## Interventions

**Articles testing the applied science and implementation of mindfulness-based interventions**

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Journal</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmadyar, K., Robinson, E., Tapper, K.</td>
<td>The effect of a mindfulness-based body scan exercise on food intake during TV watching</td>
<td><em>Appetite</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Alzahrani, A. M., Hakami, A., AlHadi, A., ...Almigbal, T. H.</td>
<td>The effectiveness of mindfulness training in improving medical students’ stress, depression, and anxiety</td>
<td><em>PLOS ONE</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Black, D. S., Kirkpatrick, M. G.</td>
<td>Mindfulness training app effect on a cigarette smoking quit attempt: Investigator-blinded 58-county RCT</td>
<td><em>JNCI Cancer Spectrum</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Boch, C., Cappaert, T., Shotwell, M. P., Schmelzer, C.</td>
<td>Investigating the Impact of Mindfulness Meditation on Stress Reduction and Self-Compassion of Nursing Health Care Professionals in a Small Community Hospital in the Midwest: A Pilot Study</td>
<td><em>Holistic Nursing Practice</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Bringmann, H. C., Berghöfer, A., Jeitler, M., ...Haller, H.</td>
<td>Meditation-Based Lifestyle Modification in Mild-to-Moderate Depression: Outcomes and Moderation Effects of Spirituality</td>
<td><em>Journal of Integrative and Complementary Medicine</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Brown, C. K., Vazquez, J., Metz, S. M., McCown, D.</td>
<td>Effects of an 8-Week Mindfulness Course in People With Voice Disorders</td>
<td><em>Journal of Voice</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Cheng, Y. T., Young, K. W., Carlbright, P., ...Hung, S. L.</td>
<td>A Pilot RCT Among People Recovering from Mental Illness: A Tailored Mindfulness-Based Intervention versus Relaxation Training</td>
<td><em>Journal of Evidence-Based Social Work</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Christensen, A. J., Virnig, J. P., Case, N. L., ...Allen, M. P.</td>
<td>Addressing Burnout in the Primary Care Setting: The Impact of an Evidence-Based Mindfulness Toolkit</td>
<td><em>Military Medicine</em></td>
<td>[link]</td>
</tr>
<tr>
<td>De Jaegere, E., Dumon, E., van Heeringen, K., ...Portzky, G.</td>
<td>Mindfulness-Based Cognitive Therapy for Individuals Who Are Suicidal: A RCT</td>
<td><em>Archives of Suicide Research</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Ibici Akca, E., Cengizhan, S. O., Gokbulut, N.</td>
<td>Effectiveness of a MBSR Program on Stress, Anxiety, and Prenatal Attachment for High-Risk Pregnant Women: A RCT</td>
<td><em>Mindfulness</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Khatib, L., Dean, J. G., Oliva, V., ...Zeidan, F.</td>
<td>The role of endogenous opioids in mindfulness and sham mindfulness-meditation for the direct alleviation of evoked chronic low back pain: A RCT</td>
<td><em>Neuropsychopharmacology</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Kummar, A. S., Correia, H., Tan, J., ...Fujiyama, H.</td>
<td>An 8-week compassion and mindfulness-based exposure therapy program improves posttraumatic stress symptoms</td>
<td><em>Clinical Psychology &amp; Psychotherapy</em></td>
<td>[link]</td>
</tr>
<tr>
<td>Loucks, E. B., Kronish, I. M., Saadeh, F. B., ...Schuman-Olivier, Z.</td>
<td>Adapted Mindfulness Training for Interoception and...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Adherence to the DASH Diet: A Phase 2 RCT. *JAMA Network Open.* [link]


**Associations**

Articles examining the correlates and mechanisms of mindfulness


Mirabito, G., & Verhaeghen, P. (2023). Changes in State Mindfulness are the Key to Success in Mindfulness Interventions: Ecological Momentary Assessments of Predictors, Mediators, and Outcomes in a Four-Week Koru Mindfulness Intervention. *Psychological Reports.* [link]


Tennor, M., Gioia, D., Anderson, J., ...Satchell, S. (2023). Mindfulness and mothering in...
Baltimore city: How mindfulness training impacts black women’s transition into motherhood. Social Work in Mental Health. [link]


Yue, W. L., Ng, K. K., Koh, A. J., ... Lim, J. (2023). Mindfulness-based therapy improves brain functional network reconfiguration efficiency. Translational Psychiatry. [link]


Hassdenteufel, K., Müller, M., Abele, H., ... Wallwiener, S. (2023). Using an Electronic Mindfulness-based Intervention (eMBI) to improve maternal mental health during pregnancy: Results from a RCT. Psychiatry Research. [link]


mindfulness and affect. Scientific Reports. [link]


Wu, J., & Zhao, Q. (2023). The contribution of mindfulness in the association between L2 learners’ engagement and burnout. Heliyon. [link]
The incidence of psychological symptoms in adolescents and young adults has risen significantly over the past decade, placing increased stress on university counseling resources. Mindfulness-based interventions may be less staff and time intensive than many traditional mental health interventions. Further, they might achieve positive outcomes at lower cost.

Wagner et al. [BMJ Open] evaluated the cost-effectiveness of a Mindfulness Skills for Students (MSS) program added to mental health services-as-usual to a control group that had access solely to mental health services-as-usual alone.

The researchers randomly assigned 616 British university students (mean age = 23 years; 63% female) with an expressed interest in the MSS program to either the MSS program with access to mental health services-as-usual when needed, or a control group with access to treatment-as-usual when needed. The control group was guaranteed slots in the following year's MSS program.

The MSS program consisted of 8 weekly 75-90 minute group sessions, each incorporating two periods of meditation, as well as opportunities for reflection and inquiry. Students were encouraged to dedicate 8-25 minutes of daily home practice. Mental health services-as-usual involved access to university individual and group counseling services, along with counseling service workshops. The MSS program was offered during the winter and spring semesters, with results reported separately for these cohorts.

Participants underwent assessments using self-report questionnaires measuring psychological distress and well-being at time of recruitment, post-intervention, during exam week, and at 12 month follow-up. The psychological distress questionnaire formed the basis for computing quality-adjusted life years (QALYs), a standard metric for evaluating quality of life in cost-effectiveness studies. The cost of the MSS program was determined by calculating the staff time cost per participant. Meanwhile, the cost of treatment-as-usual was calculated based on the staff cost for delivering services at the university counseling center per participant, derived from counseling center records. A small percentage of the participants (<18%) used counseling center resources, and there was no difference in usage between the study groups.

The results indicated that MSS groups had lower levels of distress than the control group at all three outcomes assessments. These differences were statistically significant at all three times for the winter cohort, and at post-intervention and exam time for the spring cohort. Well-being scores were significantly higher for MSS group than controls at all assessment times.

A cost-benefit analysis revealed that the MSS group achieved significantly better mental health outcomes at significantly higher cost than controls. On average, the cost for each MSS participant was $84.96 USD, whereas for those in the control group, it was $24.66 USD. Using the British National Institute for Health and Care Excellence estimates of willingness to pay for an increase of one quality-adjusted life year, the MSS program was deemed by the authors to be cost-effective.

The study shows that the Mindfulness Skills for Students program significantly decreases psychological distress and improves well-being in university students in a cost-effective manner compared to treatment-as-usual. The study is limited by relying on students with an interest in mindfulness and the absence of another short-term treatment as a comparator.
At any given time, 8% of adults experience chronic low back pain. Some studies indicate that mindfulness meditation can alleviate the pain and disability associated with this condition. However, the precise mechanism behind this benefit is not clear. Does it involve engaging the body's endogenous opioid system, teaching individuals to become psychologically non-reactive, or operating through a placebo effect?

Khatib et al. [Neuropsychopharmacology] tested the effects of mindfulness meditation versus sham mindfulness meditation, both with and without the opioid antagonist Naloxone, on evoked chronic low back pain.

The researchers randomly assigned 71 patients (average age = 46 years; 51% female; 87% Caucasian) experiencing chronic low back pain persisting for at least 3 months to either mindfulness or sham mindfulness meditation groups. Both groups participated in four 20-minute meditation training sessions. The mindfulness training focused on accepting thoughts and feelings, recognizing their transient nature, and returning attention to the breath. In contrast, sham meditation training emphasized breathing slowly and deeply in a meditative posture without additional instructions.

Participants met with researchers seven times. The first session was a pre-intervention assessment. During sessions 1, 6, and 7, the researchers induced pain in participants using a straight leg raise procedure. Participants lay supine while the researchers raised one of their legs to a 90-degree angle while keeping the knee straight. Participants alerted researchers when their pain rose by 2 points on a 10-point scale. Researchers continued to raise their legs up to 6 times until a 2-point increase in pain was induced. Participants then rated post-leg raise pain on a 10-point scale.

Participants practiced mindfulness or sham mindfulness meditation during sessions 2-5 and completed questionnaires of pain severity, catastrophizing, and disability before and after each session. During sessions 6 and 7, pain was evoked by straight leg raises after seven minutes of rest. Participants then received either intravenous Naloxone (which blocks the endogenous opioid system) or saline (a placebo). Participants then meditated or sham meditated for 7 minutes before once again reporting evoked pain both before and after leg raises.

The results indicated that both mindfulness and sham meditation significantly reduced evoked pain following both Naloxone and saline administration. However, the mindfulness group reported significantly lower evoked pain after rest, Naloxone, and saline compared to the sham meditation group (partial η² = .09). Sixty percent of the mindfulness group reported practicing non-reactive attention during meditation, while 20% of the sham mindfulness group did. Practicing non-reactive attention during meditation was associated with lower evoked pain in the mindfulness group (r = -.35) but not in the sham group (r = .04).

The study shows that both mindfulness and sham meditation effectively decrease evoked pain in chronic low back pain patients. However, mindfulness meditation outperformed sham meditation in this aspect. The finding that Naloxone fails to block this effect suggests that meditation does not rely on endogenous opioids to achieve pain reduction. This does not rule out contributions from non-opioid systems like the dopaminergic, glutaminergic, or endocannabinoid systems. The correlation between non-reactive attention and pain reduction suggests that mindfulness meditation’s pain-reduction effect is due, at least partially, to non-reactive reappraisal processes.