranceanu, PhD
 Dept. Psychiatry, MGH
My healthy brain: a novel mind-body program for promoting brain health through lifestyle change



Huan Yang, PhD
 Dept. Neurology, BIDMC
Examining the interactive effects of mindfulness and slow-paced breathing on stress physiology

Discretionary awards



Kathryn Hall, PhD
 Dept. Medicine, BWH
The impact of polysupplementation in functional assays, cardiovascular disease, hospitalization and all-cause mortality



Peter Wayne, PhD
 Dept. Medicine, BWH
Biophysical assessments of acupoints in inflammatory bowel disease: a pilot study

OSHER PILOT AWARDS 2015-2021

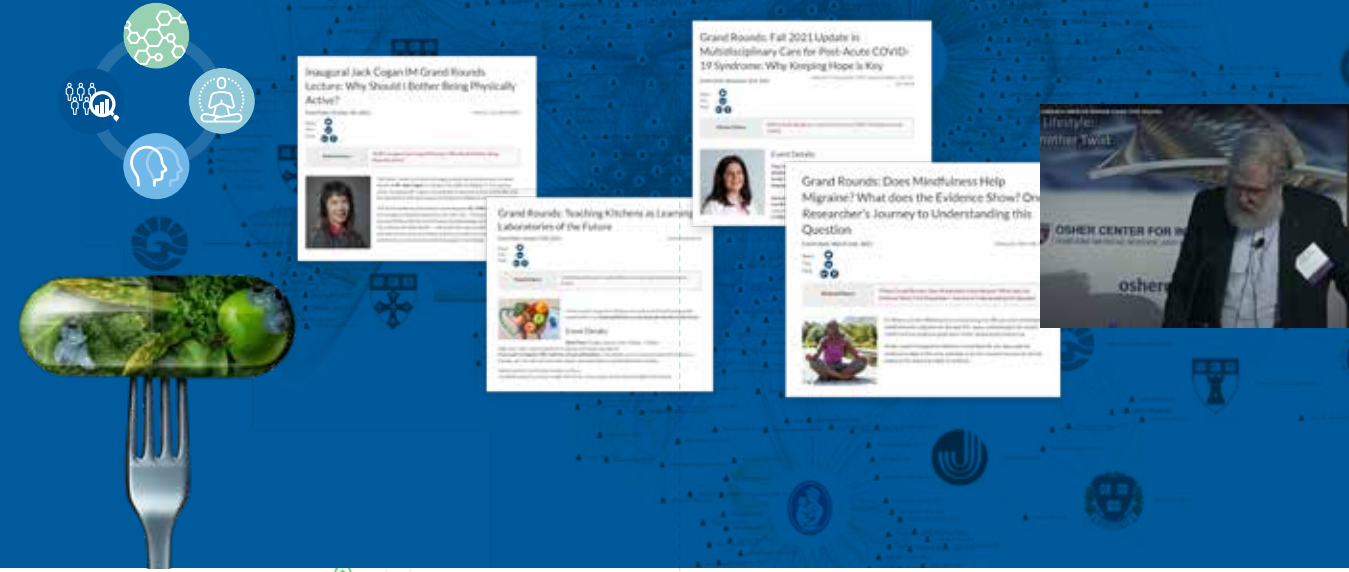
- 7** Rounds of annual funding
- 33** Pilot research projects supported
- \$1,138,432** Awarded
- SUBSEQUENT OUTCOMES**
 16 Scientific publications 12 New studies

INSTITUTIONAL COLLABORATIONS SUPPORTED

NETWORK BUILDING

Integrative Medicine Grand Rounds

Our monthly Integrative Medicine Grand Rounds have been running since 2015 and have inspired other integrative medicine centers to create similar programs. Attendance remains double that of prior years since switching to a fully virtual format in 2020 in response to the pandemic. In 2021, we hosted successive leaders from their respective fields including Joseph Loscalzo, JoAnn Manson, Jun Mao and I-Min Lee. Research and clinical case presentations included a diverse range of topics from diet and nutrition, cardiovascular health, healthy aging, integrative oncology and delivering integrative care during COVID-19.



Inaugural Jack Cogan Integrative Medicine Lecture

In October 2021, we hosted the first installment of a newly endowed annual lecture series to honor the life of Mr. Jack Cogan and his active engagement with and support of integrative medicine at the Osher Center. Mr. Cogan was committed to physical activity and good health, and we thank his wife, Mary Corneille, for her generous gift to support the series to showcase the benefits of remaining physically active. Dr. I-Min Lee presented the inaugural lecture, "Why Should I Bother Being Physically Active?"

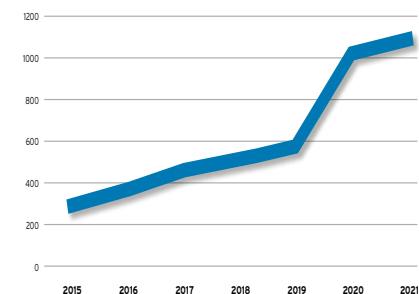


Jack Cogan and Mary Corneille

"Jack always understood the importance of exercise, and his lifelong passion for running started on a cross country team in high school. When health challenges began making it more difficult for him to continue his running routine and medications were not able to compensate, he began looking at how integrative therapies offered by the Osher Center might help him. Therapeutic massage and tai chi both contributed to Jack's balance, patience and better understanding of how to deal with the limitations of his neurological disease."

Mary Corneille

Integrative Medicine Grand Rounds annual attendance (2015-2021)



2021 Grand Rounds
Registered: 1,800
Attended Live: 1,100
YouTube Views: 3,130

Cross-institutional collaborations



Center for Mindfulness and Compassion

Harvard Medical School Distinguished Lecture in Mind Body Research and Health: In June of last year, the Osher Center partnered with the Benson-Henry Institute for Mind Body Medicine (BHI) and the Center for Mindfulness and Compassion (CMC) at the Cambridge Health Alliance (CHA) to launch this rotating annual lecture series to showcase excellence and innovation in mind body research and health. Willem Kuyken, PhD, DClInPsy presented the inaugural lecture on entitled, "Mindfulness-Based Cognitive Therapy for Life: Ancient Wisdom Meets Modern Psychology in the Contemporary World."

Symposia development



To maintain programming momentum, Osher faculty started planning our fifth biennial Integrative **Medicine Network Forum**, to be held virtually on November 10-11, 2022, entitled "**The Lived Experience of Depression—An Integrative Approach**" and our inaugural **International Tai Chi Research Conference**, "**The Science of Tai Chi & Qigong as Whole-Person Health**," to be held in-person in the fall of 2023.

Online presence

We reach our online integrative medicine community through our OsherCenter.org website, monthly e-newsletter, YouTube Channel, and social media postings. We support the connectivity of our community with video resources, research publications, access to clinical providers and news and event updates.

Osher Center website 2021	YouTube 2021
101,646 visits	1,940 subscribers
55,703 sessions	3,145 views

Osher Mailing List Activity

	2017	2018	2019	2020	2021
Number of Subscribers	1,839	2,168	2,309	2,693	2,696
Average Email Open Rate	26.4%	25.5%	24.2%	30.3%	30.4%
Average Click-through Rate	3.0%	3.2%	3.2%	4.3%	4.2%

Interactive Network Maps

We further support connectivity across the Harvard integrative medicine research community with our Research integrative Medicine network map on our website. The interactive map, which automatically updates on a monthly basis, is searchable by publication authors and integrative medicine modality. This functionality can help researchers identify potential cross-institutional and interdisciplinary research collaboration opportunities. There are currently 733 authors of integrative medicine articles in the Harvard research community, responsible for 1,348 publications.

DEMONSTRATING LEADERSHIP

In 2021, Osher faculty continued to provide visionary leadership to the integrative medicine community through local, national and international presentations and contributions. Faculty remained active in a variety of committees and organizations responsible for steering and shaping the future of integrative medicine globally. In addition, the Translational Research Director assumed new responsibilities in Boston and the Osher Center created a new leadership position to direct initiatives in planetary health.

Faculty Invited Presentations

Faculty gave 58 invited presentations, ranging from local talks to international keynotes. The full list of presentations can be found in Appendices 4-7. Some noteworthy presentations include the following:



Peter Wayne
Tai Chi for Whole Person Health and Healthy Aging
 Invited Virtual Grand Rounds Lecture
 Feinberg School of Medicine, Northwestern University, Chicago, IL

Do Tai Chi and Qigong Make “Sense”
 Invited Symposium Presenter: The Science of Interoception; Society for Acupuncture Research (Virtual)

Tai Chi for Fall Prevention and Healthy Mind-body Aging
 Invited Keynote Speaker
 Jaseng Medical Academy, Seoul, South Korea (Virtual)



Donald Levy
Complementary and Integrative Medicine Approaches to Chronic Pain Management.
 Office Practice of

Primary Care Medicine.
 Brigham and Women’s Hospital

Finding High Quality Dietary Supplements for Stress, Anxiety and Burnout
 Advancing Women’s Health: A 2021 Update.
 Brigham and Women’s Hospital

Using Botanicals and Other Dietary Supplements in the Management of Stress, Anxiety and Burnout.
 Osher Collaborative Clinical Speaker Series (Virtual)



Darshan Mehta
Well-Being - Galvanizing Change (slowly) from the Individual to the System Level
 Grand Rounds
 Department of Radiology
 Mass General Brigham

Crucial Conversations: Racism and Healthcare in the Asian, Asian-American, Pacific Islander, and South Asian Communities
 Panelist
 Academy of Integrative Health and Medicine, Virtual Meeting

Physician Wellness & Health: An Integrated Approach
 Invited Plenary Speaker
 4th Annual South Asian Health Conference, Canada India Network Society, Virtual Meeting



Gloria Yeh
Laying the Foundation: Defining Building Blocks of Music-Based Interventions

Panelist
 National Institutes of Health Sound Health Initiative, Music and Health Working Group

Mind-Body Exercise in Patients with COPD: Results from the LEAP Study
 General Medicine Grand Rounds
 Beth Israel Deaconess Medical Center, Harvard Medical School

Assessing and Measuring Target Engagement: Mechanistic and Clinical Outcome Measures for Brain Disorders of Aging
 Panelist
 National Institutes of Health Sound Health Initiative, Music and Health Working Group

Mind-Body Movement and Cardiopulmonary Health
 Toronto-Ottawa Heart Summit- International Conference
 University of Toronto
 University of Ottawa Heart Institute



Kathryn Hall
Health Disparities and Nocebo Effects in Clinical Care
 Program in Placebo Studies, Beth Israel Deaconess Medical Center, Harvard Medical School

Panacea or Poison: Placebos and Nocebos in Modern Medicine
 The Helix Center, New York City

Molecular Mechanisms of Placebo Response: From Genes to Pathways
 Chair and speaker
 Society of Interdisciplinary Placebo Studies Conference, Baltimore Maryland



Matthew Kowalski
A Series of Interesting Cases at the Osher Clinical Center
 Osher Clinical Center
 Brigham and Women’s Hospital

Bridging Clinical Practice into Chiropractic Research: Integrative Migraine Pain Alleviation through Chiropractic Therapy (IMPACT) Trial
 Invited Lecture
 Palmer College of Chiropractic, Davenport, IA

Faculty National and International Leadership Positions

Peter Wayne

- Membership on multiple NIH grant review panels (NIA and NCCIH)
- Chair, Data and Safety Monitoring Board for the NIH-funded multicenter trial: Spinal Manipulation and Patient Self-Management for Preventing Acute to Chronic Back Pain (PACBACK)
- Member, Advisory Board, Assessing Pain, Patient Reported Outcomes and Complementary Health (APPROACH): The CIH for Pain National Demonstration Project, Veterans Administration
- Fellow and Faculty Member, Mind & Life Research Institute
- Advisory Board Member, Cochrane Complementary Medicine, Center for Integrative Medicine, University of Maryland School of Medicine
- Executive Editor, Journal of Alternative and Complementary Medicine; Associate Editor, Global Advances in Health and Medicine
- Board Member, Society for Acupuncture Research
- Member, Scientific Review Committee, International Congress for Integrative Medicine and Health

Gloria Yeh

- Member, National Institutes of Health, National Advisory Council for Complementary and Integrative Health, NCCIH
- Co-Chair, Executive Organizing Committee, Academic Consortium for Integrative Medicine and Health, 2022 International Congress on Integrative Medicine and Health, Phoenix, Arizona
- Advisory Board Member, Cochrane Complementary Medicine, Center for Integrative Medicine, University of Maryland School of Medicine
- Member, Harvard Catalyst Scientific Review Committee, Harvard Medical School, Harvard Catalyst Clinical Research Center

Darshan Mehta

- Chair, Diversity, Equity and Inclusion (DEI) Task Force for the Academic Consortium for Integrative Medicine and Health (ACIMH)
- Director, Office for Well-Being, Center for Faculty Development at MGH
- Site Director (MGH), Practice of Medicine Curriculum, Harvard Medical School
- Workplace Well-Being Collaborative, Massachusetts General Hospital
- Black, Indigenous, and People of Color (BIPOC) Committee, Academy of Integrative Health and Medicine
- Resilience, Well-Being, and Prevention Think Tank, Department of Psychiatry, Massachusetts General Hospital

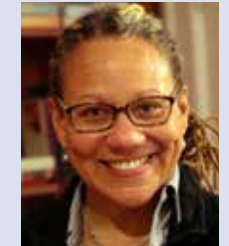
Kathryn Hall

- Public Awareness and Education Committee
 American Society of Human Genetics

Matthew Kowalski

- Member, Inter-Institutional Chiropractic Research Network
- Advisory Committee Member, NCMIC Foundation, Inc. Clive, IA

New Leadership Transitions



Kathryn T. Hall, PhD, Director of Basic and Translational Research was selected to serve as Deputy Executive Director, Population Health and Health Equity, at the Boston Public

Health Commission. Her new role includes overseeing the Offices of Research and Evaluation, Racial Equity and Community Engagement, The Community Health Education Center, The Consortium for Professional Development, and The Child and Family Health Bureau. Dr. Hall continues to maintain strong links with the Osher Center.



Aterah Z. Nusrat, MSc. DIC, former Program Manager, was re-recruited as Senior Program Manager and Director of Programs in Integrative Medicine and Planetary Health. In this equally

split role, Ms. Nusrat will support the Osher Center’s operations and, in partnership with the leadership team, develop new programming and collaborative initiatives at the interface of integrative medicine and planetary health.

2021 GRAND ROUNDS PRESENTATIONS AND ATTENDANCE					
Month	Speaker	Program/Institution	Title	Registrants	Attended Live
2-Feb	Amy Peters, PhD; Zeina Chemali, MD, MSCE; Steven Atlas, MD, MPH; Julia Loewenthal, MD	Massachusetts General Hospital; Brigham and Women's Hospital	Integrative Geriatrics: Clinical Approaches to Healthy Aging.	222	159
3-Mar	Rebecca Wells, MD, MPH	Department of Neurology, Wake Forest Baptist Health	Does Mindfulness Help Migraine? What Does the Evidence Show? One Researcher's Journey to Understanding this Question.	132	76
6-Apr	Eric Roseen, DC, MSc	Boston University School of Medicine	Accessing Chiropractic Care for Back Pain After Seeing a Primary Care Provider: Barriers and Implementation Strategies.	105	69
4-May	Joseph Loscalzo, MD, PhD	Department of Medicine, Brigham and Women's Hospital	Food As Innate Drug Source: Novel Strategies for Drug Development in the Era of Big Data.	144	82
1-Jun	Irene Martyniuk, MAc, LAc; Lorrie Kubicek, MT-BC; Jeffery Peppercorn, MD, MPH	Katherine A. Gallagher Integrative Therapies Program; MGH Cancer Center, Massachusetts General Hospital	Navigating Uncharted Territory: Providing Integrative Therapies During a Pandemic.	74	49
6-Jul	Gloria Yeh, MD, MPH	Osher Center for Integrative Medicine	Studying The Intersection Between Mind-Body and Physical Activity in Cardiopulmonary Disease.	176	100
3-Aug	JoAnn Mason, MD, MPH, DPH	Division of Preventive Medicine, Brigham and Women's Hospital	How Vital are Vitamin D and Omega-3s for Cardiometabolic Health?	115	78
14-Sep	Jun Mao, MD, MSCE	Memorial Sloan Kettering Cancer Center	Integrative Oncology: Evidence-based Medicine Meets Patient-centered Care.	118	78
5-Oct	I-Min Lee, ScD, MPH	Division of Preventive Medicine, Brigham and Women's Hospital	Why Should I Bother Being Physically Active?	269	165
2-Nov	Zeina El-Chemali, MD, MSCE; Jennifer Freeburn, MS CCC-SLP	McCance Center for Brain Health; Center for NeuroTechnology and NeuroRecovery, Massachusetts General Hospital	Fall 2021 Update in Multidisciplinary Care for Post-Acute Covid-19 Syndrome: Why Keeping Hope is Key.	85	52
7-Dec	Adam Rindfleisch, MPhil, MD	Whole Health School of Medicine and Health Sciences in Arkansas	Building an Integrative/Whole Health Medical School From the Ground Up: The Promises and Perils of Starting From Scratch.	183	86

In 2021, our portfolio of research included a total of 36 active studies, ranging from studies just being launched to studies focused on data analysis and finalization of manuscripts. 24 of these studies were funded by NIH, 6 by foundation grants and 6 by internal funds. Icons correspond with key research domains.

ACTIVE PROJECTS					
Study/Project Title (Funding Source)	Summary Description	PI/ Key Osher Investigators/Affiliates	Research Domain		
Acute yogic stretching and inflammation (NCCIH T32 AT000051, Huffington Foundation) 2020-2022	This randomized clinical trial (RCT) evaluates two intensities of acute stretching (60 min) vs. a wait list control on panels of inflammatory markers (including resolvins) in healthy adults. (N=45)	Munoz-Vergara (PI) Wayne (mentor) Yeh (mentor) Rist (co-I)			
BEAM: breathing, education, awareness, movement in COPD (NCCIH R01 AT005436) 2016-2021	This is a 3-arm RCT of tai chi vs. mind-body breathing vs. education in patients with chronic obstructive pulmonary disease. Outcomes: feasibility, HRQL, dyspnea, cognitive emotional measures, functional status. (N=123)	Yeh (MPI) Moy (MPI) Wayne (co-I)			
Biophysical properties of acupoints (NCCIH T32 AT000051, Osher Pilot) 2021-2022	Using a neuroinflammation viscera-somatic model in IBD patients, this study evaluates local blood flow (laser speckle photometry), thermography, and pressure sensitivity at verum and sham acupoints relevant to GI health in IBD patient and healthy controls. (N=45)	Yang (PI) Wayne (mentor) Lu (mentor) Rist (co-I)			
Opioid dose reduction in comprehensive inpatient rehabilitation: A pharmaco-behavioral approach (NIH NIDA K23 DA052041-01A1) 2021-2026	This career development award supports Dr Morales-Quezada in conducting a pilot RCT of a novel intervention based on classical conditioning and placebo analgesia for pain management in complex pain patients with spinal cord injury in the inpatient rehabilitation setting.	Morales-Quezada (PI) Kaptchuk (mentor) Yeh (mentor)			
Efficacy of open-label placebo, double-blind placebo, and peppermint oil in IBS (NCCIH R01 AT008573) 2015-2021	This study evaluates genetic contributions (placebo effects) in irritable bowel syndrome (IBS) symptoms across four randomized placebo- related treatment arms in a clinical trial. (N=304)	Kaptchuk (MPI) Lembo (MPI) Hall (co-I)			
Impact of sex/gender influences in a randomized clinical trial of peppermint oil versus placebo in IBS (NCCIH Supplement to R01 AT009573) 2019-2021	The study evaluates sex hormone effects on placebo and IBS symptoms in a randomized trial of placebo and peppermint oil. (N=304)	Kaptchuk (MPI) Lembo (MPI) Hall (co-I)			
Long-term exercise adherence after pulmonary rehabilitation in COPD (NCCIH R01 AT006358) 2017-2022	This 3-arm RCT evaluates tai chi vs. walking vs. usual care in patients with COPD to maintain exercise gains after pulmonary rehabilitation. Outcomes: exercise capacity, symptoms, HRQL, self-efficacy, physical activity, cardiopulmonary physiology. (N=91)	Yeh (MPI) Moy (MPI) Wayne (co-I)			
MBCT via teleconference in cardiac patients with Depression (NCCIH K23 AT009715) 2019-2023	This study includes development, refinement, and feasibility testing in a pilot RCT of a MBCT group video-conference intervention in post-acute coronary syndrome depression. It explores impacts on depression, inflammation, and emotional regulation. (N=40)	Luberto (PI) Park (mentor) Yeh (mentor)			
Mind-body-wellness in supportive housing—The MiWish Trial (NIA R01 AG025037) 2016-2021	This study is a cluster RCT of tai chi vs. health education in low-income elderly housing facilities. Outcomes: Physical function and health care utilization. (N=320)	Wayne (MPI) Lipsitz (MPI) Manor (co-I) Hausdorff (co-I) Macklin (co-I)			



Science of Mind Body Connections



Systems and Translational Biology of Integrative Medicine



Placebo and the Science of Human Connection
















Clinical Effectiveness of Multimodal and Integrative Interventions

ACTIVE PROJECTS					
Study/Project Title (Funding Source)	Summary Description	PI/ Key Osher Investigators/Affiliates	Research Domain		
Mindful steps in COPD and HF (NCCIH R34 AT009354) 2019-2022	This study develops, refines and tests feasibility in an RCT of a multimodal internet-mediated mind- body, health education, and wearable device intervention to promote walking, motivation, self-efficacy in COPD and heart failure. (N=42)	Yeh (PI) Moy (co-I) Wayne (consultant)			
Mindful treadmill walking in metabolic syndrome (NCCIH T32 AT005436) 2018-2021	This is a pilot RCT of mindful (audio scripted) treadmill vs. regular treadmill walking program to begin to dismantle mind-body exercise, examining both acute and longitudinal cardiopulmonary physiology and psychological measures. (N=20)	Kraemer (PI) Yeh (mentor) Wayne (mentor)			
Mindfulness training, insomnia, and EEG complexity (NCCIH T32 AT005436) 2019-2022	This pilot RCT examines acute and longitudinal effects of pre-sleep mindfulness meditation via mobile app on pre-sleep wakefulness and sleep brain dynamics assessed with conventional and non-linear EEG complexity frameworks. (N=10)	Ma (PI) Yeh (mentor) Wayne (mentor) Peng (co-I) Ahn (co-I)			
Mindfulness-based interventions for persons living with HIV and with increased CVD risk (NCCIH T32 AT005436) 2020-2023	This study uses secondary analyses to examine associations between mindfulness, psychological functioning and adaptive health behaviors for patients with HIV and increased cardiovascular risk.	Foley (PI) Batchelder (mentor) Yeh (mentor)			
Multimodal tele-video mind-body intervention for mTBI (NCCIH K23 AT01065) 2020-2025	This study will develop, refine and test feasibility in an RCT of a mind-body resiliency program delivered remotely via video for anxiety in patients with traumatic brain injury. (N=50)	Greenberg (PI) Vranceanu (mentor) Yeh (mentor)			
Qigong for cancer caregivers (NCCIH R34 AT010081) 2019-2022	This mixed methods RCT compares in-person qigong vs. virtual delivery vs. education for managing distress and QOL cancer caregivers. (N=60)	Wayne (MPI) Budhrani (MPI) Yeh (consultant)			
Stress management and resiliency program for fear of cancer recurrence (NCCIH K23 AT010157) 2019-2024	This study will develop, refine and test feasibility in an RCT of adapted SMART program for fear of recurrence in cancer survivors, and explore impact on psychological symptoms and healthcare engagement. (N=48)	Hall (PI) Park (mentor) Yeh (mentor)			
Tai Chi and chronic pain in HIV (NCCIH K23 AT010099) 2019-2024	This study will develop, refine and test feasibility in an RCT of adapted Tai Chi Easy program for HIV patients with chronic pain, and explore its impact on psychological symptoms. (N=40)	Dunne (PI) Yeh (mentor)			
Tai chi, multisite pain, and fall risk (NIA R56AG062737) 2019-2021	This pilot randomized clinical trial evaluates the effectiveness of a 16-week mind-body intervention on pain and function in older adults with chronic multisite pain. (N=20).	You/Leville (MPIs) Wayne (consultant) Yeh (consultant)			
Tele-Tai Chi: A mobile tai chi platform for fall prevention in older adults (NIA R43 AG059491) 2018-2022	This study, in partnership with industry, aims to develop a virtual Tai Chi training that can be delivered via tele-health, and using wearable sensor technology, to remotely assess clinical outcomes related to fall risk. (N=50)	Wayne (MPI) Bonato (MPI) BioSensics, Inc (Industry partner)			

ACTIVE PROJECTS					
Study/Project Title (Funding Source)	Summary Description	PI/ Key Osher Investigators/Affiliates	Research Domain		
Understanding components of mind- body exercise for physical activity engagement in metabolic syndrome (NCCIH 5K23AT011043-02)	This mixed methods factorial pilot RCT aims to understand the effects of mindful attention and exercise in mind-body exercise (MBE) interventions in sedentary patients with metabolic syndrome. It also explores mechanisms of self- regulation and cardiopulmonary physiology. (N=40)	Kraemer (PI) Yeh (mentor) Wayne (mentor)			
Research training: complementary & integrative medicine (NIH/NCCIH T32 AT000051) 2019-2024	The goal of this training grant (continuously funded through competitive renewal since 1999) is to support a three-year clinical and translational research fellowship program for academic faculty development in complementary and integrative medicine.	Yeh (PI)			
Epidemiological, pharmacogenomic and clinical impact of COMT on CVD (NIH / NHLBI K0 1HL130625-01) 2016-2021	Genetic variation in catechol-O-methyltransferase (COMT), an enzyme that breaks down catecholamines, has been implicated in cardiovascular disease risk and response to specific medications. This translational project leverages the wealth of epidemiologic and large-scale genomic data to provide insight into the impact of COMT from molecular networks to public health.	Hall (PI)			
The role of COMT effects on vitamin E in cancer (NIH / NHLBI U01 CA182913) Supplement 2021	This grant examines how genetic variation in COMT modifies rates of all cancer in the presence and absence of vitamin E.	Hall (Co-I)			
Pharmacogenomic effects of scavenger B1 in cardiovascular disease prevention (NHLBI R03)	Identifying and validating individual and combinatorial effects of novel pharmacogenomic loci that influence the disease preventative effects of the widely used over-the-counter drugs, aspirin, and vitamin E.	Hall (PI)			
Foundation or internally funded					
ACT for migraine trial (Lavine Foundation) 2020-2022	RCT evaluating Acceptance and Commitment Based Therapy (ACT) vs. wait-list control for chronic migraineurs. Outcomes: feasibility, migraine episodes. Neuroimaging sub-study. Mixed methods. (N=40)	Bernstein (PI) Rist (co-I) Wayne (co-I)			
Acupuncture for breast cancer lymphedema (Osher Pilot) 2020-2022	RCT of acupuncture treatment in breast cancer lymphedema patients who are ineligible for/decline lymphatic surgery. Outcomes: feasibility, bioimpedance spectroscopy, standard lymphedema clinical measures, QOL, inflammatory markers. (N=21)	Singhal (PI) Yeh (co-I) Lu (co-I)			
Gait health as a clinical outcome (Palmer Foundation) 2020-2024	This feasibility study assesses integration of gait health parameters (Zeno Gait System) into patient visits at Osher Clinic.	Wayne (PI) Kowalski (co-I)			
Mindfulness and tai chi for cancer health: The MATCH trial (Hecht Foundation) 2018-2023	This Canada-based pragmatic patient preference and randomized trial evaluates the effectiveness of two alternative mind-body therapies (tai chi vs. mindfulness training) for symptom management and quality of life in cancer patients. (N=600)	Carlson (PI) Wayne (co-I)			

ACTIVE PROJECTS						
Study/Project Title (Funding Source)	Summary Description	PI/ Key Osher Investigators/Affiliates	Research Domain			
Foundation or internally funded (continued)						
Orthotics for chronic knee arthritis pain: Can mindfulness change the composition of platelet-rich plasma (PRP)? (Osher Pilot) 2020-2022	This study aims to identify molecular biomarkers and examine the potential of integrative medicine to enhance response to platelet-rich plasma.	Hall (MPI) Vora (MPI)				
Non-verbal measurement of negative self-conscious emotion (Osher Pilot) 2020-2022	Pilot study using facial gesture, posture, and voice acoustic analyses along with machine learning algorithms to identify objective markers of shame in men diagnosed with HIV and who engage in risky behaviors. (N=30)	Batchelder (PI) Bonato (co-I) Wayne (co-I)				
Tai chi plus chiropractic for chronic neck pain in nurses (Palmer and Van Sloun Foundations) 2021-2022	Pre-post feasibility study evaluating pragmatic (community-based) delivery of combined tai chi and chiropractic care for chronic neck pain. Primary outcomes: feasibility, neck pain, function, postural control. Mixed methods. (N=20)	Wayne (PI) Kowalski (co-I) Rist (co-I)				
Pre-sleep EEG brain dynamics and mindfulness meditation in insomnia (Osher Pilot) 2019 -2021	This proof-of-concept pilot randomized controlled trial explores feasibility of an app-based mindfulness intervention in patients with insomnia and evaluates both acute and longitudinal changes in brain physiologic signals (e.g. EEG spectral analyses and complexity analyses) with pre-sleep meditation.	Yeh (PI)				
Epidemiologic risk factors for COVID-19 across three established cohorts of older US adults BWH COVID Fund 2020	This study leverages data from three large epidemiological studies to evaluate the impact of exercise and life-style on risk of COVID infection and its impact on overall well-being.	Wayne (MPI)				
Establishing a clinician-researcher chiropractic postdoctoral fellowship at the Harvard Medical School/Brigham and Women's Hospital Osher Center for Integrative Medicine (NCMIC Foundation) 2021 – 2024	This gift supports the training of a chiropractic clinician-research fellow at the Osher Center for a 3-year period.	Wayne (MPI) Kowalski (MPI)				
Stress Management and Resiliency Training (SMART) for employees and their family members (Mass General Brigham Systems Behavioral and Mental Health Grant) 2021	This clinical project aims to improve access to behavioral health care for MGB employees and their covered family members through subsidies for participation in the SMART program at BHI-MGH. In the first year of this project, approximately 100 patients benefited from the subsidy.	Mehta (MPI) Kowalski (MPI)				
Intermittent fasting in dharmic traditions (Uberoi Foundation for Religious Studies)	Day-long virtual conference focusing on the science and practice of intermittent fasting. More than 600 participants registered for event.	Mehta (PI) Rathi (co-I)				

SUBMITTED/PENDING GRANTS						
Study/Project Title (Target Funding Source)	Brief Summary of Planned Study	PI/ Key Osher Investigators	Research Domain			
A novel strategy for precision IBS pain relief using natural supplements (NCCIH R01)	This study is the first to prospectively address the high placebo response rate in IBS, a chronic pain condition, by introducing a pharmacogenomic biomarker and strategy to identify which population subset will benefit from quercetin or placebo treatment (N=240).	Hall (MPI) Lembo (MPI) Kaptchuk (co-I)				
Acupuncture for pain reduction and opioid sparing in head and neck cancer: A pilot randomized controlled trial (NCCIH R34)	Opioid naive patients taking prescription opioids for acute pain increases the risk for developing new persistent opioid use. To inform the feasibility and design of a future definitive trial, the goal of this application is to perform a pilot study of preemptive acupuncture for reducing opioid use in head and neck cancer patients. (N=60)	Wayne (MPI) Lu (MPI) Rist (co-I)				
Chiropractic care for episodic migraine: A multisite pragmatic trial (NCCIH U01)	Multisite pilot pragmatic RCT of chiropractic care plus enhanced usual care (EUC) vs EUC alone for episodic migraines. Outcomes include feasibility and preliminary estimates of impact on migraine days, headache disability, and neck pain. (N=120)	Wayne (MPI) Rist (MPI) Kowalski (co-I) Buring (co-I)				
Enhancing aerobic intensity of a Tai chi intervention for sedentary individuals with cardiovascular risk NIH/NCCIH R34	The benefit of exercise and increasing cardiorespiratory fitness to decrease morbidity and mortality due to cardiovascular disease is well-known. This is application develops an aerobically enhanced tai chi intervention in preparation for a future RCT examining higher intensity tai chi on cardiorespiratory fitness in sedentary individuals with CV risk. (N=30)	Yeh (MPI) Wayne (MPI) Rist (co-I)				
Tai chi exercise and wearable feedback technology to promote physical activity in ACS survivors (NCCIH R01)	Phase 2 RCT of a 6-month remote tai chi program plus wearable feedback device (Fitbit) vs enhanced usual care in sedentary acute coronary syndrome survivors. Outcomes: physical activity (accelerometry), cognitive-behavioral constructs, CHD risk factors. (N=156)	Yeh (MPI) Wayne (co-I) Rist (co-I)				
Combined chiropractic care and tai chi for chronic non-specific neck pain (NCCIH R34)	Chronic neck pain ranks in the top five causes for years lived with disability. To inform the feasibility and design of a future definitive trial, the goal of this application is to perform a pilot study of chiropractic care and Tai Chi mind-body exercise for adults with chronic non-specific neck pain (N=60)	Wayne (PI) Rist (co-I) Kowalski (co-I)				
Tai chi, executive function, and gait health in adults at risk for cognitive decline (NIA R01)	This randomized clinical trial will evaluate the benefits of tai chi mind-body exercise for preserving age-related decline in executive cognitive function and associated gait health in older adults. The project addresses the critical need of identifying early interventions that will positively arrest the growing dementia epidemic in our aging society. N=240	Wayne (MPI) Lipsitz (MPI) Rist (co-I) Manor (co-I) Hausdorff (co-I)				
Using deep learning to understand combined influence of genomics and sex hormones on symptom severity in irritable bowel syndrome (IBS) Mass Life Sciences Center -First Look 2021	Individual and combinatorial effects of chronic pain genes and sex hormones on IBS pain severity and frequency with randomized peppermint versus placebo.	Hall (MPI) Lembo (co-I)				

SUBMITTED/PENDING GRANTS			
Study/Project Title (Target Funding Source)	Brief Summary of Planned Study	PI/ Key Osher Investigators	Research Domain
Exploring brain dynamics and mechanisms of mindfulness-based interventions for insomnia (NCCIH K23)	Development/feasibility testing in an RCT of mobile-app based mindfulness intervention vs. wait-list control in insomnia. Exploring acute and longitudinal change in physiological signals (EEG/ECG dynamics, complexity) of sleep quality.	Ma (PI) Yeh (mentor) Wayne (mentor) Rist (co-I)	  
Yoga for post-surgical persistent pain in breast cancer survivors (NCCIH)	Development/feasibility testing in an RCT of yoga vs. control for pain and psychosocial distress in breast cancer survivors with persistent post- surgical pain.	Munoz-Vergara (PI) Wayne (mentor) Schreiber (mentor) Yeh (co-I) Rist (co-I)	 
Using instrumented everyday gait to predict falls in older adults using the Women's Health Study cohort NIA RO1	Among community-living older adults, falls are a leading cause of injury, disability, injury-related death, and high medical costs. Using data collected from approximately 17,500 women enrolled in the Women's Health Study who wore an accelerometer during waking hours for a week, we will evaluate if metrics of daily living gait and physical activity inform the prediction of injurious falls	Wayne (MPI) Lee (MPI) Buring (co-I) Hausdorff (co-I)	
Promoting resilience through non-opioid Therapy for pain management (DOD PRMRP)	The goal of this proposal is to conduct trials of non-medicinal treatments to help military personnel develop resiliency for pain management.	Wayne (co-I)	 
Physiological outcomes of mind-body health behaviors for stress-related disorders (NCCIH F32)	This is a pre-doctoral early career development award that supports a project to examine pranayama, hyperarousal and cardiovascular reactivity in female sexual trauma survivors.	Sinnott (PI) Yeh (co-mentor)	 
Decreasing sedative requirements for peripheral vascular interventions using preoperative guided meditation. (Agency for Healthcare Research and Quality)	This early career post-doctoral development award supports the development and piloting of a novel preoperative guided meditation program to decrease sedative requirements in patients undergoing vascular surgery intervention.	Png (PI) Yeh (co-mentor)	 
Biophysical assessments of acupoints in inflammatory bowel disease (NCCIH)	Using a neuro-inflammation framework and Irritable Bowel Disease (IBD) as a model for studying acupoint sensitization and viscerosomatic convergence, this pilot study will conduct biophysical assessments of acupoints and non-acupoint controls in both IBD and healthy patients to inform the design of a future fully powered study.	Yang (PI) Wayne (mentor) Napadow (mentor) Korzenik (co-I) Ahn (co-I) Rist (co-I)	

Appendix 4: Local Lectures by Osher Center Directors, 2021

Donald Levy

Complementary and integrative medicine approaches to chronic pain management

Office Practice of Primary Care medicine
Brigham and Women's Hospital (BWH), Harvard Medical School (HMS)

Complementary and integrative medicine in the general internist's practice

Innovations and New Practices in Internal Medicine 2021
BWH, HMS

Finding high quality dietary supplements for stress, anxiety and burnout

Advancing Women's Health: A 2021 Update, BWH

Kathryn Hall

Placebos in medicine

Grand Rounds, Division of Gastroenterology
Boston Childrens Hospital (BCH), HMS

Health disparities and nocebo effects in clinical care

Program in Placebo Studies
Beth Israel Deaconess Medical Center (BIDMC), HMS

How expectations influence clinical outcomes

Harvard Catalyst Visiting Research Internship Program, HMS

Matthew Kowalski

Position in Life is Everything, Caring for Your Spine

First year medical students
HMS

Darshan Mehta

Positivity and relaxation training

Workshop
Department of Radiation Oncology, Massachusetts General Hospital (MGH)

Positivity and relaxation training

Workshop
Department of Radiology, MGH

Positivity and relaxation training for CRNAs

Workshop
Department of Anesthesia, MGH

Positivity and relaxation training

Workshop
Post-Doctoral Fellows, BWH, MGH

Positivity and relaxation training

Workshop
Graduate Student Division, HMS

Positivity and relaxation training

Workshop
Post-Baccalaureate Association, MGH

Update on the Office for Well-Being

Invited Presentation
Executive Committee on Research, MGH

Complementary and integrative medicine

Invited Presentation
VariAsian Conference, HMS

Stress management and resilience

Invited Presentation
2021 CPBO Coding Retreat, MGH

Well-being - Galvanizing change (slowly) from the individual to the system level

Grand Rounds
Department of Radiology, MGH/BWH

Peter Wayne

Mind-body research: Towards an embodied approach

Faculty Presentation
Harvard Medical School T32 Fellowship in Integrative Medicine Research, BIDMC

Tai chi for fall prevention

Invited Faculty Lecture
Department of Preventive Medicine, BWH, HMS

Clinical trials of tai chi: Unique challenges inherent in evaluating multi-component non-pharmacological interventions

Invited Lecture
Master of Medical Science in Clinical Investigation Program, HMS

Gloria Yeh

Mind-body exercise in patients with COPD: Results from the LEAP study

General Medicine Grand Rounds
BIDMC, HMS

Studying the intersection between mind-body and physical activity in cardiopulmonary disease

Osher Center for Integrative Medicine Grand Rounds
BWH, HMS

Appendix 5: Regional and National Lectures by Osher Center Directors, 2021

Donald Levy

Rational use of dietary supplements

Invited Lecture
Primary Care Now. Pri-Med Institute

Using botanicals and other dietary supplements in the management of stress, anxiety and burnout

Invited Lecture
Osher Collaborative Clinical Committee Speaker Series

Kathryn Hall

Placebos and nocebos in medicine

Invited Lecture
University of California, San Francisco, Osher Center for Integrative Medicine

Panacea or poison: Placebos and nocebos in modern medicine

The Helix Center, New York City
Invited Lecture

How to engage community response to COVID vaccine

Moderator
American Society of Human Genetics (ASHG) Webinar

Darshan Mehta

What does resiliency mean for you? A primer

Invited Presentation
Northern New England Clinical Oncology Society, Virtual Meeting

Supporting clinicians through COVID-19 and beyond

Grand Rounds
Boston HealthCare for the Homeless, Virtual Meeting

Building resiliency for ourselves in the era of COVID-19

Psychiatry Grand Rounds
Thomas Jefferson University and Jefferson Health, Philadelphia, PA, Virtual Meeting

Applying meditation at the organizational level

Invited Presentation
TexMed 2021 Annual Meeting
Virtual Meeting

An overview of well-being

Invited Presentation
American Society of Neuroradiology Annual Meeting
Virtual Meeting

Crucial conversations: Racism and healthcare in the Asian, Asian-American, Pacific Islander, and South Asian communities

Invited Panel Discussion
Academy of Integrative Health and Medicine
Virtual Meeting

TOS/PCNA Joint Symposium: Keeping the healthcare provider engaged and preventing burnout

Invited Symposium
The Obesity Society Annual Meeting
Virtual Meeting

Resilience and well-being

Invited Plenary Session
Academy of Integrative Health and Medicine Annual Conference
Virtual Meeting

Resilience and well-being

Invited Panel Presentation
2021 Virtual CTSA Program Meeting
National Center for Advancing Translational Sciences at the National Institutes of Health, Bethesda, MD, Virtual Meeting

Peter Wayne

Exercising your body and mind: Tai chi for balance, cognition, and wellness in Parkinson's disease

Invited Lecture
Goddard House, Boston, MA

Tai chi as integrative medicine

Invited Speaker
Massachusetts College of Pharmacy and Health Sciences, Worcester, MA

Tai chi for preventing falls and cognitive decline in older adults

Invited Speaker
Boston Public Library, MA

Bringing the body back into mind-body research

Invited Lecture
College of the Atlantic, ME

Tai chi training as integrative medicine

Invited Lecture
University of East-West Medicine, Sunnyvale, CA

Integrating health with Tai chi: Studies of chronic heart failure, balance, cognition and pain

Georgetown University School of Medicine, MD

Appendix 5: Regional and National Lectures by Osher Center Directors, 2021 (continued)

East-Asian mind-body practices

Invited Virtual Lecture
UCSF Integrative Medicine Training Fellowship
UCSF Osher Center, San Francisco, CA

Virtual delivery of mind-body interventions

Panel speaker
Osher Research Collaborative
UCSF Osher Center, San Francisco, CA

Chiropractic care and integrative health

Invited Virtual Lecture
Logan University, Chesterfield, MO

Tai chi for whole person health and healthy aging

Invited Virtual Grand Rounds Lecture
Feinberg School of Medicine, Northwestern University, Chicago, IL

Tai chi for whole person health and healthy aging

Invited Virtual Lecture
University Hospitals Connors Whole Health, Cleveland, OH

Tai chi and qigong: Understanding the healing benefits of mind-body exercises for cancer patients

Invited Virtual National Lecture
Anticancer Lifestyle Foundation, Concord, NH

Gloria Yeh

Laying the foundation: Defining building blocks of music-based interventions

Invited Panelist
National Institutes of Health Sound Health Initiative, Music and Health Working Group
Virtual Meeting

Assessing and measuring target engagement: Mechanistic and clinical outcome measures for brain disorders of aging

Invited Panelist
NIH Sound Health Initiative, Music and Health Working Group
Virtual Meeting

Appendix 6: International Lectures by Osher Center Directors, 2021

Kathryn Hall

Predictability of clinical placebo responses

Invited presentation panel
Society of Interdisciplinary Placebo Studies Conference, Baltimore, MD

Molecular mechanisms of placebo response: From genes to pathway

Chair and speaker
Society of Interdisciplinary Placebo Studies Conference, Baltimore, MD

Educational session on career development

Panelist
Society of Interdisciplinary Placebo Studies Conference, Baltimore, MD

Darshan Mehta

Experiences of health services in integrative medicine

Invited presentation
II World Summit on Traditional and Complementary Medicine towards an Integrative Medicine, Medical College of Peru, Virtual meeting

Physician wellness & health: An integrated approach

Invited plenary session
4th Annual South Asian Health Conference, Canada India Network Society
Virtual meeting

Peter Wayne

The science of “Qi”

Invited speaker
World Tai Chi & Qigong Day Summit (Virtual)

Qigong as an ecological mind-body practice

Invited presenter
Mind and Life Institute, Charlottesville, VA (Virtual)

Ecology of mind body

Invited podcast/interview
Mind and Life Institute, Charlottesville, VA (Virtual)

Choosing a control group: An example from mind-body research

Invited Symposium Presenter
Epidemiologists as clinical trialists; Society for Epidemiological Research (Virtual)

Do tai chi and qigong make “sense”

Invited symposium presenter
The science of interoception
Society for acupuncture research (Virtual)

Health disparities, East Asian medicine, and COVID-19 symposium

Panel chair
Society for Acupuncture Research (Virtual)

Tai chi and qigong mind-body exercise for cancer survivors

Invited lecture
Society for Integrative Oncology, 18th International Conference
Baltimore, MD (Virtual)

Tai Chi for fall prevention and healthy mind-body aging

Invited Keynote Speaker
Jaseng Medical Academy, Seoul, South Korea (Virtual)

Bringing the body back into mind-body research

Invited Speaker
Herbert Benson, MD Course in Mind Body Medicine
MGB, Boston, MA (Virtual)

Gloria Yeh

Mind-body movement and cardiopulmonary health

Toronto-Ottawa Heart Summit- International Conference
University of Toronto
University of Ottawa Heart Institute

Appendix 7: Osher Directors’ and Core Faculty Publications

A live video mind-body treatment to prevent persistent symptoms following mild traumatic brain injury: protocol for a mixed methods study.

Greenberg J, Singh T, Iverson GL, Silverberg ND, Macklin EA, Parker RA, Giacino JT, **Yeh GY**, Vranceanu AM. JMIR Res Protoc. 2021;10(1):e25746.

A mind-body program for pain and stress management in active duty service members and veterans.

Millegan J, Denninger JW, Bui E, Jakubovic RJ, Ram V, Bhakta J, Hiller Lauby MD, **Mehta DH**, Sager JC, Fricchione G, Sylvia LG. Psychol Serv. 2021;18(2):186-194.

A pilot study of a stress management program for incarcerated veterans.

Sylvia LG, Chudnofsky R, Fredriksson S, Xu B, McCarthy MD, Francona J, Hart BR, Millstein R, **Mehta DH**, Park ER, Fricchione GL. Mil Med. 2021;186(11-12):1061-1065.

Acupuncture research in animal models: rationale, needling methods and the urgent need for a stricta-striaam adaptation.

More AO, Harris R, Napadow V, Taylor-Swanson L, **Wayne PM**, Witt CM, Lao L. J Altern Complement Med. 2021;27(3):193-197.

An ethnographic study of opioid use disorder in rural Maine: The problem of pain.

Grabowska W, Holden S, **Wayne PM**, Kilgore K. Qual Research in Medicine and Healthcare. 2021;4:132-45.

An exploratory analysis of the association between Catechol-O-methyltransferase and response to a randomized open-label placebo treatment for cancer-related fatigue.

Hoene Meyer TW, Baidwan NK, **Hall KT**, **Kaptchuk TJ**, Fontaine KR, Mehta TS. Frontiers in Psychiatry, 2021;12:684556.

Development of a novel intervention (mindful steps) to promote long-term walking behavior in chronic cardiopulmonary disease: Protocol for a randomized controlled trial.

Litrownik D, Gilliam EA, **Wayne PM**, Richardson CR, Kadri R, **Rist PM**, Moy ML, **Yeh GY**. JMIR Res Protoc. 2021;10(4).

Efficacy of cognitive behavioral therapy for insomnia in breast cancer: A meta-analysis.

Ma Y, Hall DL, Ngo LH, Liu Q, Bain PA, **Yeh GY**. Sleep Med Rev. 2021;55:101376.

Evaluation of a yoga-based mind-body intervention for resident physicians: a randomized clinical trial.

Loewenthal J, Dyer NL, Lipsyc-Sharf M, Borden S, **Mehta DH**, Dusek JA, Khalsa SBS. Glob Adv Health Med. 2021; 10.

Exploring correlates of improved depression symptoms and quality of life following tai chi exercise for patients with heart failure.

Luberto CM, Coey CA, Davis RB, **Wayne PM**, Crute S, **Yeh GY**. ESC Heart Fail. 2020;7(6):4206-12.

Exploring tai chi exercise and mind-body breathing in patients with copd in a randomized controlled feasibility trial.

Kraemer KM, Litrownik D, Moy ML, **Wayne PM**, Beach D, Klings ES, Reyes Nieva H, Pinheiro A, Davis RB, **Yeh GY**. COPD. 2021;18(3):288-298.

Factors influencing preference for intervention in a comparative effectiveness trial of mindfulness-based cancer recovery and tai chi/qigong in cancer survivors.

Oberoi D, McLennan A, Piedalue KA, **Wayne PM**, Jones J, Carlson LE. Factors J Alt Comp Med 2021;5:423-33.

Gait variability is associated with the strength of functional connectivity between the default and dorsal attention brain networks: evidence from multiple cohorts.

Lo OY, Halko MA, Devaney KJ, **Wayne PM**, Lipsitz LA Manor B. J Gerontol A Biol Sci Med Sci. 2021;76(10).

Impact of a yogic breathing technique on the well-being of healthcare professionals during the covid-19 pandemic.

Kanchibotla D, Bharathi S, Ramyakhyan S, and **Mehta DH**. Glob Adv Health Med. 2021; 10.

Improved health outcomes in integrative medicine visits may reflect differences in physician and patient behaviors compared to standard medical visits.

Dossett ML, Hall JA, **Kaptchuk TJ**, **Yeh GY**. Patient Educ Couns. 2021;104(2):315-321.

Initial management of acute and chronic low back pain: Responses from brief interviews of primary care providers.

Roseen EJ, Conyers FG, Atlas SJ, **Mehta DH**. J Altern Complement Med. 2021;27(S1): S106-S114.

Long-term Exercise After Pulmonary Rehabilitation (LEAP): A pilot randomized controlled trial of Tai Chi in COPD.

Moy ML, **Wayne PM**, Litrownik D, Beach D, Klings ES, Davis RB, Pinheiro A, **Yeh GY**. ERJ Open Res. 2021;7(3):00025-2021.

Lower distress tolerance is associated with greater anxiety and depression symptoms among patients after acute coronary syndrome.

Luberto CM, Crute S, Wang A, **Yeh GY**, Celano CM, Huffman JC, Park ER. Gen Hosp Psychiatry. 2021;70:143-144.

Appendix 7: Osher Directors' and Core Faculty Publications (continued)

Managing the experience of breathlessness with Tai Chi: A qualitative analysis from a randomized controlled trial in COPD.

Gilliam EA, Kilgore KL, Liu Y, Bernier L, Criscitiello S, Litrownik D, **Wayne PM**, Moy ML, **Yeh GY**. *Respir Med.* 2021;184:106463.

Moderators of a resiliency group intervention for frontline clinicians during the COVID-19 pandemic.

Sylvia LG, George N, Rabideau DJ, Streck JM, Albury E, Hall DL, Luberto CM, Mizrach HR, Perez GK, Crute S, **Mehta DH**, Convery MS, Looby SE, Fricchione G, Fava M, Wilhelm S, Park ER. *J Affect Disord.* 2021; 293:373-378.

Multimodal chiropractic care for migraine: A pilot randomized controlled trial.

Rist PM, **Bernstein C**, **Kowalski M**, Osypiuk K, Connor JP, Vining R, Long CR, Macklin EA, **Wayne PM**. *Cephalalgia.* 2021;41(3):318-328.

NHLBI-CMREF workshop report on pulmonary vascular disease.

Oldham WM, Hemnes AR, Aldred MA, Barnard J, Brittain EL, Chan SY, Cheng F, Cho MH, Desai AA, Garcia, JGN, Geraci MW, Ghiassian, **Hall KT**, Horn EM, Jain M, Kelly RS, Leopold JA, Lindstrom S, Modena BD, Nichols WC, Rhodes CJ, Sun W, Sweatt AJ, Vanderpool RR, Wilkins MR, Wilmot B, Zamanian RT, Fessel JP, Aggarwal NR, Loscalzo J, Xiao L.

Journal of the American College of Cardiology, 2021; 77(16):2040-2052.

Open-label placebo vs double-blind placebo for irritable bowel syndrome: a randomized clinical trial.

Lembo A, Kelley J, Nee J, Ballou S, Iturrino J, Cheng V, Rangan V, Katon J, Hirsch W, Irving Kirsch I, **Hall KT**, Davis R, **Kaptchuk TJ**. *Pain*, 2021;162(9):2428-2435.

Perceptions of chiropractic care among women with migraine: A qualitative substudy using a grounded-theory framework.

Connor JP, **Bernstein C**, Kilgore K, **Rist PM**, Osypiuk K, **Kowalski M**, **Wayne PM**.

J Manipulative Physiol Ther. 2021;44(2):154-163.

Profile of subjective-objective sleep discrepancy in patients with insomnia and sleep apnea.

Ma Y, Goldstein MR, Davis RB, **Yeh GY**.

J Clin Sleep Med. 2021;17(11):2155-2163.

Qigong mind-body program for caregivers of cancer patients: design of a pilot three-arm randomized clinical trial.

Shani P, Raeesi K, Walter E, Lewis K, Wang W, Cohen L, **Yeh GY**, Lengacher CA, **Wayne PM**. *Pilot Feasibility Stud.* 2021;7(1):73.

Randomized controlled trials of mindfulness and acceptance-based interventions over the past two decades: a bibliometric analysis.

Ma Y, **Kraemer KM**, Lyu J, **Yeh GY**.

J Altern Complement Med. 2021(11):930-939.

Stress management and resiliency training for healthcare professionals: A mixed-methods, quality-improvement, Cohort Study.

Dossett ML, Needles EW, Nittoli CE, **Mehta DH**. *J Occup Environ Med.* 2021;63(1):64-68.

Tai Chi for health and well-being: A bibliometric analysis of published clinical studies between 2010 and 2020.

Yang GY, Sabag A, Hao WL, Zhang LN, Jia MX, Dai N, Zhang H, Ayati Z, Cheng YJ, Zhang CH, Zhang XW, Bu FL, Wen M, Zhou X, Liu JP, **Wayne PM**, Ee C, Chang D, Kiat H, Hunter J, Bensoussan A. *Complement Ther Med.* 2021;60:102748

Tai Chi training's effect on lower extremity muscle co-contraction during single- and dual-task gait: Cross-sectional and randomized trial studies.

Wayne PM, Gow BJ, Hou FZ, Ma Y, Hausdorff JH, Lo J, **Rist PM**, Peng CK, Lipsitz LA, Novak V, Manor B. *PLoSOne* 2021;16(1).

The impact of Tai Chi and mind-body breathing in COPD: Insights from a qualitative sub-study of a randomized controlled trial.

Gilliam EA, Cheung T, **Kraemer K**, Litrownik D, Wayne PM, Moy ML, **Yeh GY**. *PLoS One.* 2021;16(4):e0249263

The impact of tai chi exercise on health care utilization and imputed cost in residents of low-income senior housing.

Perloff J, Thomas C, Macklin EA, Gagnon P, Tsai T, Isaza I, **Wayne PM**, Lipsitz L. *GAHM* 2021;10: 1–8.

Wellness program implementation in an academic radiology department: Determination of need, organizational buy-in, and outcomes.

Buch KA, Daye D, Wood MJ, Alvarez C, Del Carmen MG, **Mehta DH**, Bredella MA. *J Am Coll Radiol.* 2021;18(5):663-668.

What do placebo and nocebo effects have to do with health equity? The hidden toll of nocebo effects on racial and ethnic minority patients in clinical care.

Yetman HE, Cox N, Adler SR, **Hall KT**, Stone VE. *Frontiers in Psychology*, 2021;12:788230.

Appendix 7: Osher Directors' and Core Faculty Publications (continued)

EDITORIAL COLUMNS

Minding the mind-body literature: Nourishing children's minds and bodies.

Wayne PM, **Mehta DH**, **Yeh GY**.

J Altern Complement Med. 2021;27(11):899-903.

Minding the mind-body literature: Towards an integrative "lightness" of being.

Wayne PM, **Mehta DH**, **Yeh GY**.

J Altern Complement Med. 2021;27(4): 290-293.

TEXTBOOK CHAPTERS

Psychosocial issues in cardiovascular disease [textbook chapter]

Luberto CL, Park ER, Huffman JC, **Yeh GY**.

In: Wood, Aggarwal, editors. Sex difference in cardiac disease. Elsevier; 2021.



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