

Mental Health and the Benefits of a Healthy Lifestyle

50TH ANNUAL PSYCHOPHARMACOLOGY OCTOBER 15-18, 2026

WESTIN COPLEY PLACE BOSTON

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Disclosures

Neither I nor my spouse/partner has a relevant financial relationship with a commercial interest to disclose.

Presentation Outline



Background on Depression



Research on Healthy Lifestyle – i.e., exercise, quality relationships and connections, nutrition, yoga, sauna



Findings from Completed Studies of Heated Yoga



Ongoing Studies

Depression



COVID-19 pandemic triggers 25% increase in prevalence of anxiety and depression worldwide

Wake-up call to all countries to step up mental health services and support

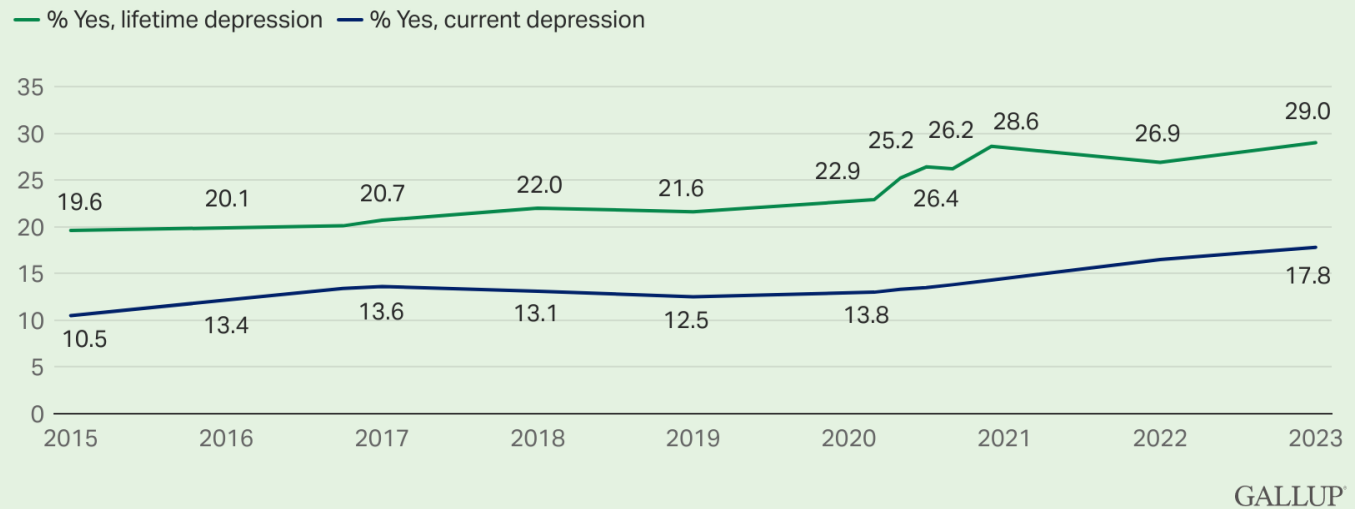
2 March 2022 | News release | Reading time: 3 min (927 words)

In the first year of the COVID-19 pandemic, global prevalence of anxiety and depression increased by a massive 25%, according to a scientific brief released by the World Health Organization (WHO) today. The brief also highlights who has been most affected and summarizes the effect of the pandemic on the availability of mental health services and how this has changed during the

Rising Trends: Lifetime and Current Depression Rates

Has a doctor or nurse ever told you that you have depression?

Do you currently have or are you currently being treated for depression?



<https://news.gallup.com/poll/505745/depression-rates-reach-new-highs.aspx>

Depression

Worldwide more than 300 million people diagnosed with depression (WHO)

Depression is a leading cause of disability worldwide

Stigma → under-reporting

Not enough treaters – e.g., between ~15-30k shortage of psychiatrists

Depression Treatment



Antidepressants, no matter what is chosen as an initial treatment, only work for about 20%-40% of people



We call the people who don't respond to initial treatment, "treatment-resistant" –at least 20-60% of people depending on definition



Patients spend years trying many different treatments

Depression Treatment

- **Novel & Currently Under-Studied:**

- Temperature therapeutics – hot and cold (cold plunges, cryotherapy, sauna)
- Hyperbaric oxygen
- Float tanks
- IV drip micronutrients
- Functional medicine
- Psychedelics
- Massage
- Breathwork
- Red light therapy

- **Self-Management:**

- Exercise
- Quality relationships & connections
- Nature
- Nutrition
- Sunlight
- Sleep
- New experiences / behavioral activation

Mental Health Empowerment

People can take their mental health into their own hands
... while waiting for treatment.
... while in treatment.
... to feel better outside of mental health system.

Selected Healthy Lifestyle Strategies for Depression

Quality relationships & connections

Nutrition

Exercise

Yoga

Sauna

Quality Relationships & Connections

 **Massachusetts General Hospital**
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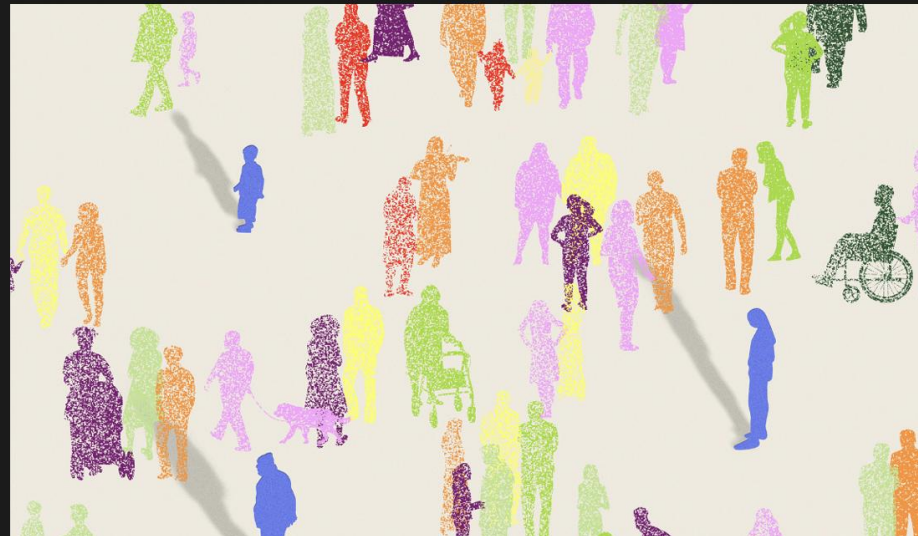
Quality Relationships & Connections

 **Massachusetts General Hospital**
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Psychiatry Academy

Our Epidemic of Loneliness and Isolation

2023

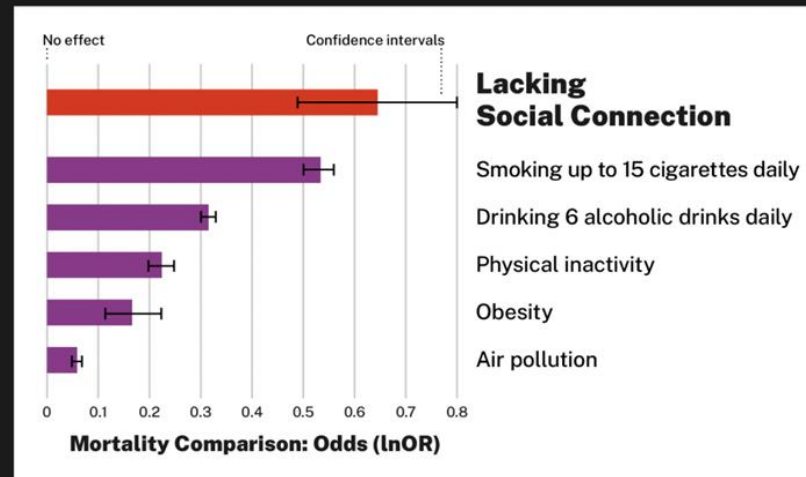
The U.S. Surgeon General's Advisory on the
Healing Effects of Social Connection and Community



mghcme.org

Quality Relationships & Connections

**Lacking social connection
is as dangerous as smoking
up to 15 cigarettes a day.**



Comparison groups: Complex measures of social integration: high v. low; not smoking v. smoking < 15 cigarettes daily; alcohol abstinence v. drinking > 6 alcoholic drinks daily; physical activity v. inactivity; low BMI v. high BMI; low air pollution v. high air pollution.

Source: Holt-Lunstad J, Robles TF, Sbarra DA. Advancing Social Connection as a Public Health Priority in the United States. *American Psychologist*. 2017;72(6):517-530. doi:10.1037/amp0000103. This graph is a visual approximation.

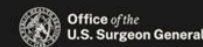
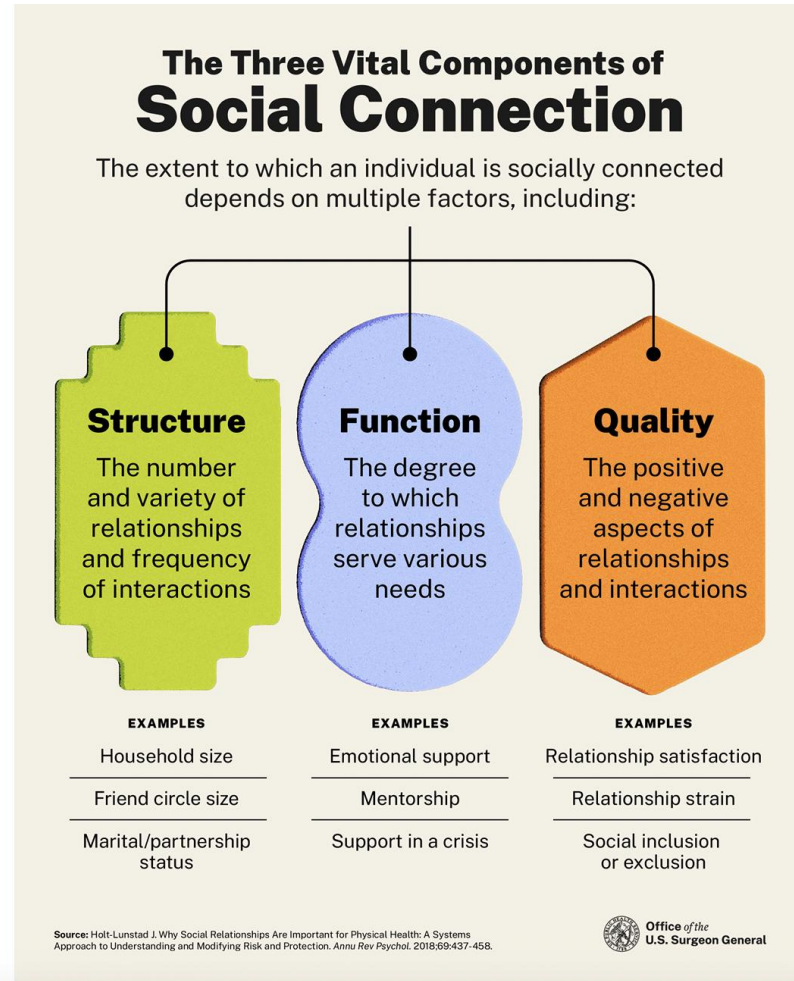


FIGURE 4: Lacking social connection is as dangerous as smoking up to 15 cigarettes a day.

Quality Relationships & Connections



Quality Relationships & Connections

- Loneliness and social isolation impact health and mortality – increase risk of:
 - heart disease by 29%
 - dementia 50%
 - depression 77%
 - premature death 29%
 - diabetes 29%

What is Social Health and How Does it Impact Longevity?

October 2, 2024 / in Mental Health, Social Engagement /

By Sharon Brock, MEd, MS



Quality Relationships & Connections

- Increases risk for high cortisol
- Barriers to social connection:
 - Fear of social situations – vicious cycle - perception that social situations are more threatening than they are
 - Busyness – US works more and social connections can lose priority
 - Technology – so easy to disappear into technology at our fingertips

What is Social Health and How Does it Impact Longevity?

October 2, 2024 / in Mental Health, Social Engagement /

By Sharon Brock, MEd, MS



Quality Relationships & Connections



[Findings](#) | [Campus & Community](#) | [Health](#) | [Science & Tech](#) | [Menu](#)

Liz Mineo | Harvard Staff Writer

April 11, 2017 • 9 min read

Harvard study, almost 80 years old, has proved that embracing community helps us live longer, and be happier



Part of the
Tackling Issues of Aging series

A series on how Harvard researchers are tackling the problematic issues of aging.

Quality Relationships & Connections



What makes a good life? Lessons from the longest study on happiness

50,929,853 plays ⓘ | Robert Waldinger | TEDxBeaconStreet • November 2015

- Robert Waldinger, MD
Director of "The Harvard Study of Adult Development", likely the longest study of adult life
- Over 50 million views
- Listed as one of the 25 most popular TED Talks of all time

Quality Relationships & Connections



Massachusetts General Hospital
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Psychiatry Academy

Take home messages:

- Observed lives unfold over time to see what keeps people healthy and happy
- Since 1938 (75+ years) – tracked lives of 724 men, in two groups:
 - Sophomores at Harvard & those from disadvantaged communities
- *“Good relationships keep us happier and healthier.” Dr. Robert Waldinger*

Quality Relationships & Connections

- Those more connected to family, friends, community have happier, healthier and longer lives
- Quality of close relationships matter
 - Living in conflict bad for health, high conflict marriage worse than divorce.
 - How satisfied in relationships at age 50 predicted health at 80
- Those happiest in retirement replaced work relationships with new relationships
- Young adults believed *fame and achievement* are what is needed to have a good life, but those who actually did the best, *leaned into relationships*

Nutrition



Review > [Ageing Res Rev. 2021 Sep;70:101403. doi: 10.1016/j.arr.2021.101403.](#)

Epub 2021 Jul 8.

Associations between nutrition and the incidence of depression in middle-aged and older adults: A systematic review and meta-analysis of prospective observational population-based studies

[Annabel P Matison](#)¹, [Karen A Mather](#)², [Victoria M Flood](#)³, [Simone Reppermund](#)⁴

Affiliations + expand

PMID: 34246793 DOI: [10.1016/j.arr.2021.101403](#)

Nutrition

- 33 articles in middle aged, observational studies
- Higher fruit and vegetable intake decreased risk of depression
- Pro-inflammatory and “Western diet” (highly processed, unhealthy fats, sugar) were associated with higher rates of depression

Matison et al., *Ageing Research Reviews*, 2021

Research article | [Open access](#) | Published: 30 January 2017

A randomised controlled trial of dietary improvement for adults with major depression (the 'SMILES' trial)

[Felice N. Jacka](#) , [Adrienne O'Neil](#), [Rachelle Opie](#), [Catherine Itsiopoulos](#), [Sue Cotton](#), [Mohammedreza Mohebbi](#), [David Castle](#), [Sarah Dash](#), [Cathrine Mihalopoulos](#), [Mary Lou Chatterton](#), [Laima Brazionis](#), [Olivia M. Dean](#), [Allison M. Hodge](#) & [Michael Berk](#)

[BMC Medicine](#) **15**, Article number: 23 (2017) | [Cite this article](#)

841k Accesses | **577** Citations | **2915** Altmetric | [Metrics](#)

Jacka et al., *BMC Medicine*, 2017

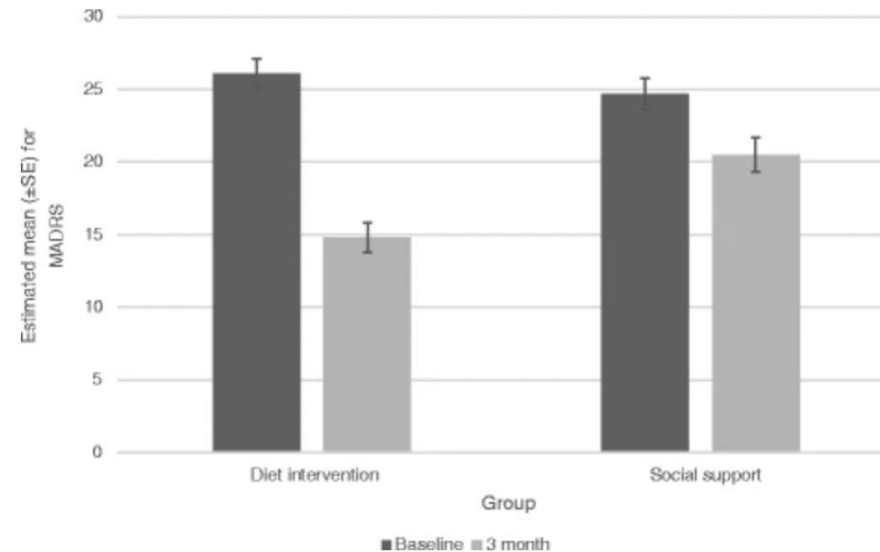
Nutrition

Study Element	Details
Population	Adults with moderate-to-severe depression and poor dietary quality
Sample Size	N = 67 • 21 on medication + therapy • 9 therapy only • 25 medication only
Intervention	Dietary Program: 7 individual nutritional consultation sessions with a dietitian
Control Condition	Social Support Protocol: Same session frequency and duration (as the intervention)
Diet Quality Criteria	“Low intake of dietary fiber, lean proteins, fruits, and vegetables; high intake of sweets, processed meats, and salty snacks.”
Primary Outcome	MADRS (Montgomery–Åsberg Depression Rating Scale)
Results (12 Weeks)	The dietary group showed significantly greater improvement vs. control $t(60.7) = 4.38, p < .001$, Cohen’s $d = -1.16$

Jacka et al., *BMC Medicine*, 2017

Fig. 2

From: [A randomised controlled trial of dietary improvement for adults with major depression \(the 'SMILES' trial\)](#)



MADRS scores for dietary support and social support control groups at baseline and endpoint. Effect size: Cohen's $d = -1.16$ (95% CI $-1.73, -0.59$). Baseline data $n = 67$; 12 week data $n = 56$

Jacka et al., *BMC Medicine*, 2017cc

Exercise



Exercise for Depression

Research

Effect of exercise for depression: systematic review and network meta-analysis of randomised controlled trials

BMJ 2024 ; 384 doi: <https://doi.org/10.1136/bmj-2023-075847> (Published 14 February 2024)

Cite this as: *BMJ* 2024;384:e075847

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Mark Moresi , lecturer⁴, Rebecca Pagano , senior lecturer¹⁰, Lisa Pagano , postdoctoral fellow¹¹,
Roberta Vasconcellos , doctoral student², Hugh Arnott , masters student², Benjamin Varley , doctoral student¹²,
Philip Parker , pro vice chancellor research¹³, Stuart Biddle , professor^{14 15}, Chris Lonsdale , deputy provost¹³

Noetel et al., *British Medical Journal*, 2024

Exercise for Depression

the**bmj** Visual abstract 

Effect of exercise for depression

A systematic review and network meta-analysis of randomised controlled trials

Summary



For treating depression, various exercise modalities are well tolerated and effective, particularly walking or jogging, yoga, and strength training. Effects were comparable to psychotherapy and pharmacotherapy. Exercise worked better when more intense

Population

14 170
participants

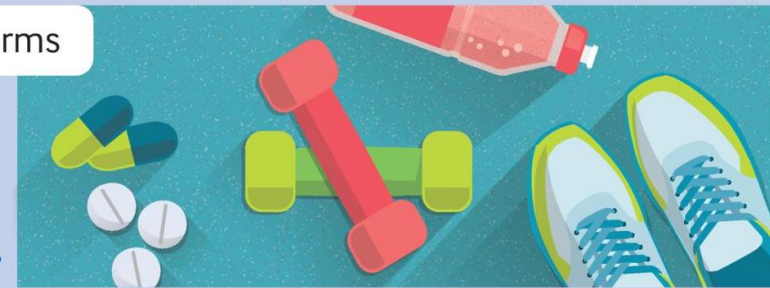
Participants with depression
(ie, meeting clinical thresholds
or diagnosed by a clinician)

No other exclusion criteria, so
participants are from any age,
and with any comorbidities

 **Study design** 218 studies | 495 unique arms

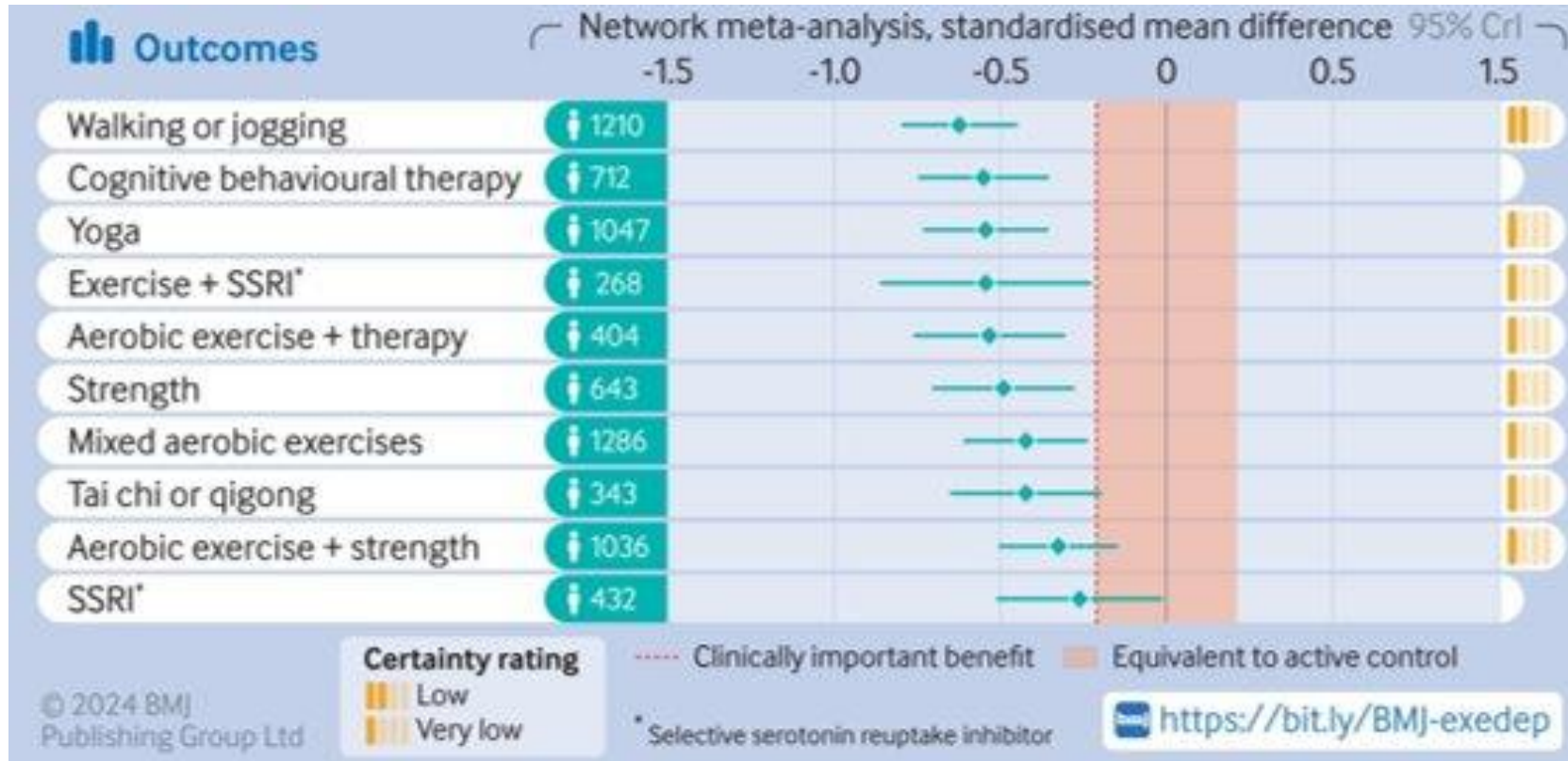
Comparison

Different forms of exercise compared with other common treatments for depression. All results are presented as 'compared with active controls.'



Noetel et al., *British Medical Journal*, 2024

Exercise for Depression



Noetel et al., *British Medical Journal*, 2024

Yoga



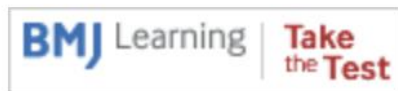
Yoga and Depression

Review

Effects of yoga on depressive symptoms in people with mental disorders: a systematic review and meta-analysis **FREE**

 Jacinta Brinsley¹, Felipe Schuch², Oscar Lederman³, Danielle Girard¹, Matthew Smout⁴, Maarten A Immink¹, Brendon Stubbs⁵, Joseph Firth⁶, Kade Davison¹,  Simon Rosenbaum^{7, 8}

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jacintabrinsley.aep@gmail.com



Brinsley, et al. *British Journal of Sports Medicine* 2021;**55**:992-1000.

Yoga and Depression

- 13 RCTs on depressive symptoms.
- A moderate effect of yoga on depressive symptoms compared with all control groups was found (RCT=13; yoga n=333; control n=299).
- Studies demonstrated fair to high quality (high=53%, fair=47%).

Brinsley, et al. *British Journal of Sports Medicine* 2021;**55**:992-1000.

Sauna



Sauna, Large-Scale Cohort Studies

Study	Journal	Population & Design	Main Findings
Laukkanen T, 2015, [1]	JAMA Internal Medicine	2,315 Finnish men, prospective cohort, median follow-up 20.7 years	Higher frequency of sauna (2–3 or 4–7 times/week) was associated with significantly reduced risk of sudden cardiac death, fatal coronary heart disease, fatal cardiovascular disease, and all-cause mortality
Laukkanen T, 2017, [2]	Age & Ageing	2,315 Finnish men, prospective cohort, median follow-up 20.7 years	Moderate to high frequency sauna (2–3 or 4–7 times/week) associated with lower risk of dementia and Alzheimer’s disease
Laukkanen T, 2018, [3]	Annals of Medicine	1,688 Finnish men and women, prospective cohort, median follow-up 15 years	Increased frequency and duration of sauna were independently associated with lower cardiovascular mortality ; adding sauna improved CVD risk prediction
Kunutsor SK, 2018, [4]	BMC Medicine	2,269 Finnish men, KIHd cohort, 11-year follow-up	Sauna (4–7 times/week) was associated with lower inflammatory markers (hsCRP, fibrinogen, leukocyte count) at baseline and follow-up; no effect on oxidative stress marker (GGT)

1. Laukkanen T, Khan H, Zaccardi F, Laukkanen JA. Association Between Sauna Bathing and Fatal Cardiovascular and All-Cause Mortality Events. JAMA Internal Medicine. 2015;175(4):542-8.^[1]

2. Laukkanen T, Kunutsor S, Kauhanen J, Laukkanen JA. Sauna Bathing Is Inversely Associated With Dementia and Alzheimer’s Disease in Middle-Aged Finnish Men. Age and Ageing. 2017;46(2):245–249. doi:10.1093/ageing/afw212

3. Kunutsor SK, Laukkanen T, Laukkanen JA. Longitudinal Associations of Sauna Bathing With Inflammation and Oxidative Stress: The KIHd Prospective Cohort Study. Annals of Medicine. 2018;50(5):437-442.^[2]

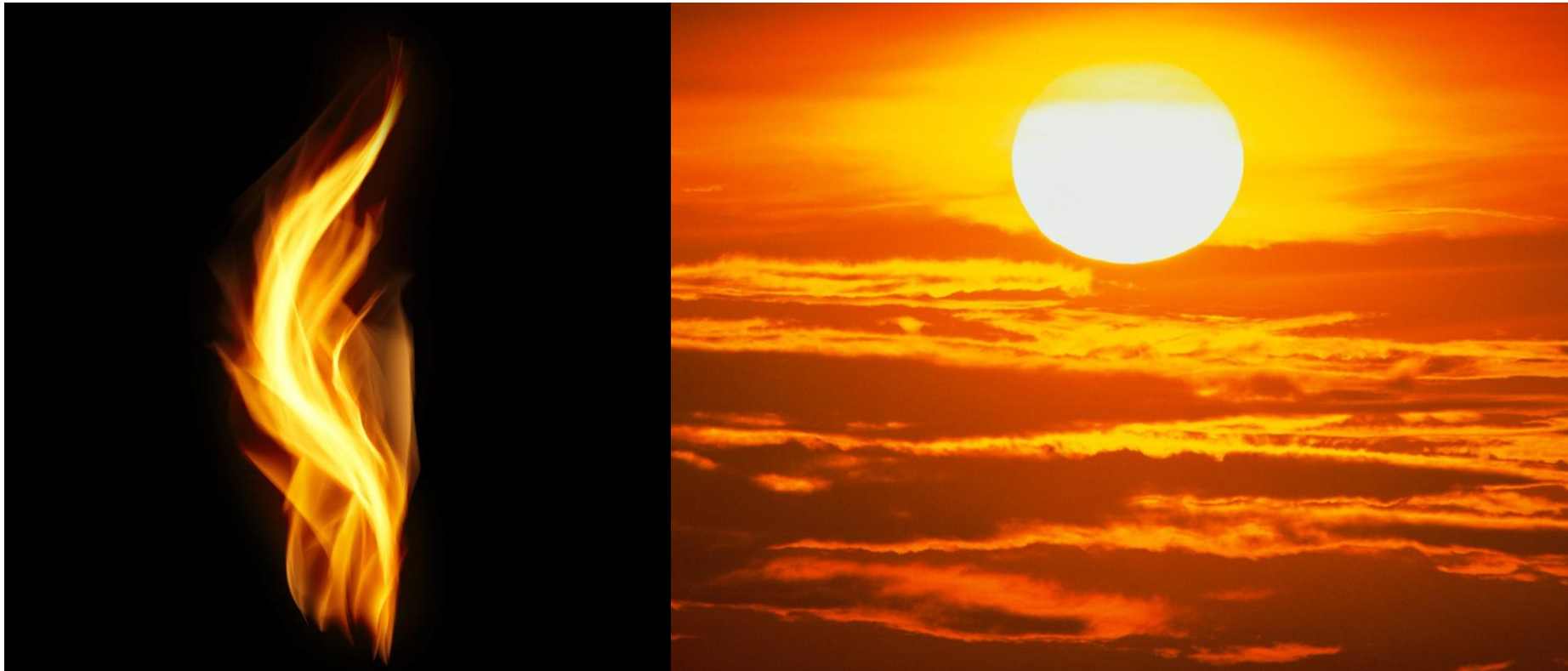
4. Laukkanen T, Kunutsor SK, Khan H, et al. Sauna Bathing Is Associated With Reduced Cardiovascular Mortality and Improves Risk Prediction in Men and Women: A Prospective Cohort Study. BMC Medicine. 2018;16(1):219.^[3]

Sauna, Mental Health Research

Study	Population & Design	Mental Health Outcome(s)	Main Findings
Kunutsor SK, 2024 [1]	2,221 Finnish men, prospective cohort, median follow-up 25 years	Psychosis	Frequent sauna (3–7 times/week) associated with 51% lower risk of psychosis, independent of cardiorespiratory fitness
Yamasaki S, 2023 [2]	10,429 Japanese adults ≥65 years, retrospective cross-sectional	Depression	Habitual daily hot spring bathing independently associated with lower prevalence of depression (OR 0.63, 95% CI 0.41–0.94)
Strandberg TE, 2018 [3]	524 Finnish octogenarian men, cross-sectional	Health-Related Quality of Life (HRQoL)	Regular sauna users reported better HRQoL in vitality, social functioning, and general health domains
Lennox RD, 2018 [4]	109 substance abuse patients, prospective	Mental health (SF-36), emotional symptoms	Sauna-based detoxification regimen improved mental health and emotional symptoms, with high client satisfaction

1. Kunutsor SK, Kauhanen J, Laukkanen JA. *Frequent Sauna Bathing and Psychosis: Interrelationship With Cardiorespiratory Fitness*. *Journal of Psychiatric Research*. 2024;175:75–80. doi:10.1016/j.jpsychires.2024.04.044
2. Yamasaki S, Maeda T, Horiuchi T. *Association Between Habitual Hot Spring Bathing and Depression in Japanese Older Adults: A Retrospective Study in Beppu*. *Complementary Therapies in Medicine*. 2023;72:102909. doi:10.1016/j.ctim.2022.102909
3. Strandberg TE, Strandberg A, Pitkälä K, Benetos A. *Sauna Bathing, Health, and Quality of Life Among Octogenarian Men: The Helsinki Businessmen Study*. *Aging Clinical and Experimental Research*. 2018;30(9):1053–1057. doi:10.1007/s40520-017-0855-z
4. Lennox RD, Cecchini-Sternquist M. *Safety and Tolerability of Sauna Detoxification for the Prolonged Withdrawal Symptoms of Substance Abuse*. *Journal of International Medical Research*. 2018;46(11):4480–4499. doi:10.1177/0300060518779314

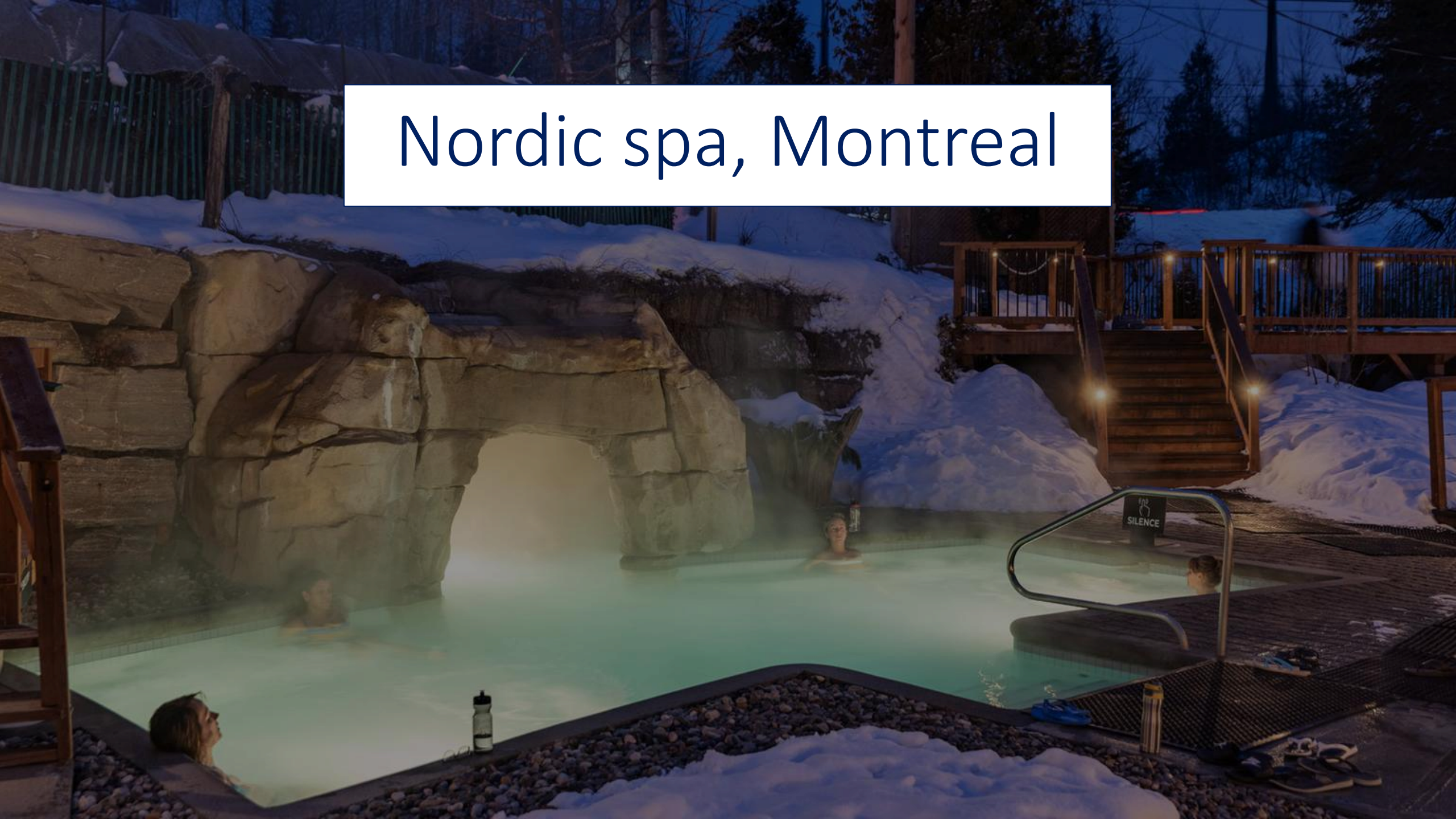
Heat



Blue Lagoon, Iceland



Nordic spa, Montreal



Korean sauna



Snow Monkeys, Japan



Sweat Lodges



Whole Body Hyperthermia (WBH) For Depression

Research

JAMA Psychiatry | [Original Investigation](#)

Whole-Body Hyperthermia for the Treatment of Major Depressive Disorder A Randomized Clinical Trial

Clemens W. Janssen, PhD; Christopher A. Lowry, PhD; Matthias R. Mehl, PhD; John J. B. Allen, PhD;
Kimberly L. Kelly, MPA; Danielle E. Gartner, BA; Angelica Medrano, BA; Tommy K. Begay, PhD;
Kelly Rentscher, MA; Joshua J. White, BS; Andrew Fridman, BS; Levi J. Roberts, BA; Megan L. Robbins, PhD;
Kay-u Hanusch, MSc; Steven P. Cole, PhD; Charles L. Raison, MD



Janssen et al., *JAMA Psychiatry*, 2016.

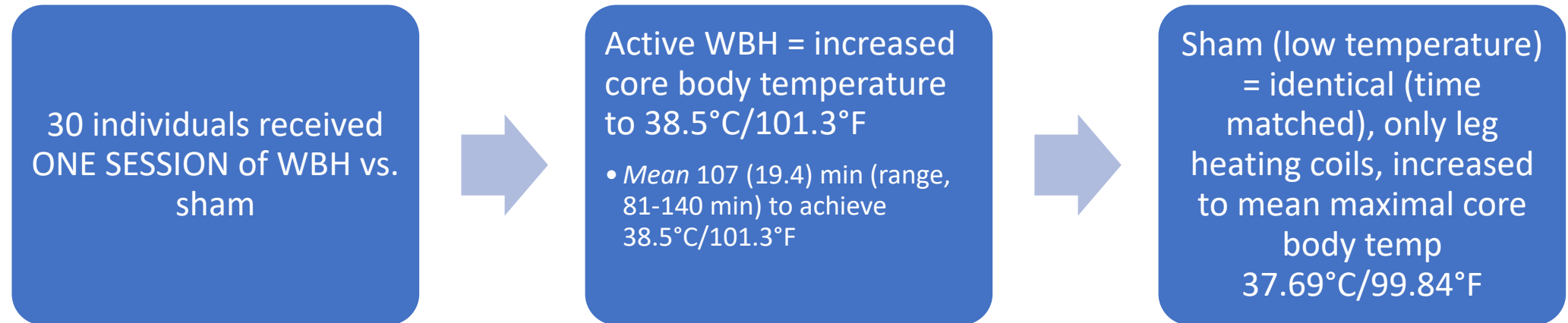
Whole Body Hyperthermia (WBH) For Depression



Heckel HT3000 WBH system



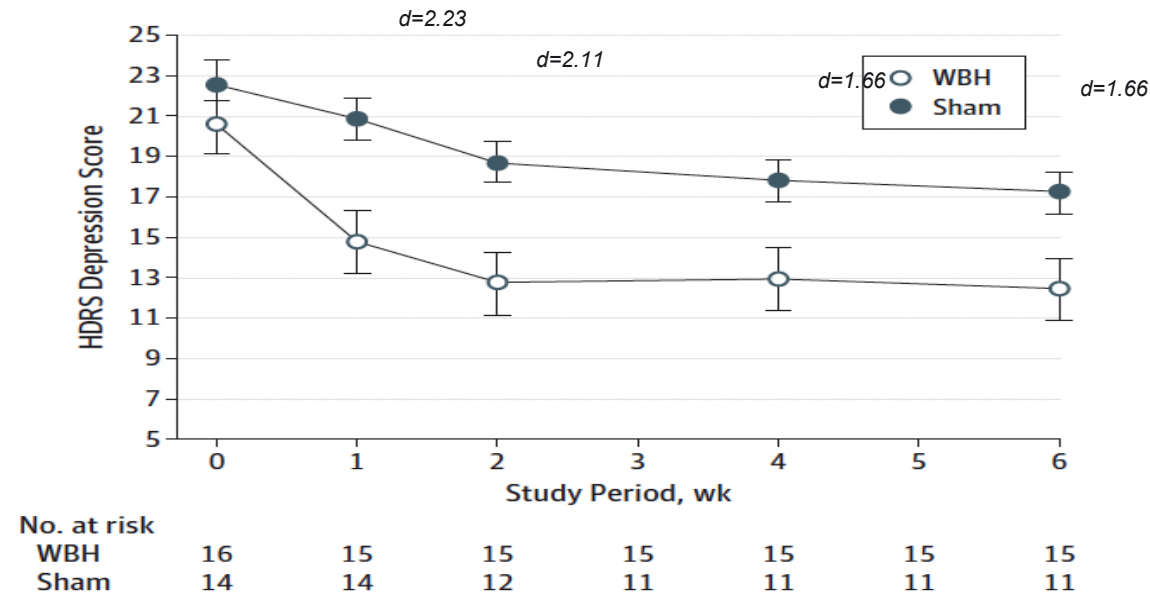
Whole Body Hyperthermia (WBH) For Depression



Janssen et al., *JAMA Psychiatry*, 2016.

Whole Body Hyperthermia (WBH) For Depression

Figure 2. Effect of Whole-Body Hyperthermia (WBH) vs Sham Treatment on 17-Item Hamilton Depression Rating Scale (HDRS) Across the 6-Week Postintervention Period

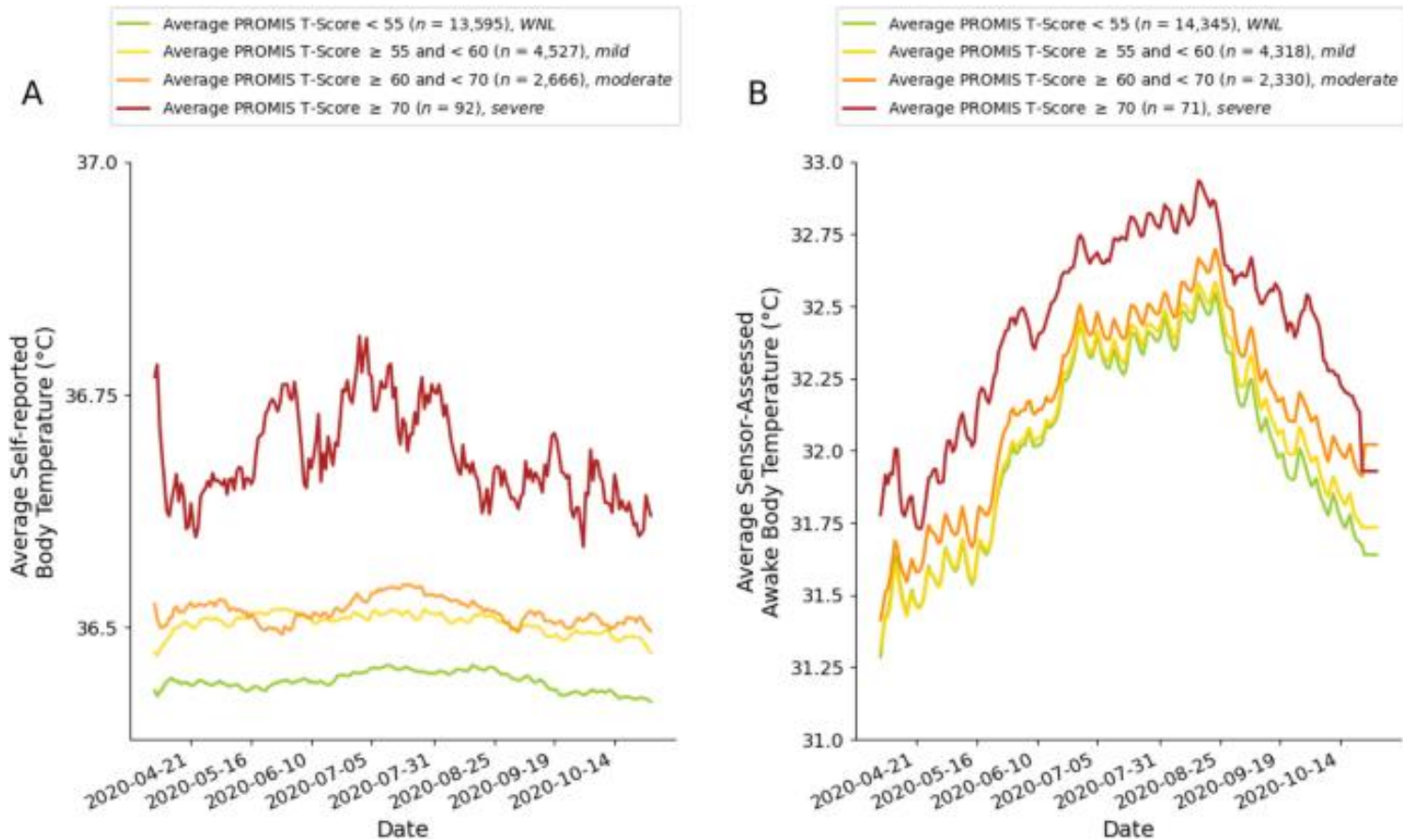


The error bars indicate SEs. Means and SEs were derived from the raw data provided in Table 2.

Janssen et al., *JAMA Psychiatry*, 2016.

mghcme.org

Elevated body temperature is associated with depressive symptoms: Results from the TemPredict Study



Mason et al., *Scientific Reports*, 2024.

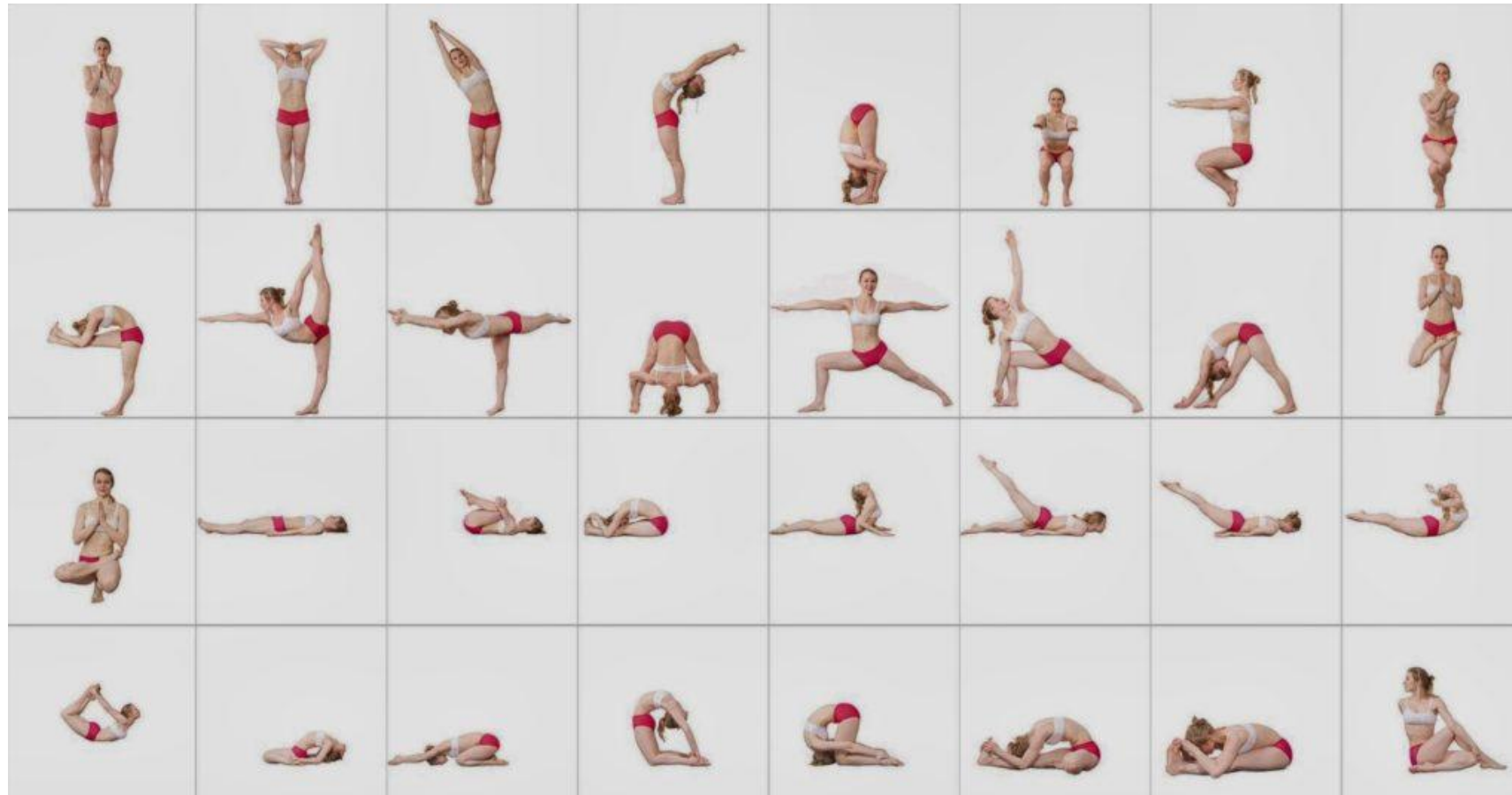
Completed Original Research



Acknowledgments

Gratitude to the ~120 individuals with depression who went, sometimes for the first time, to community heated yoga studios.

Heated Yoga



Heated Yoga Open Label Trial for Depression

 **Massachusetts General Hospital**
Founding Member, Mass General Brigham
Psychiatry Academy

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Volume 25, Number 8, 2019, pp. 814–823
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DOI: 10.1089/acm.2018.0365

JACM

Community-Delivered Heated Hatha Yoga as a Treatment for Depressive Symptoms: An Uncontrolled Pilot Study

Maren Nyer, PhD,^{1,2} Lindsey B. Hopkins, PhD,^{3,4} Amy Farabaugh, PhD,^{1,2} Maya Nauphal, BA,¹ Susannah Parkin, BA,¹ Madison M. McKee, BA,¹ Karen K. Miller, MD,^{2,5} Chris Streeter, MD,^{2,6,7} Lisa A. Uebelacker, PhD,^{8,9} Maurizio Fava, MD,^{1,2} Jonathan E. Alpert, MD, PhD,^{10,11} Paola Pedrelli, PhD,^{1,2} and David Mischoulon, MD, PhD^{1,2}

Nyer et al., *Journal of Alternative and Complementary Medicine*, 2019.

Heated Yoga Open Label Trial for Depression

Study Methods	8-wk open-label; healthy adults with at least mild depressive symptoms; on-or off medications Assessments at the Depression Clinical and Research Program (DCRP) Community-delivered yoga, donated from studios 90-minutes; 26 sequenced postures & 2 breathing exercises, 105°F with 40% humidity; at least 2x weekly classes
Results (N=28)	Multilevel modeling revealed improvements over time in clinician-rated Hamilton Depression Rating Scale (HRSD-17; $p=0.003$; dGLMM=1.43) and self-reported Beck Depression Inventory (BDI; $p<0.001$, dGLMM=1.31) depressive symptoms.

Heated Yoga Randomized Controlled Trial

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Original Research



A Randomized Controlled Trial of Community-Delivered Heated Hatha Yoga for Moderate-to-Severe Depression

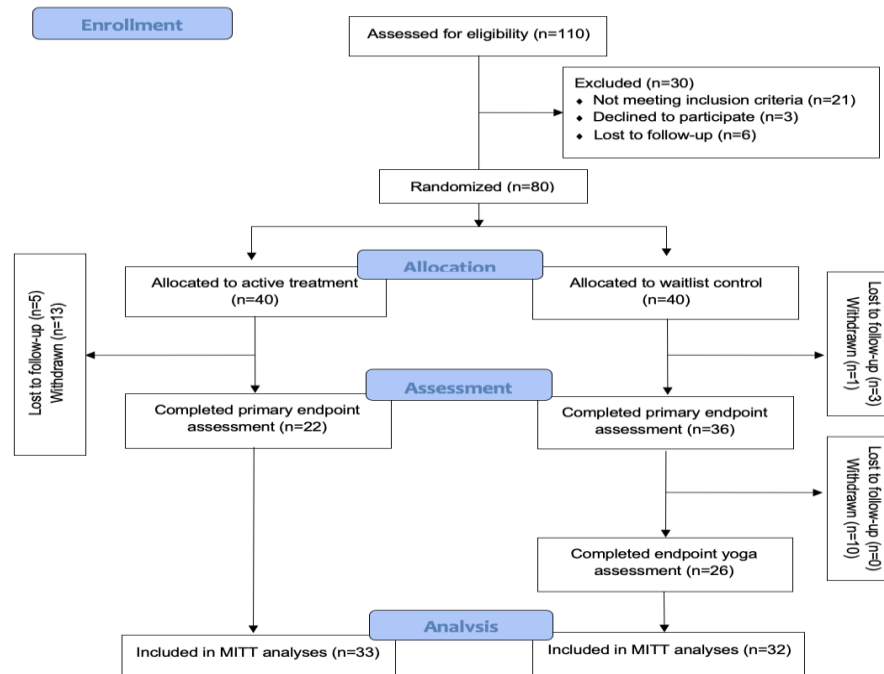
Maren B. Nyer, PhD; Lindsey B. Hopkins, PhD; Megha Nagaswami, BA; Richard Norton, MA; Chris C. Streeter, MD; Bettina B. Hoepfner, PhD, MS; Chloe E. C. Sorensen, BA; Lisa Uebelacker, PhD; Jill Koontz, MEd; Simmie Foster, MD, PhD; Christina Dording, MD; Naoise Mac Giollabhui, PhD; Albert Yeung, MD, ScD; Lauren B. Fisher, PhD; Cristina Cusin, MD; Felipe A. Jain, MD; Paola Pedrelli, PhD; Grace A. Ding, BA; Ashley E. Mason, PhD; Paolo Cassano, MD, PhD; Darshan H. Mehta, MD, MPH; Christina Sauder, MS; Charles L. Raison, MD; Karen K. Miller, MD; Maurizio Fava, MD; and David Mischoulon, MD, PhD

Nyer et al., *Journal of Clinical Psychiatry*, 2023.

Heated Yoga Randomized Controlled Trial



CONSORT 2010 Flow Diagram

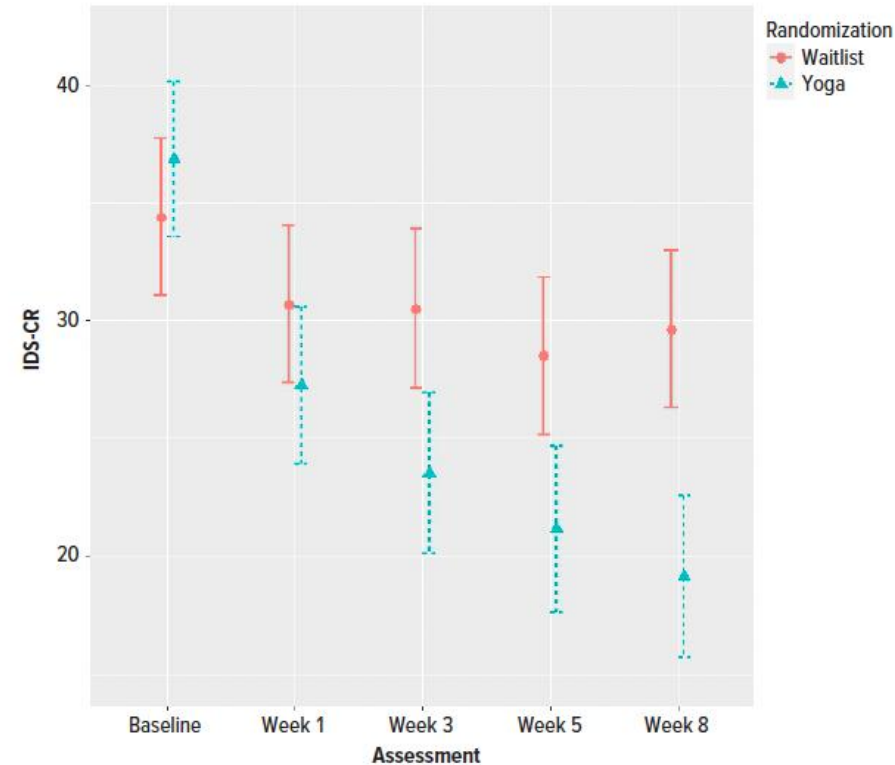


Study Design Element	Details
Sample Size & Randomization	80 patients randomized
Age Range & Mean	21–60 years (M = 32.5, SD = 11.33)
Completion Rates	Active group: 22/40 (55%) Waitlist group: 26/40 (65%)
Mean Attendance	Active group: 10.1 classes Waitlist group: 10.4 classes

Heated Yoga Randomized Controlled Trial

Figure 2.

Decreases in Depressive Symptom Severity Over the 8-Week Study Period



Abbreviation: IDS-CR=Inventory of Depressive Symptoms, Clinician-Rated.

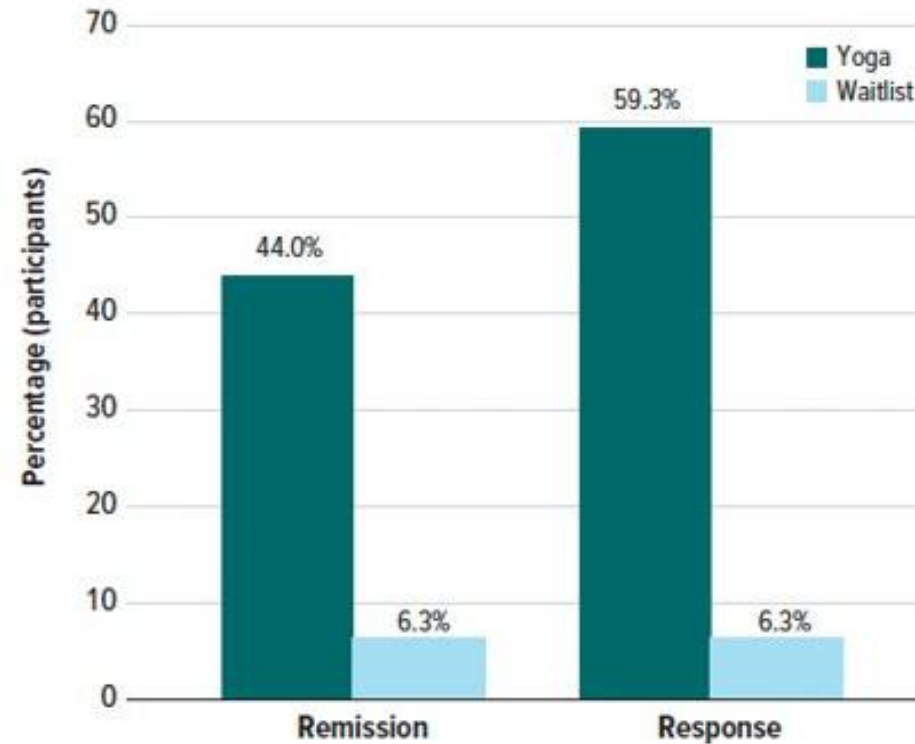
* * $p < .001$, Cohen's $d=1.04$

Nyer et al., *Journal of Clinical Psychiatry*, 2023.

Heated Yoga Randomized Controlled Trial

Figure 3.
Remission (IDS-CR Score <14) and Response (IDS-CR $\geq$ %50 Decrease in Symptoms) Rates by Arm

Nyer et al., *Journal of Clinical Psychiatry*, 2023



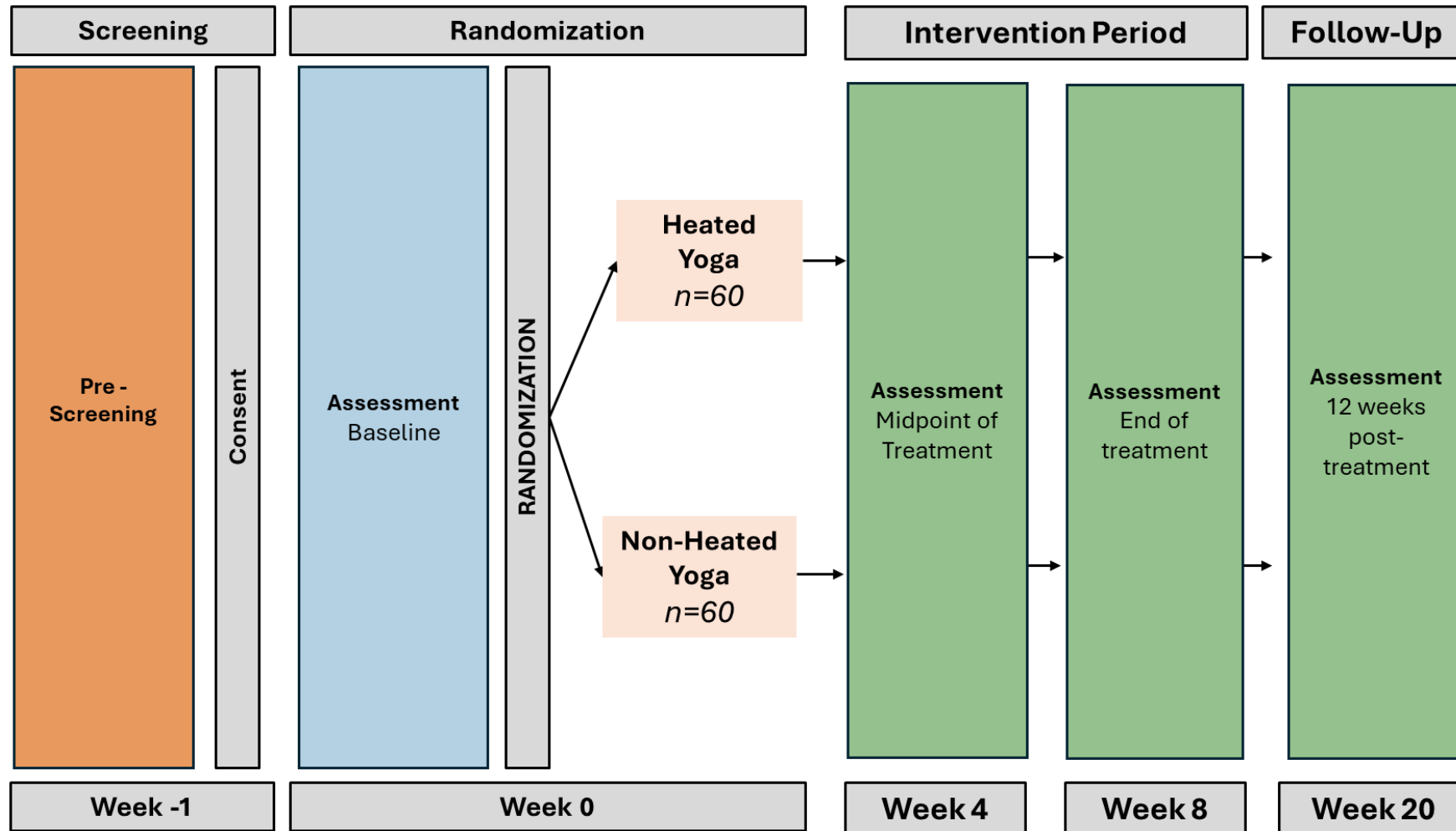
Abbreviation: IDS-CR = Inventory of Depressive Symptoms, Clinician-Rated.

Ongoing Research

RHYME: Heated vs. Non-Heated Yoga for Depression Research

Study Design Element	Details
Sample Size & Population	120 adults with moderate depression
Randomization	Heated yoga ($n=60$) vs. non-heated yoga ($n=60$)
Intervention Duration	8 weeks
Intervention Frequency	At least 2x per week
Assessment Timepoints	Baseline (Week 0), Mid (Week 4), Post (Week 8), 3-month follow-up (Week 20)
Primary Outcome	Depressive symptoms

RHYME Study Schema



Community Partnership: In-Person Heated Yoga Classes

 **Massachusetts General Hospital**
Founding Member, Mass General Brigham
Psychiatry Academy



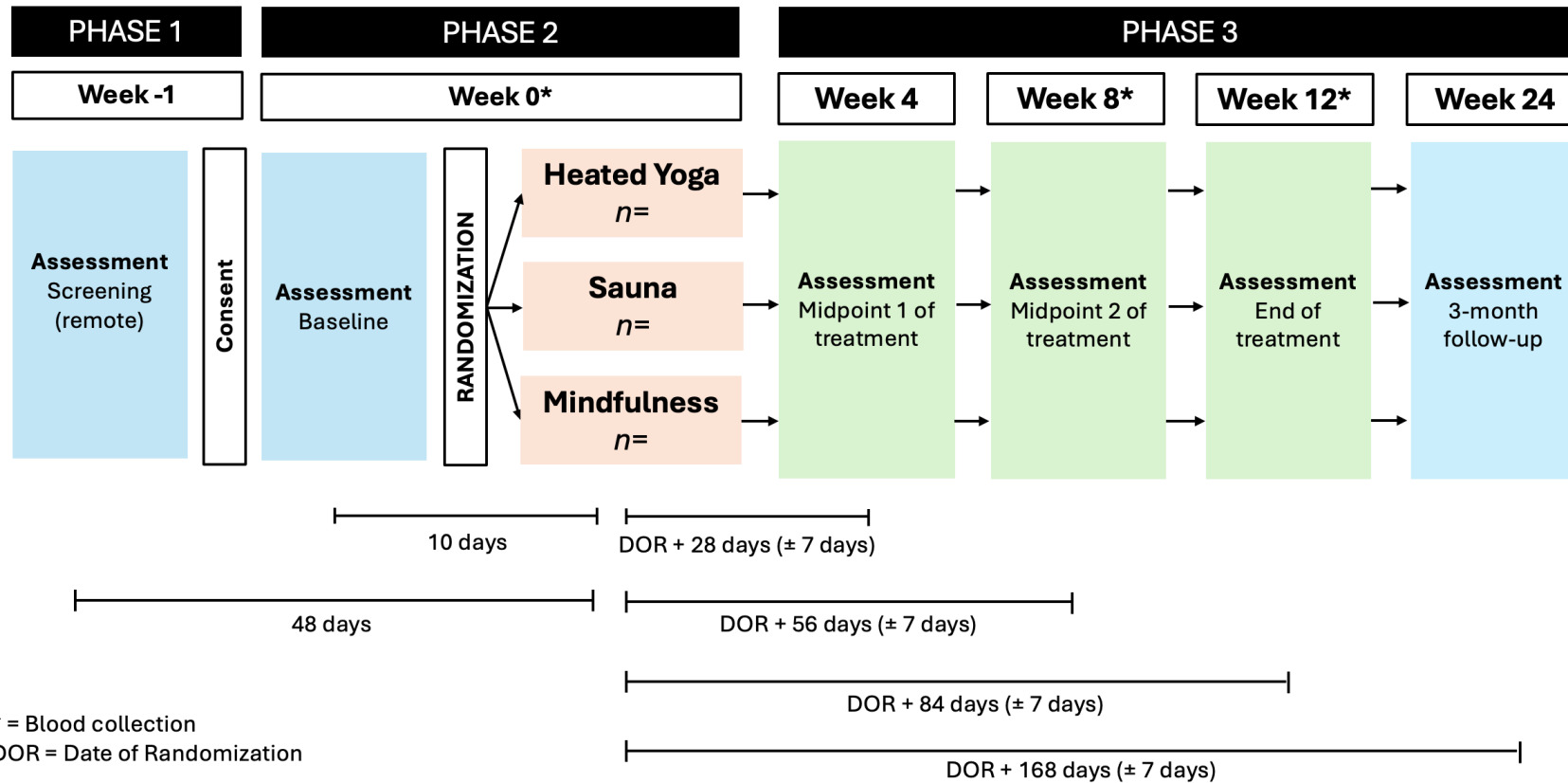
BRĒATHĒ
HOT YOGA | HOT PILATES | HOT HIIT

SHINE Study Overview

Feature	Description
Design	12-week, three-arm randomized controlled trial
Population	Adults with mild to moderate depression
Arms (Interventions)	1. Heated Yoga – 90 min, 2×/week at community studios 2. Sauna Therapy – 40 min, 2×/week at community sauna 3. Mindfulness App – App-based guided meditation, matched total time to sauna condition
Setting	Community-based interventions to enhance ecological validity
Duration	12 weeks
Primary Outcome	Change in depressive symptom severity measured by PHQ-9
Secondary Outcomes	Inflammatory biomarkers, perceived stress, sleep quality, and wellbeing
Exploratory Aim	Gene expression and transcriptomic changes related to inflammation and mood regulation
Hypothesis	Heated yoga and sauna will yield greater reductions in PHQ-9 scores and inflammatory markers than the mindfulness app.

SHINE Study Schema

SHINE Study Schema



Funding

Open Label Study of Heated Yoga
for Depression

NIH-NCCIH/Loan Repayment Award

Randomized Controlled Trial of
Heated Yoga for Depression

- K23AT008043 National Center for Complementary and Integrative Health (NCCIH)
- NIH-NCCIH/Loan Repayment Award

Randomized Controlled Trial of
Heated vs. Non-Heated Yoga for
Depression

Tiny Blue Dot Foundation

Randomized Controlled Trial of
Heated Yoga vs. Sauna vs.
Mindfulness App

Donor Funded

Acknowledgements

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- David Mischoulon, MD, PhD
- Maurizio Fava, MD
- Naoise Mac Giallabhui, PhD
- Karen Miller, MD
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QUESTIONS?